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**pyexcel**  
*Release 0.5.15*

**Mar 06, 2020**



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## Contents

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<b>1</b>	<b>Introduction</b>	<b>3</b>
<b>2</b>	<b>Support the project</b>	<b>5</b>
2.1	Installation . . . . .	5
2.2	Usage . . . . .	7
2.3	Design . . . . .	7
2.4	New tutorial . . . . .	15
2.5	Old tutorial . . . . .	44
2.6	Cook book . . . . .	75
2.7	Real world cases . . . . .	84
2.8	API documentation . . . . .	87
2.9	Developer's guide . . . . .	169
2.10	Change log . . . . .	173
<b>3</b>	<b>Indices and tables</b>	<b>187</b>
	<b>Bibliography</b>	<b>189</b>
	<b>Index</b>	<b>191</b>



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# CHAPTER 1

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## Introduction

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**pyexcel** provides **one** application programming interface to read, manipulate and write data in various excel formats. This library makes information processing involving excel files an enjoyable task. The data in excel files can be turned into *array or dict* with minimal code and vice versa. This library focuses on data processing using excel files as storage media hence fonts, colors and charts were not and will not be considered.

The idea originated from the common usability problem: when an excel file driven web application is delivered for non-developer users (ie: team assistant, human resource administrator etc). The fact is that not everyone knows (or cares) about the differences between various excel formats: csv, xls, xlsx are all the same to them. Instead of training those users about file formats, this library helps web developers to handle most of the excel file formats by providing a common programming interface. To add a specific excel file format type to you application, all you need is to install an extra pyexcel plugin. Hence no code changes to your application and no issues with excel file formats any more. Looking at the community, this library and its associated ones try to become a small and easy to install alternative to Pandas.





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## Support the project

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If your company has embedded pyexcel and its components into a revenue generating product, please support me on [github](#), [patreon](#) or [bounty source](#) to maintain the project and develop it further.

If you are an individual, you are welcome to support me too and for however long you feel like. As my backer, you will receive [early access to pyexcel related contents](#).

And your issues will get prioritized if you would like to become my patreon as *pyexcel pro user*.

With your financial support, I will be able to invest a little bit more time in coding, documentation and writing interesting posts.

## 2.1 Installation

You can install pyexcel via pip:

```
$ pip install pyexcel
```

or clone it and install it:

```
$ git clone https://github.com/pyexcel/pyexcel.git
$ cd pyexcel
$ python setup.py install
```

For individual excel file formats, please install them as you wish:

Table 1: A list of file formats supported by external plugins

Package name	Supported file formats	Dependencies	Python versions
pyexcel-io	csv, csvz <a href="#">[#f1]_</a> , tsv, tsvz <a href="#">[#f2]_</a>		2.6, 2.7, 3.3, 3.4, 3.5, 3.6 pypy
pyexcel-xls	xls, xlsx(read only), xlsx(read only)	<a href="#">xlrd</a> , <a href="#">xlwt</a>	same as above
pyexcel-xlsx	xlsx	<a href="#">openpyxl</a>	same as above
pyexcel-ods3	ods	<a href="#">pyexcel-ezodf</a> , <a href="#">lxml</a>	2.6, 2.7, 3.3, 3.4 3.5, 3.6
pyexcel-ods	ods	<a href="#">odfpy</a>	same as above

Table 2: Dedicated file reader and writers

Package name	Supported file formats	Dependencies	Python versions
pyexcel-xlsxw	xlsx(write only)	XlsxWriter	Python 2 and 3
pyexcel-xlsxr	xlsx(read only)	lxml	same as above
pyexcel-xlsbr	xlsx(read only)	pyxlsb	same as above
pyexcel-odsr	read only for ods, fods	lxml	same as above
pyexcel-odsw	write only for ods	loxun	same as above
pyexcel-htmlr	html(read only)	lxml,html5lib	same as above
pyexcel-pdfreader	pdf(read only)	pdftables	Python 2 only.

Table 3: Other data renderers

Package name	Supported file formats	Dependencies	Python versions
pyexcel-text	write only:rst, mediawiki, html, latex, grid, pipe, orgtbl, plain simple read only: ndjson r/w: json	tabulate	2.6, 2.7, 3.3, 3.4 3.5, 3.6, pypy
pyexcel-handsontable	handsontable in html	handsonstable	same as above
pyexcel-pygal	svg chart	pygal	2.7, 3.3, 3.4, 3.5 3.6, pypy
pyexcel-sortable	sortable table in html	csvtable	same as above
pyexcel-gantt	gantt chart in html	frappe-gantt	except pypy, same as above

In order to manage the list of plugins installed, you need to use pip to add or remove a plugin. When you use virtualenv, you can have different plugins per virtual environment. In the situation where you have multiple plugins that does the same thing in your environment, you need to tell pyexcel which plugin to use per function call. For example, pyexcel-ods and pyexcel-odsr, and you want to get\_array to use pyexcel-odsr. You need to append get\_array(..., library='pyexcel-odsr').

For compatibility tables of pyexcel-io plugins, please click [here](#)

Table 4: Plugin compatibility table

pyexcel	pyexcel-io	pyexcel-text	pyexcel-handsontable	pyexcel-pygal	pyexcel-gantt
0.5.15+	0.5.19+	0.2.6+	0.0.1+	0.0.1	0.0.1
0.5.14	0.5.18	0.2.6+	0.0.1+	0.0.1	0.0.1
0.5.10+	0.5.11+	0.2.6+	0.0.1+	0.0.1	0.0.1
0.5.9.1+	0.5.9.1+	0.2.6+	0.0.1	0.0.1	0.0.1
0.5.4+	0.5.1+	0.2.6+	0.0.1	0.0.1	0.0.1
0.5.0+	0.4.0+	0.2.6+	0.0.1	0.0.1	0.0.1
0.4.0+	0.3.0+	0.2.5			

Table 5: a list of support file formats

file format	definition
csv	comma separated values
tsv	tab separated values
csvz	a zip file that contains one or many csv files
tsvz	a zip file that contains one or many tsv files
xls	a spreadsheet file format created by MS-Excel 97-2003 <a href="#">[#f1]</a>
xlsx	MS-Excel Extensions to the Office Open XML SpreadsheetML File Format. <a href="#">[#f2]</a>
xlsm	an MS-Excel Macro-Enabled Workbook file
ods	open document spreadsheet
fods	flat open document spreadsheet
json	java script object notation
html	html table of the data structure
simple	simple presentation
rst	rStructured Text presentation of the data
mediawiki	media wiki table

## 2.2 Usage

Suppose you want to process the following excel data :

Here are the example usages:

```
>>> import pyexcel as pe
>>> records = pe.iget_records(file_name="your_file.xls")
>>> for record in records:
...     print("%s is aged at %d" % (record['Name'], record['Age']))
Adam is aged at 28
Beatrice is aged at 29
Ceri is aged at 30
Dean is aged at 26
>>> pe.free_resources()
```

## 2.3 Design

### 2.3.1 Introduction

This section introduces Excel data models, its representing data structures and provides an overview of formatting, transformation, manipulation supported by **pyexcel**.

#### Data models and data structures

When dealing with excel files, **pyexcel** pay attention to three primary objects: **cell**, **sheet** and **book**.

A book contains one or more sheets and a sheet is consisted of a sheet name and a two dimensional array of cells. Although a sheet can contain charts and a cell can have formula, styling properties, this library ignores them and only pays attention to the data in the cell and its data type. So, in the context of this library, the definition of those three concepts are:

concept	definition	pyexcel data model
a cell	is a data unit	a Python data type
a sheet	is a named two dimensional array of data units	<i>Sheet</i>
a book	is a dictionary of two dimensional array of data units.	<i>Book</i>

## Data source

A data source is a storage format of structured data. The most popular data source is an excel file. Libre Office/Microsoft Excel can easily be used to generate an excel file of your desired format. Besides a physical file, this library recognizes three additional types of source:

1. Excel files in computer memory. For example: when a file is uploaded to a Python server for information processing. If it is relatively small, it can be stored in memory.
2. Database tables. For example: a client would like to have a snapshot of some database table in an excel file and asks it to be sent to him.
3. Python structures. For example: a developer may have scraped a site and have stored data in Python array or dictionary. He may want to save this information as a file.

Reading from - and writing to - a data source is modelled as parsers and renderers in pyexcel. Excel data sources and database sources support read and write. Other data sources may only support read only, or write only methods.

Here is a list of data sources:

Data source	Read and write properties
Array	Read and write
Dictionary	Same as above
Records	Same as above
Excel files	Same as above
Excel files in memory	Same as above
Excel files on the web	Read only
Django models	Read and write
SQL models	Read and write
Database querysets	Read only
Textual sources	Write only

## Data format

This library and its plugins support most of the frequently used excel file formats.

file format	definition
csv	comma separated values
tsv	tab separated values
csvz	a zip file that contains one or many csv files
tsvz	a zip file that contains one or many tsv files
xls	a spreadsheet file format created by MS-Excel 97-2003 <sup>1</sup>
xlsx	MS-Excel Extensions to the Office Open XML SpreadsheetML File Format. <sup>2</sup>
xlsm	an MS-Excel Macro-Enabled Workbook file
ods	open document spreadsheet
json	java script object notation
html	html table of the data structure
simple	<i>simple</i> presentation
rst	rStructured Text presentation of the data
mediawiki	media wiki table

See also *A list of file formats supported by external plugins*.

## Data transformation

Often a developer would like to have excel data imported into a Python data structure. This library supports the *conversions from* previous three data source to the following list of data structures, and *vice versa*.

Table 6: A list of supported data structures

Pesudo name	Python name	Related model
two dimensional array	a list of lists	<code>pyexcel.Sheet</code>
a dictionary of key value pair	a dictionary	<code>pyexcel.Sheet</code>
a dictionary of one dimensional arrays	a dictionary of lists	<code>pyexcel.Sheet</code>
a list of dictionaries	a list of dictionaries	<code>pyexcel.Sheet</code>
a dictionary of two dimensional arrays	a dictionary of lists of lists	<code>pyexcel.Book</code>

## Data manipulation

The main operation on a cell involves *cell access*, *formatting* and *cleansing*. The main operation on a sheet involves group access to a row or a column; data filtering; and data transformation. The main operation in a book is obtain access to individual sheets.

## Data transcoding

For various reasons the data in one format needs to be transcoded into another. This library provides a transcoding tunnel for data transcoding between supported file formats.

## Data visualization

Via `pyexcel.renderer.AbstractRenderer` interface, data visualization is made possible. **pyexcel-chart** is the interface plugin to formalize this effort. **pyexcel-pygal** is the first plugin to provide bar, pie, histogram charts and more.

<sup>1</sup> quoted from [whatis.com](http://whatis.com). Technical details can be found at [MSDN XLS](http://msdn.com)

<sup>2</sup> xlsx is used by MS-Excel 2007, more information can be found at [MSDN XLSX](http://msdn.com)

## Examples of supported data structure

Here is a list of examples:

```
>>> import pyexcel as p
>>> two_dimensional_list = [
...     [1, 2, 3, 4],
...     [5, 6, 7, 8],
...     [9, 10, 11, 12],
... ]
>>> p.get_sheet(array=two_dimensional_list)
pyexcel_sheet1:
+---+---+---+---+
| 1 | 2 | 3 | 4 |
+---+---+---+---+
| 5 | 6 | 7 | 8 |
+---+---+---+---+
| 9 | 10 | 11 | 12 |
+---+---+---+---+
>>> a_dictionary_of_key_value_pair = {
...     "IE": 0.2,
...     "Firefox": 0.3
... }
>>> p.get_sheet(adict=a_dictionary_of_key_value_pair)
pyexcel_sheet1:
+-----+-----+
| Firefox | IE |
+-----+-----+
| 0.3     | 0.2 |
+-----+-----+
>>> a_dictionary_of_one_dimensional_arrays = {
...     "Column 1": [1, 2, 3, 4],
...     "Column 2": [5, 6, 7, 8],
...     "Column 3": [9, 10, 11, 12],
... }
>>> p.get_sheet(adict=a_dictionary_of_one_dimensional_arrays)
pyexcel_sheet1:
+-----+-----+-----+
| Column 1 | Column 2 | Column 3 |
+-----+-----+-----+
| 1        | 5        | 9        |
+-----+-----+-----+
| 2        | 6        | 10       |
+-----+-----+-----+
| 3        | 7        | 11       |
+-----+-----+-----+
| 4        | 8        | 12       |
+-----+-----+-----+
>>> a_list_of_dictionaries = [
...     {
...         "Name": 'Adam',
...         "Age": 28
...     },
...     {
...         "Name": 'Beatrice',
...         "Age": 29
...     },
...     {
```

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```

...     "Name": 'Ceri',
...     "Age": 30
... },
... {
...     "Name": 'Dean',
...     "Age": 26
... }
... ]
>>> p.get_sheet(records=a_list_of_dictionaries)
pyexcel_sheet1:
+-----+-----+
| Age | Name   |
+-----+-----+
| 28  | Adam   |
+-----+-----+
| 29  | Beatrice |
+-----+-----+
| 30  | Ceri   |
+-----+-----+
| 26  | Dean   |
+-----+-----+
>>> a_dictionary_of_two_dimensional_arrays = {
...     'Sheet 1':
...         [
...             [1.0, 2.0, 3.0],
...             [4.0, 5.0, 6.0],
...             [7.0, 8.0, 9.0]
...         ],
...     'Sheet 2':
...         [
...             ['X', 'Y', 'Z'],
...             [1.0, 2.0, 3.0],
...             [4.0, 5.0, 6.0]
...         ],
...     'Sheet 3':
...         [
...             ['O', 'P', 'Q'],
...             [3.0, 2.0, 1.0],
...             [4.0, 3.0, 2.0]
...         ]
...     }
>>> p.get_book(bookdict=a_dictionary_of_two_dimensional_arrays)
Sheet 1:
+-----+-----+
| 1.0 | 2.0 | 3.0 |
+-----+-----+
| 4.0 | 5.0 | 6.0 |
+-----+-----+
| 7.0 | 8.0 | 9.0 |
+-----+-----+
Sheet 2:
+-----+-----+
| X  | Y  | Z  |
+-----+-----+
| 1.0 | 2.0 | 3.0 |
+-----+-----+
| 4.0 | 5.0 | 6.0 |

```

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```
+-----+-----+-----+
Sheet 3:
+-----+-----+-----+
| O   | P   | Q   |
+-----+-----+-----+
| 3.0 | 2.0 | 1.0 |
+-----+-----+-----+
| 4.0 | 3.0 | 2.0 |
+-----+-----+-----+
```

## 2.3.2 Signature functions

### Import data into Python

This library provides one application programming interface to read data from one of the following data sources:

- physical file
- memory file
- SQLAlchemy table
- Django Model
- Python data structures: dictionary, records and array

and to transform them into one of the following data structures:

- two dimensional array
- a dictionary of one dimensional arrays
- a list of dictionaries
- a dictionary of two dimensional arrays
- a *Sheet*
- a *Book*

### Four data access functions

Python data can be handled well using lists, dictionaries and various mixture of both. This library provides four module level functions to help you obtain excel data in these data structures. Please refer to “A list of module level functions”, the first three functions operates on any one sheet from an excel book and the fourth one returns all data in all sheets in an excel book.

Table 7: A list of module level functions

Functions	Name	Python name
<code>get_array()</code>	two dimensional array	a list of lists
<code>get_dict()</code>	a dictionary of one dimensional arrays	an ordered dictionary of lists
<code>get_records()</code>	a list of dictionaries	a list of dictionaries
<code>get_book_dict()</code>	a dictionary of two dimensional arrays	a dictionary of lists of lists

See also:

- `get_an_array_from_an_excel_sheet`



- *How to get a dictionary from an excel sheet*
- *How to obtain records from an excel sheet*
- *How to obtain a dictionary from a multiple sheet book*

The following two variants of the data access function use generator and should work well with big data files

Table 8: A list of variant functions

Functions	Name	Python name
<code>iget_array()</code>	<b>a memory efficient two dimensional array</b>	a generator of a list of lists
<code>iget_records()</code>	a memory efficient list list of dictionaries	a generator of a list of dictionaries

However, you will need to call `free_resource()` to make sure file handles are closed.

## Two pyxcel functions

In cases where the excel data needs custom manipulations, a pyxcel user got a few choices: one is to use *Sheet* and *Book*, the other is to look for more sophisticated ones:

- Pandas, for numerical analysis
- Do-it-yourself

Functions	Returns
<code>get_sheet()</code>	<i>Sheet</i>
<code>get_book()</code>	<i>Book</i>

For all six functions, you can pass on the same command parameters while the return value is what the function says.

## Export data from Python

This library provides one application programming interface to transform them into one of the data structures:

- two dimensional array
- a (ordered) dictionary of one dimensional arrays
- a list of dictionaries
- a dictionary of two dimensional arrays
- a *Sheet*
- a *Book*

and write to one of the following data sources:

- physical file
- memory file
- SQLAlchemy table
- Django Model

- Python data structures: dictionary, records and array

Here are the two functions:

Functions	Description
<code>save_as()</code>	Works well with single sheet file
<code>isave_as()</code>	Works well with big data files
<code>save_book_as()</code>	<b>Works with multiple sheet file</b> and big data files
<code>isave_book_as()</code>	<b>Works with multiple sheet file</b> and big data files

If you would only use these two functions to do format transcoding, you may enjoy a speed boost using `isave_as()` and `isave_book_as()`, because they use `yield` keyword and minimize memory footprint. However, you will need to call `free_resource()` to make sure file handles are closed. And `save_as()` and `save_book_as()` reads all data into memory and **will make all rows the same width**.

See also:

- [How to save an python array as an excel file](#)
- [How to save a dictionary of two dimensional array as an excel file](#)
- [How to save an python array as a csv file with special delimiter](#)

## Data transportation/transcoding

This library is capable of transporting your data between any of the following data sources:

- physical file
- memory file
- SQLAlchemy table
- Django Model
- Python data structures: dictionary, records and array

See also:

- [How to import an excel sheet to a database using SQLAlchemy](#)
- [How to open an xls file and save it asxlsx](#)
- [How to open an xls file and save it as csv](#)

### 2.3.3 Architecture

**pyexcel** uses loosely couple plugins to fulfill the promise to access various file formats. **lml** is the plugin management library that provide the specialized support for the loose coupling.

#### What is loose coupling?

The components of **pyexcel** is designed as building blocks. For your project, you can cherry-pick the file format support without affecting the core functionality of **pyexcel**. Each plugin will bring in additional dependences. For example, if you choose **pyexcel-xls**, **xldr** and **xlwt** will be brought in as 2nd level dependencies.

Looking at the following architectural diagram, pyexcel hosts plugin interfaces for data source, data renderer and data parser. pyexcel-pygal, pyexcel-matplotlib, and pyexcel-handsontable extend pyexcel using data renderer interface. pyexcel-io package takes away the responsibilities to interface with excel libraries, for example: xlrd, openpyxl, ezodf.

As in *A list of file formats supported by external plugins*, there are overlapping capabilities in reading and writing xlsx, ods files. Because each third parties express different personalities although they may read and write data in the same file format, you as the pyexcel is left to pick which suit your task best.

Dotted arrow means the package or module is loaded later.

## 2.4 New tutorial

### 2.4.1 One liners

This section shows you how to get data from your excel files and how to export data to excel files in **one line**

#### One liner to get data from the excel files

##### Get a list of dictionaries

Suppose you want to process the following coffee data (data source [coffee chart](#) on the center for science in the public interest):

Let's get a list of dictionary out from the xls file:

```
>>> records = p.get_records(file_name="your_file.xls")
```

And let's check what do we have:

```
>>> for record in records:
...     print("%s of %s has %s mg" % (
...         record['Serving Size'],
...         record['Coffees'],
...         record['Caffeine (mg)']))
venti(20 oz) of Starbucks Coffee Blonde Roast has 475 mg
large(20 oz.) of Dunkin' Donuts Coffee with Turbo Shot has 398 mg
grande(16 oz.) of Starbucks Coffee Pike Place Roast has 310 mg
regular(16 oz.) of Panera Coffee Light Roast has 300 mg
```

##### Get two dimensional array

Instead, what if you have to use `pyexcel.get_array()` to do the same:

```
>>> for row in p.get_array(file_name="your_file.xls", start_row=1):
...     print("%s of %s has %s mg" % (
...         row[1],
...         row[0],
...         row[2]))
venti(20 oz) of Starbucks Coffee Blonde Roast has 475 mg
large(20 oz.) of Dunkin' Donuts Coffee with Turbo Shot has 398 mg
```

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```
grande(16 oz.) of Starbucks Coffee Pike Place Roast has 310 mg
regular(16 oz.) of Panera Coffee Light Roast has 300 mg
```

where `start_row` skips the header row.

## Get a dictionary

You can get a dictionary too:

Now let's get a dictionary out from the spreadsheet:

```
>>> my_dict = p.get_dict(file_name="your_file.xls", name_columns_by_row=0)
```

And check what do we have:

```
>>> from pyexcel._compact import OrderedDict
>>> isinstance(my_dict, OrderedDict)
True
>>> for key, values in my_dict.items():
...     print(key + " : " + ','.join([str(item) for item in values]))
Coffees : Starbucks Coffee Blonde Roast,Dunkin' Donuts Coffee with Turbo Shot,
↳Starbucks Coffee Pike Place Roast,Panera Coffee Light Roast
Serving Size : venti(20 oz),large(20 oz.),grande(16 oz.),regular(16 oz.)
Caffeine (mg) : 475,398,310,300
```

Please note that `my_dict` is an `OrderedDict`.

## Get a dictionary of two dimensional array

Suppose you have a multiple sheet book as the following:

Here is the code to obtain those sheets as a single dictionary:

```
>>> book_dict = p.get_book_dict(file_name="book.xls")
```

And check::

```
>>> isinstance(book_dict, OrderedDict)
True
>>> import json
>>> for key, item in book_dict.items():
...     print(json.dumps({key: item}))
{"Sheet 1": [[1, 2, 3], [4, 5, 6], [7, 8, 9]]}
{"Sheet 2": [{"X", "Y", "Z"}, [1, 2, 3], [4, 5, 6]]}
{"Sheet 3": [{"O", "P", "Q"}, [3, 2, 1], [4, 3, 2]]}
```

## Data export in one line

### Export an array

Suppose you have the following array:

```
>>> data = [[1, 2, 3], [4, 5, 6], [7, 8, 9]]
```

And here is the code to save it as an excel file

```
>>> p.save_as(array=data, dest_file_name="example.xls")
```

Let's verify it:

```
>>> p.get_sheet(file_name="example.xls")
pyexcel_sheet1:
+---+---+---+
| 1 | 2 | 3 |
+---+---+---+
| 4 | 5 | 6 |
+---+---+---+
| 7 | 8 | 9 |
+---+---+---+
```

And here is the code to save it as a csv file

```
>>> p.save_as(array=data,
...           dest_file_name="example.csv",
...           dest_delimiter=':')
```

Let's verify it:

```
>>> with open("example.csv") as f:
...     for line in f.readlines():
...         print(line.rstrip())
...
1:2:3
4:5:6
7:8:9
```

## Export a list of dictionaries

```
>>> records = [
...     {"year": 1903, "country": "Germany", "speed": "206.7km/h"},
...     {"year": 1964, "country": "Japan", "speed": "210km/h"},
...     {"year": 2008, "country": "China", "speed": "350km/h"}
... ]
>>> p.save_as(records=records, dest_file_name='high_speed_rail.xls')
```

## Export a dictionary of single key value pair

```
>>> henley_on_thames_facts = {
...     "area": "5.58 square meters",
...     "population": "11,619",
...     "civilian parish": "Henley-on-Thames",
...     "latitude": "51.536",
...     "longitude": "-0.898"
... }
>>> p.save_as(adict=henley_on_thames_facts, dest_file_name='henley.xlsx')
```

## Export a dictionary of single dimensional array

```
>>> ccs_insights = {
...     "year": ["2017", "2018", "2019", "2020", "2021"],
...     "smart phones": [1.53, 1.64, 1.74, 1.82, 1.90],
...     "feature phones": [0.46, 0.38, 0.30, 0.23, 0.17]
... }
>>> p.save_as(adict=ccs_insights, dest_file_name='ccs.csv')
```

## Export a dictionary of two dimensional array as a book

Suppose you want to save the below dictionary to an excel file

```
>>> a_dictionary_of_two_dimensional_arrays = {
...     'Sheet 1':
...     [
...         [1.0, 2.0, 3.0],
...         [4.0, 5.0, 6.0],
...         [7.0, 8.0, 9.0]
...     ],
...     'Sheet 2':
...     [
...         ['X', 'Y', 'Z'],
...         [1.0, 2.0, 3.0],
...         [4.0, 5.0, 6.0]
...     ],
...     'Sheet 3':
...     [
...         ['O', 'P', 'Q'],
...         [3.0, 2.0, 1.0],
...         [4.0, 3.0, 2.0]
...     ]
... }
```

Here is the code:

```
>>> p.save_book_as(
...     bookdict=a_dictionary_of_two_dimensional_arrays,
...     dest_file_name="book.xls"
... )
```

If you want to preserve the order of sheets in your dictionary, you have to pass on an ordered dictionary to the function itself. For example:

```
>>> data = OrderedDict()
>>> data.update({"Sheet 2": a_dictionary_of_two_dimensional_arrays['Sheet 2']})
>>> data.update({"Sheet 1": a_dictionary_of_two_dimensional_arrays['Sheet 1']})
>>> data.update({"Sheet 3": a_dictionary_of_two_dimensional_arrays['Sheet 3']})
>>> p.save_book_as(bookdict=data, dest_file_name="book.xls")
```

Let's verify its order:

```
>>> book_dict = p.get_book_dict(file_name="book.xls")
>>> for key, item in book_dict.items():
...     print(json.dumps({key: item}))
```

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```
{ "Sheet 2": [ ["X", "Y", "Z"], [1, 2, 3], [4, 5, 6] ] }
{ "Sheet 1": [ [1, 2, 3], [4, 5, 6], [7, 8, 9] ] }
{ "Sheet 3": [ ["O", "P", "Q"], [3, 2, 1], [4, 3, 2] ] }
```

Please notice that “Sheet 2” is the first item in the *book\_dict*, meaning the order of sheets are preserved.

### File format transcoding on one line

**Note:** Please note that the following file transcoding could be with zero line. Please install pyexcel-cli and you will do the transcode in one command. No need to open your editor, save the problem, then python run.

The following code does a simple file format transcoding from xls to csv:

```
>>> p.save_as(file_name="birth.xls", dest_file_name="birth.csv")
```

Again it is really simple. Let’s verify what we have gotten:

```
>>> sheet = p.get_sheet(file_name="birth.csv")
>>> sheet
birth.csv:
+-----+-----+-----+
| name  | weight | birth  |
+-----+-----+-----+
| Adam  | 3.4    | 03/02/15 |
+-----+-----+-----+
| Smith | 4.2    | 12/11/14 |
+-----+-----+-----+
```

**Note:** Please note that csv(comma separate value) file is pure text file. Formula, charts, images and formatting in xls file will disappear no matter which transcoding tool you use. Hence, pyexcel is a quick alternative for this transcoding job.

Let use previous example and save it as xlsx instead

```
>>> p.save_as(file_name="birth.xls",
...           dest_file_name="birth.xlsx") # change the file extension
```

Again let’s verify what we have gotten:

```
>>> sheet = p.get_sheet(file_name="birth.xlsx")
>>> sheet
pyexcel_sheet1:
+-----+-----+-----+
| name  | weight | birth  |
+-----+-----+-----+
| Adam  | 3.4    | 03/02/15 |
+-----+-----+-----+
| Smith | 4.2    | 12/11/14 |
+-----+-----+-----+
```

## Excel book merge and split operation in one line

### Merge all excel files in directory into a book where each file become a sheet

The following code will merge every excel files into one file, say “output.xls”:

```
from pyexcel.cookbook import merge_all_to_a_book
import glob

merge_all_to_a_book(glob.glob("your_csv_directory\*.csv"), "output.xls")
```

You can mix and match with other excel formats: xls, xlsx and ods. For example, if you are sure you have only xls, xlsx, ods and csv files in *your\_excel\_file\_directory*, you can do the following:

```
from pyexcel.cookbook import merge_all_to_a_book
import glob

merge_all_to_a_book(glob.glob("your_excel_file_directory\*.xls"), "output.xls")
```

### Split a book into single sheet files

Suppose you have many sheets in a work book and you would like to separate each into a single sheet excel file. You can easily do this:

```
>>> from pyexcel.cookbook import split_a_book
>>> split_a_book("megabook.xls", "output.xls")
>>> import glob
>>> outputfiles = glob.glob("*_output.xls")
>>> for file in sorted(outputfiles):
...     print(file)
...
Sheet 1_output.xls
Sheet 2_output.xls
Sheet 3_output.xls
```

for the output file, you can specify any of the supported formats

### Extract just one sheet from a book

Suppose you just want to extract one sheet from many sheets that exists in a work book and you would like to separate it into a single sheet excel file. You can easily do this:

```
>>> from pyexcel.cookbook import extract_a_sheet_from_a_book
>>> extract_a_sheet_from_a_book("megabook.xls", "Sheet 1", "output.xls")
>>> if os.path.exists("Sheet 1_output.xls"):
...     print("Sheet 1_output.xls exists")
...
Sheet 1_output.xls exists
```

for the output file, you can specify any of the supported formats



## 2.4.2 Stream APIs for big file : A set of two liners

This section shows you how to get data from your **BIG** excel files and how to export data to excel files in **two lines** at most.

### Two liners for get data from big excel files

#### Get a list of dictionaries

Suppose you want to process the following coffee data:

Let's get a list of dictionary out from the xls file:

```
>>> records = p.get_records(file_name="your_file.xls")
```

And let's check what do we have:

```
>>> for record in records:
...     print("%s of %s has %s mg" % (
...         record['Serving Size'],
...         record['Coffees'],
...         record['Caffeine (mg)']))
venti(20 oz) of Starbucks Coffee Blonde Roast has 475 mg
large(20 oz.) of Dunkin' Donuts Coffee with Turbo Shot has 398 mg
grande(16 oz.) of Starbucks Coffee Pike Place Roast has 310 mg
regular(16 oz.) of Panera Coffee Light Roast has 300 mg
```

Please do not forgot the second line:

```
>>> p.free_resources()
```

#### Get two dimensional array

Instead, what if you have to use `pyexcel.get_array()` to do the same:

```
>>> for row in p.get_array(file_name="your_file.xls", start_row=1):
...     print("%s of %s has %s mg" % (
...         row[1],
...         row[0],
...         row[2]))
venti(20 oz) of Starbucks Coffee Blonde Roast has 475 mg
large(20 oz.) of Dunkin' Donuts Coffee with Turbo Shot has 398 mg
grande(16 oz.) of Starbucks Coffee Pike Place Roast has 310 mg
regular(16 oz.) of Panera Coffee Light Roast has 300 mg
```

Again, do not forgot the second line:

```
>>> p.free_resources()
```

where `start_row` skips the header row.

#### Data export in one liners

## Export an array

Suppose you have the following array:

```
>>> data = [[1, 2, 3], [4, 5, 6], [7, 8, 9]]
```

And here is the code to save it as an excel file

```
>>> p.isave_as(array=data, dest_file_name="example.xls")
```

But the following line is not required because the data source are not file sources:

```
>>> # p.free_resources()
```

Let's verify it:

```
>>> p.get_sheet(file_name="example.xls")
pyexcel_sheet1:
+---+---+---+
| 1 | 2 | 3 |
+---+---+---+
| 4 | 5 | 6 |
+---+---+---+
| 7 | 8 | 9 |
+---+---+---+
```

And here is the code to save it as a csv file

```
>>> p.isave_as(array=data,
...           dest_file_name="example.csv",
...           dest_delimiter=':')
```

Let's verify it:

```
>>> with open("example.csv") as f:
...     for line in f.readlines():
...         print(line.rstrip())
...
1:2:3
4:5:6
7:8:9
```

## Export a list of dictionaries

```
>>> records = [
...     {"year": 1903, "country": "Germany", "speed": "206.7km/h"},
...     {"year": 1964, "country": "Japan", "speed": "210km/h"},
...     {"year": 2008, "country": "China", "speed": "350km/h"}
... ]
>>> p.isave_as(records=records, dest_file_name='high_speed_rail.xls')
```

### Export a dictionary of single key value pair

```
>>> henley_on_thames_facts = {
...     "area": "5.58 square meters",
...     "population": "11,619",
...     "civilial parish": "Henley-on-Thames",
...     "latitude": "51.536",
...     "longitude": "-0.898"
... }
>>> p.isave_as(adict=henley_on_thames_facts, dest_file_name='henley.xlsx')
```

### Export a dictionary of single dimensional array

```
>>> ccs_insights = {
...     "year": ["2017", "2018", "2019", "2020", "2021"],
...     "smart phones": [1.53, 1.64, 1.74, 1.82, 1.90],
...     "feature phones": [0.46, 0.38, 0.30, 0.23, 0.17]
... }
>>> p.isave_as(adict=ccs_insights, dest_file_name='ccs.csv')
>>> p.free_resources()
```

### Export a dictionary of two dimensional array as a book

Suppose you want to save the below dictionary to an excel file

```
>>> a_dictionary_of_two_dimensional_arrays = {
...     'Sheet 1':
...         [
...             [1.0, 2.0, 3.0],
...             [4.0, 5.0, 6.0],
...             [7.0, 8.0, 9.0]
...         ],
...     'Sheet 2':
...         [
...             ['X', 'Y', 'Z'],
...             [1.0, 2.0, 3.0],
...             [4.0, 5.0, 6.0]
...         ],
...     'Sheet 3':
...         [
...             ['O', 'P', 'Q'],
...             [3.0, 2.0, 1.0],
...             [4.0, 3.0, 2.0]
...         ]
... }
```

Here is the code:

```
>>> p.isave_book_as(
...     bookdict=a_dictionary_of_two_dimensional_arrays,
...     dest_file_name="book.xls"
... )
```

If you want to preserve the order of sheets in your dictionary, you have to pass on an ordered dictionary to the function itself. For example:

```
>>> from pyexcel._compact import OrderedDict
>>> data = OrderedDict()
>>> data.update({"Sheet 2": a_dictionary_of_two_dimensional_arrays['Sheet 2']})
>>> data.update({"Sheet 1": a_dictionary_of_two_dimensional_arrays['Sheet 1']})
>>> data.update({"Sheet 3": a_dictionary_of_two_dimensional_arrays['Sheet 3']})
>>> p.isave_book_as(bookdict=data, dest_file_name="book.xls")
>>> p.free_resources()
```

Let's verify its order:

```
>>> import json
>>> book_dict = p.get_book_dict(file_name="book.xls")
>>> for key, item in book_dict.items():
...     print(json.dumps({key: item}))
{"Sheet 2": [{"X", "Y", "Z"}, [1, 2, 3], [4, 5, 6]]}
{"Sheet 1": [[1, 2, 3], [4, 5, 6], [7, 8, 9]]}
{"Sheet 3": [{"O", "P", "Q"}, [3, 2, 1], [4, 3, 2]]}
```

Please notice that “Sheet 2” is the first item in the *book\_dict*, meaning the order of sheets are preserved.

### File format transcoding on one line

---

**Note:** Please note that the following file transcoding could be with zero line. Please install pyexcel-cli and you will do the transcode in one command. No need to open your editor, save the problem, then python run.

---

The following code does a simple file format transcoding from xls to csv:

```
>>> import pyexcel
>>> p.save_as(file_name="birth.xls", dest_file_name="birth.csv")
```

Again it is really simple. Let's verify what we have gotten:

```
>>> sheet = p.get_sheet(file_name="birth.csv")
>>> sheet
birth.csv:
+-----+-----+-----+
| name  | weight | birth  |
+-----+-----+-----+
| Adam  | 3.4    | 03/02/15 |
+-----+-----+-----+
| Smith | 4.2    | 12/11/14 |
+-----+-----+-----+
```

---

**Note:** Please note that csv(comma separate value) file is pure text file. Formula, charts, images and formatting in xls file will disappear no matter which transcoding tool you use. Hence, pyexcel is a quick alternative for this transcoding job.

---

Let use previous example and save it as xlsx instead

```
>>> import pyexcel
>>> p.isave_as(file_name="birth.xls",
...           dest_file_name="birth.xlsx") # change the file extension
```

Again let's verify what we have gotten:

```
>>> sheet = p.get_sheet(file_name="birth.xlsx")
>>> sheet
pyexcel_sheet1:
+-----+-----+-----+
| name | weight | birth |
+-----+-----+-----+
| Adam | 3.4    | 03/02/15 |
+-----+-----+-----+
| Smith | 4.2    | 12/11/14 |
+-----+-----+-----+
```

### 2.4.3 For web developer

The following libraries are written to facilitate the daily import and export of excel data.

framework	plugin/middleware/extension
Flask	Flask-Excel
Django	django-excel
Pyramid	pyramid-excel

And you may make your own by using [pyexcel-webio](#)

#### Read any supported excel and respond its content in json

You can find a real world example in **examples/memoryfile/** directory: `pyexcel_server.py`. Here is the example snippet

```
1 def upload():
2     if request.method == 'POST' and 'excel' in request.files:
3         # handle file upload
4         filename = request.files['excel'].filename
5         extension = filename.split(".")[1]
6         # Obtain the file extension and content
7         # pass a tuple instead of a file name
8         content = request.files['excel'].read()
9         if sys.version_info[0] > 2:
10            # in order to support python 3
11            # have to decode bytes to str
12            content = content.decode('utf-8')
13            sheet = pe.get_sheet(file_type=extension, file_content=content)
14            # then use it as usual
15            sheet.name_columns_by_row(0)
16            # respond with a json
17            return jsonify({"result": sheet.dict})
18            return render_template('upload.html')
```

`request.files['excel']` in line 4 holds the file object. line 5 finds out the file extension. line 13 obtains a sheet instance. line 15 uses the first row as data header. line 17 sends the json representation of the excel file back to client browser.

## Write to memory and respond to download

```
1 data = [  
2     [...],  
3     ...  
4 ]  
5  
6 @app.route('/download')  
7 def download():  
8     sheet = pe.Sheet(data)  
9     output = make_response(sheet.csv)  
10    output.headers["Content-Disposition"] = "attachment; filename=export.csv"  
11    output.headers["Content-type"] = "text/csv"  
12    return output
```

`make_response` is a Flask utility to make a memory content as http response.

---

**Note:** You can find the corresponding source code at [examples/memoryfile](#)

---

## 2.4.4 Pyexcel data renderers

There exist a few data renderers for pyexcel data. This chapter will walk you through them.

### View pyexcel data in ndjson and other formats

With `pyexcel-text`, you can get pyexcel data in newline delimited json, normal json and other formats.

### View the pyexcel data in a browser

You can use `pyexcel-handsontable` to render your data.

### Include excel data in your python documentation

`sphinxcontrib-excel` help you present your excel data in various formats inside your sphinx documentation.

### Draw charts from your excel data

`pyexcel-pygal` helps you with all charting options and give you charts in svg format.

`pyexcel-echarts` draws 2D, 3D, geo charts from pyexcel data and has awesome animations too, but it is under development.

`pyexcel-matplotlib` helps you with scientific charts and is under development.

### Gantt chart visualization for your excel data

`pyexcel-gantt` is a specialist renderer for gantt chart.

## 2.4.5 Sheet

### Random access

To randomly access a cell of *Sheet* instance, two syntax are available:

```
sheet[row, column]
```

or:

```
sheet['A1']
```

The former syntax is handy when you know the row and column numbers. The latter syntax is introduced to help you convert the excel column header such as “AX” to integer numbers.

Suppose you have the following data, you can get value 5 by reader[2, 2].

Here is the example code showing how you can randomly access a cell:

```
>>> sheet = pyexcel.get_sheet(file_name="example.xls")
>>> sheet.content
+-----+-----+-----+
| Example | X | Y | Z |
+-----+-----+-----+
| a       | 1 | 2 | 3 |
+-----+-----+-----+
| b       | 4 | 5 | 6 |
+-----+-----+-----+
| c       | 7 | 8 | 9 |
+-----+-----+-----+
>>> print(sheet[2, 2])
5
>>> print(sheet["C3"])
5
>>> sheet[3, 3] = 10
>>> print(sheet[3, 3])
10
```

---

**Note:** In order to set a value to a cell, please use `sheet[row_index, column_index] = new_value`

---

### Random access to rows and columns

Continue with previous excel file, you can access row and column separately:

```
>>> sheet.row[1]
['a', 1, 2, 3]
>>> sheet.column[2]
['Y', 2, 5, 8]
```

**Use custom names instead of index** Alternatively, it is possible to use the first row to refer to each columns:

```
>>> sheet.name_columns_by_row(0)
>>> print(sheet[1, "Y"])
5
>>> sheet[1, "Y"] = 100
>>> print(sheet[1, "Y"])
100
```

You have noticed the row index has been changed. It is because first row is taken as the column names, hence all rows after the first row are shifted. Now accessing the columns are changed too:

```
>>> sheet.column['Y']
[2, 100, 8]
```

Hence access the same cell, this statement also works:

```
>>> sheet.column['Y'][1]
100
```

Further more, it is possible to use first column to refer to each rows:

```
>>> sheet.name_rows_by_column(0)
```

To access the same cell, we can use this line:

```
>>> sheet.row["b"][1]
100
```

For the same reason, the row index has been reduced by 1. Since we have named columns and rows, it is possible to access the same cell like this:

```
>>> print(sheet["b", "Y"])
100
>>> sheet["b", "Y"] = 200
>>> print(sheet["b", "Y"])
200
```

### Play with data

Suppose you have the following data in any of the supported excel formats again:

```
>>> sheet = pyexcel.get_sheet(file_name="example_series.xls",
...                             name_columns_by_row=0)
```

You can get headers:

```
>>> print(list(sheet.colnames))
['Column 1', 'Column 2', 'Column 3']
```

You can use a utility function to get all in a dictionary:

```
>>> sheet.to_dict()
OrderedDict([('Column 1', [1, 4, 7]), ('Column 2', [2, 5, 8]), ('Column 3', [3, 6,
↪9])])
```

Maybe you want to get only the data without the column headers. You can call `rows()` instead:

```
>>> list(sheet.rows())
[[1, 2, 3], [4, 5, 6], [7, 8, 9]]
```

You can get data from the bottom to the top one by calling `rrows()`:

```
>>> list(sheet.rrows())
[[7, 8, 9], [4, 5, 6], [1, 2, 3]]
```

You might want the data arranged vertically. You can call `columns()`:



```
>>> list(sheet.columns())
[[1, 4, 7], [2, 5, 8], [3, 6, 9]]
```

You can get columns in reverse sequence as well by calling `rcolumns()`:

```
>>> list(sheet.rcolumns())
[[3, 6, 9], [2, 5, 8], [1, 4, 7]]
```

Do you want to flatten the data? You can get the content in one dimensional array. If you are interested in playing with one dimensional enumeration, you can check out these functions `enumerate()`, `reverse()`, `vertical()`, and `rvertical()`:

```
>>> list(sheet.enumerate())
[1, 2, 3, 4, 5, 6, 7, 8, 9]
>>> list(sheet.reverse())
[9, 8, 7, 6, 5, 4, 3, 2, 1]
>>> list(sheet.vertical())
[1, 4, 7, 2, 5, 8, 3, 6, 9]
>>> list(sheet.rvertical())
[9, 6, 3, 8, 5, 2, 7, 4, 1]
```

## attributes

Attributes:

```
>>> import pyexcel
>>> content = "1,2,3\n3,4,5"
>>> sheet = pyexcel.get_sheet(file_type="csv", file_content=content)
>>> sheet.tsv
'1\t2\t3\r\n3\t4\t5\r\n'
>>> print(sheet.simple)
csv:
- - -
1 2 3
3 4 5
- - -
```

What's more, you could as well set value to an attribute, for example::

```
>>> import pyexcel
>>> content = "1,2,3\n3,4,5"
>>> sheet = pyexcel.Sheet()
>>> sheet.csv = content
>>> sheet.array
[[1, 2, 3], [3, 4, 5]]
```

You can get the direct access to underneath stream object. In some situation, it is desired:

```
>>> stream = sheet.stream.tsv
```

The returned stream object has tsv formatted content for reading.

What you could further do is to set a memory stream of any supported file format to a sheet. For example:

```
>>> another_sheet = pyexcel.Sheet()
>>> another_sheet.xls = sheet.xls
>>> another_sheet.content
+---+---+---+
```

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```
| 1 | 2 | 3 |
+---+---+---+
| 3 | 4 | 5 |
+---+---+---+
```

Yet, it is possible assign a absolute url to an online excel file to an instance of `pyexcel.Sheet`.

### custom attributes

You can pass on source specific parameters to getter and setter functions.

```
>>> content = "1-2-3\n3-4-5"
>>> sheet = pyexcel.Sheet()
>>> sheet.set_csv(content, delimiter="-")
>>> sheet.csv
'1,2,3\r\n3,4,5\r\n'
>>> sheet.get_csv(delimiter="|")
'1|2|3\r\n3|4|5\r\n'
```

## Data manipulation

The data in a sheet is represented by `Sheet` which maintains the data as a list of lists. You can regard `Sheet` as a two dimensional array with additional iterators. Random access to individual column and row is exposed by `Column` and `Row`

### Column manipulation

Suppose have one data file as the following:

```
>>> sheet = pyexcel.get_sheet(file_name="example.xls", name_columns_by_row=0)
>>> sheet
pyexcel sheet:
+-----+-----+-----+
| Column 1 | Column 2 | Column 3 |
+-----+-----+-----+
| 1         | 4         | 7         |
+-----+-----+-----+
| 2         | 5         | 8         |
+-----+-----+-----+
| 3         | 6         | 9         |
+-----+-----+-----+
```

And you want to update Column 2 with these data: [11, 12, 13]

```
>>> sheet.column["Column 2"] = [11, 12, 13]
>>> sheet.column[1]
[11, 12, 13]
>>> sheet
pyexcel sheet:
+-----+-----+-----+
| Column 1 | Column 2 | Column 3 |
+-----+-----+-----+
| 1         | 11        | 7         |
+-----+-----+-----+
```

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2	12	8	
+-----+	+-----+	+-----+	+-----+
3	13	9	
+-----+	+-----+	+-----+	+-----+

### Remove one column of a data file

If you want to remove Column 2, you can just call:

```
>>> del sheet.column["Column 2"]
>>> sheet.column["Column 3"]
[7, 8, 9]
```

The sheet content will become:

```
>>> sheet
pyexcel sheet:
+-----+
| Column 1 | Column 3 |
+-----+
| 1        | 7        |
+-----+
| 2        | 8        |
+-----+
| 3        | 9        |
+-----+
```

### Append more columns to a data file

Continue from previous example. Suppose you want add two more columns to the data file

Column 4	Column 5
10	13
11	14
12	15

Here is the example code to append two extra columns:

```
>>> extra_data = [
...     ["Column 4", "Column 5"],
...     [10, 13],
...     [11, 14],
...     [12, 15]
... ]
>>> sheet2 = pyexcel.Sheet(extra_data)
>>> sheet.column += sheet2
>>> sheet.column["Column 4"]
[10, 11, 12]
>>> sheet.column["Column 5"]
[13, 14, 15]
```

Here is what you will get:

```
>>> sheet
pyexcel sheet:
+-----+-----+-----+-----+
| Column 1 | Column 3 | Column 4 | Column 5 |
+=====+=====+=====+=====+
| 1        | 7        | 10       | 13       |
+-----+-----+-----+-----+
| 2        | 8        | 11       | 14       |
+-----+-----+-----+-----+
| 3        | 9        | 12       | 15       |
+-----+-----+-----+-----+
```

### Cherry pick some columns to be removed

Suppose you have the following data:

```
>>> data = [
...     ['a', 'b', 'c', 'd', 'e', 'f', 'g', 'h'],
...     [1,2,3,4,5,6,7,9],
... ]
>>> sheet = pyexcel.Sheet(data, name_columns_by_row=0)
>>> sheet
pyexcel sheet:
+---+---+---+---+---+---+---+---+
| a | b | c | d | e | f | g | h |
+---+---+---+---+---+---+---+---+
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 9 |
+---+---+---+---+---+---+---+---+
```

And you want to remove columns named as: 'a', 'c', 'e', 'h'. This is how you do it:

```
>>> del sheet.column['a', 'c', 'e', 'h']
>>> sheet
pyexcel sheet:
+---+---+---+---+
| b | d | f | g |
+---+---+---+---+
| 2 | 4 | 6 | 7 |
+---+---+---+---+
```

### What if the headers are in a different row

Suppose you have the following data:

```
>>> sheet
pyexcel sheet:
+-----+-----+-----+
| 1        | 2        | 3        |
+-----+-----+-----+
| Column 1 | Column 2 | Column 3 |
+-----+-----+-----+
| 4        | 5        | 6        |
+-----+-----+-----+
```

The way to name your columns is to use index 1:

```
>>> sheet.name_columns_by_row(1)
```

Here is what you get:

```
>>> sheet
pyexcel sheet:
+-----+-----+-----+
| Column 1 | Column 2 | Column 3 |
+=====+=====+=====+
| 1        | 2        | 3        |
+-----+-----+-----+
| 4        | 5        | 6        |
+-----+-----+-----+
```

## Row manipulation

Suppose you have the following data:

```
>>> sheet
pyexcel sheet:
+---+---+---+-----+
| a | b | c | Row 1 |
+---+---+---+-----+
| e | f | g | Row 2 |
+---+---+---+-----+
| 1 | 2 | 3 | Row 3 |
+---+---+---+-----+
```

You can name your rows by column index at 3:

```
>>> sheet.name_rows_by_column(3)
>>> sheet
pyexcel sheet:
+-----+---+---+---+
| Row 1 | a | b | c |
+-----+---+---+---+
| Row 2 | e | f | g |
+-----+---+---+---+
| Row 3 | 1 | 2 | 3 |
+-----+---+---+---+
```

Then you can access rows by its name:

```
>>> sheet.row["Row 1"]
['a', 'b', 'c']
```

## Formatting

Previous section has assumed the data is in the format that you want. In reality, you have to manipulate the data types a bit to suit your needs. Hence, formatters comes into the scene. use `format()` to apply formatter immediately.

---

**Note:** `int`, `float` and `datetime` values are automatically detected in `csv` files since `pyexcel` version 0.2.2

---

## Convert a column of numbers to strings

Suppose you have the following data:

```
>>> import pyexcel
>>> data = [
...     ["userid", "name"],
...     [10120, "Adam"],
...     [10121, "Bella"],
...     [10122, "Cedar"]
... ]
>>> sheet = pyexcel.Sheet(data)
>>> sheet.name_columns_by_row(0)
>>> sheet.column["userid"]
[10120, 10121, 10122]
```

As you can see, *userid* column is of *int* type. Next, let's convert the column to string format:

```
>>> sheet.column.format("userid", str)
>>> sheet.column["userid"]
['10120', '10121', '10122']
```

## Cleanse the cells in a spread sheet

Sometimes, the data in a spreadsheet may have unwanted strings in all or some cells. Let's take an example. Suppose we have a spread sheet that contains all strings but it as random spaces before and after the text values. Some field had weird characters, such as “&nbsp;&nbsp; ”:

```
>>> data = [
...     ["    Version", "    Comments", "    Author &nbsp;  "],
...     [" v0.0.1    ", " Release versions", "    &nbsp;  Eda"],
...     ["&nbsp;   v0.0.2  ", "Useful updates &nbsp;   &nbsp;  ", "    &nbsp;  Freud"]
... ]
>>> sheet = pyexcel.Sheet(data)
>>> sheet.content
+-----+-----+-----+
|      Version |      Comments          |      Author &nbsp;   |
+-----+-----+-----+
|  v0.0.1     | Release versions      |           &nbsp;  Eda |
+-----+-----+-----+
| &nbsp;   v0.0.2   | Useful updates &nbsp;   &nbsp;   |    &nbsp;  Freud     |
+-----+-----+-----+
```

Now try to create a custom cleanse function:

```
.. code-block:: python
```

```
>>> def cleanse_func(v):
...     v = v.replace("&nbsp;  ", "")
...     v = v.rstrip().strip()
...     return v
... 
```

Then let's create a `SheetFormatter` and apply it:

```
.. code-block:: python
```

```
>>> sheet.map(cleanse_func)
```

So in the end, you get this:

```
>>> sheet.content
+-----+-----+-----+
| Version | Comments          | Author |
+-----+-----+-----+
| v0.0.1  | Release versions | Eda    |
+-----+-----+-----+
| v0.0.2  | Useful updates   | Freud  |
+-----+-----+-----+
```

## Data filtering

use `filter()` function to apply a filter immediately. The content is modified.

Suppose you have the following data in any of the supported excel formats:

Column 1	Column 2	Column 3
1	4	7
2	5	8
3	6	9

```
>>> import pyexcel
```

```
>>> sheet = pyexcel.get_sheet(file_name="example_series.xls", name_columns_by_row=0)
>>> sheet.content
+-----+-----+-----+
| Column 1 | Column 2 | Column 3 |
+=====+=====+=====+
| 1         | 2         | 3         |
+-----+-----+-----+
| 4         | 5         | 6         |
+-----+-----+-----+
| 7         | 8         | 9         |
+-----+-----+-----+
```

## Filter out some data

You may want to filter odd rows and print them in an array of dictionaries:

```
>>> sheet.filter(row_indices=[0, 2])
>>> sheet.content
+-----+-----+-----+
| Column 1 | Column 2 | Column 3 |
+=====+=====+=====+
| 4         | 5         | 6         |
+-----+-----+-----+
```

Let's try to further filter out even columns:

```
>>> sheet.filter(column_indices=[1])
>>> sheet.content
+-----+-----+
| Column 1 | Column 3 |
+=====+=====+
| 4        | 6        |
+-----+-----+
```

## Save the data

Let's save the previous filtered data:

```
>>> sheet.save_as("example_series_filter.xls")
```

When you open *example\_series\_filter.xls*, you will find these data

Column 1	Column 3
2	8

## How to filter out empty rows in my sheet?

Suppose you have the following data in a sheet and you want to remove those rows with blanks:

```
>>> import pyexcel as pe
>>> sheet = pe.Sheet([[1,2,3],['',''],''],[['',''],''],[1,2,3]])
```

You can use `pyexcel.filters.RowValueFilter`, which examines each row, return *True* if the row should be filtered out. So, let's define a filter function:

```
>>> def filter_row(row_index, row):
...     result = [element for element in row if element != '']
...     return len(result)==0
```

And then apply the filter on the sheet:

```
>>> del sheet.row[filter_row]
>>> sheet
pyexcel sheet:
+---+---+---+
| 1 | 2 | 3 |
+---+---+---+
| 1 | 2 | 3 |
+---+---+---+
```

## 2.4.6 Book

You access each cell via this syntax:

```
book[sheet_index][row, column]
```

or:



```
book["sheet_name"][row, column]
```

Suppose you have the following sheets:

And you can randomly access a cell in a sheet:

```
>>> book = pyexcel.get_book(file_name="example.xls")
>>> print(book["Sheet 1"][0,0])
1
>>> print(book[0][0,0]) # the same cell
1
```

**Tip:** With pyexcel, you can regard single sheet reader as an two dimensional array and multi-sheet excel book reader as a ordered dictionary of two dimensional arrays.

### Write multiple sheet excel file

Suppose you have previous data as a dictionary and you want to save it as multiple sheet excel file:

```
>>> content = {
...     'Sheet 1':
...     [
...         [1.0, 2.0, 3.0],
...         [4.0, 5.0, 6.0],
...         [7.0, 8.0, 9.0]
...     ],
...     'Sheet 2':
...     [
...         ['X', 'Y', 'Z'],
...         [1.0, 2.0, 3.0],
...         [4.0, 5.0, 6.0]
...     ],
...     'Sheet 3':
...     [
...         ['O', 'P', 'Q'],
...         [3.0, 2.0, 1.0],
...         [4.0, 3.0, 2.0]
...     ]
... }
>>> book = pyexcel.get_book(bookdict=content)
>>> book.save_as("output.xls")
```

You shall get a xls file

### Read multiple sheet excel file

Let's read the previous file back:

```
>>> book = pyexcel.get_book(file_name="output.xls")
>>> sheets = book.to_dict()
>>> for name in sheets.keys():
...     print(name)
Sheet 1
Sheet 2
Sheet 3
```

## Get content

```

>>> book_dict = {
...     'Sheet 2':
...     [
...         ['X', 'Y', 'Z'],
...         [1.0, 2.0, 3.0],
...         [4.0, 5.0, 6.0]
...     ],
...     'Sheet 3':
...     [
...         ['O', 'P', 'Q'],
...         [3.0, 2.0, 1.0],
...         [4.0, 3.0, 2.0]
...     ],
...     'Sheet 1':
...     [
...         [1.0, 2.0, 3.0],
...         [4.0, 5.0, 6.0],
...         [7.0, 8.0, 9.0]
...     ]
... }
>>> book = pyexcel.get_book(bookdict=book_dict)
>>> book
Sheet 1:
+-----+-----+-----+
| 1.0 | 2.0 | 3.0 |
+-----+-----+-----+
| 4.0 | 5.0 | 6.0 |
+-----+-----+-----+
| 7.0 | 8.0 | 9.0 |
+-----+-----+-----+
Sheet 2:
+-----+-----+-----+
| X   | Y   | Z   |
+-----+-----+-----+
| 1.0 | 2.0 | 3.0 |
+-----+-----+-----+
| 4.0 | 5.0 | 6.0 |
+-----+-----+-----+
Sheet 3:
+-----+-----+-----+
| O   | P   | Q   |
+-----+-----+-----+
| 3.0 | 2.0 | 1.0 |
+-----+-----+-----+
| 4.0 | 3.0 | 2.0 |
+-----+-----+-----+
>>> print(book.rst)
Sheet 1:
= = =
1 2 3
4 5 6
7 8 9
= = =
Sheet 2:
=== === ===

```

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```
X      Y      Z
1.0    2.0    3.0
4.0    5.0    6.0
====  ====  ====
Sheet 3:
====  ====  ====
O      P      Q
3.0    2.0    1.0
4.0    3.0    2.0
====  ====  =====
```

You can get the direct access to underneath stream object. In some situation, it is desired.

```
>>> stream = book.stream.plain
```

The returned stream object has the content formatted in plain format for further reading.

## Set content

Surely, you could set content to an instance of `pyexcel.Book`.

```
>>> other_book = pyexcel.Book()
>>> other_book.bookdict = book_dict
>>> print(other_book.plain)
Sheet 1:
1  2  3
4  5  6
7  8  9
Sheet 2:
X      Y      Z
1.0    2.0    3.0
4.0    5.0    6.0
Sheet 3:
O      P      Q
3.0    2.0    1.0
4.0    3.0    2.0
```

You can set via 'xls' attribute too.

```
>>> another_book = pyexcel.Book()
>>> another_book.xls = other_book.xls
>>> print(another_book.mediawiki)
Sheet 1:
{| class="wikitable" style="text-align: left;"
|+ <!-- caption -->
|-
| align="right"| 1 || align="right"| 2 || align="right"| 3
|-
| align="right"| 4 || align="right"| 5 || align="right"| 6
|-
| align="right"| 7 || align="right"| 8 || align="right"| 9
|}
Sheet 2:
{| class="wikitable" style="text-align: left;"
|+ <!-- caption -->
```

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```

|-
| X || Y || Z
|-
| 1 || 2 || 3
|-
| 4 || 5 || 6
|}
Sheet 3:
{| class="wikitable" style="text-align: left;"
|+ <!-- caption -->
|-
| O || P || Q
|-
| 3 || 2 || 1
|-
| 4 || 3 || 2
|}

```

## Access to individual sheets

You can access individual sheet of a book via attribute:

```

>>> book = pyexcel.get_book(file_name="book.xls")
>>> book.sheet3
sheet3:
+---+---+---+
| 1 | 2 | 3 |
+---+---+---+
| 4 | 5 | 6 |
+---+---+---+
| 7 | 8 | 9 |
+---+---+---+

```

or via array notations:

```

>>> book["sheet 1"] # there is a space in the sheet name
sheet 1:
+---+---+---+
| 1 | 2 | 3 |
+---+---+---+
| 1 | 2 | 3 |
+---+---+---+
| 4 | 5 | 6 |
+---+---+---+

```

## Merge excel books

Suppose you have two excel books and each had three sheets. You can merge them and get a new book:

You also can merge individual sheets:

```

>>> book1 = pyexcel.get_book(file_name="book1.xls")
>>> book2 = pyexcel.get_book(file_name="book2.xlsx")

```

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```

>>> merged_book = book1 + book2
>>> merged_book = book1["Sheet 1"] + book2["Sheet 2"]
>>> merged_book = book1["Sheet 1"] + book2
>>> merged_book = book1 + book2["Sheet 2"]

```

## Manipulate individual sheets

### merge sheets into a single sheet

Suppose you want to merge many csv files row by row into a new sheet.

```

>>> import glob
>>> merged = pyexcel.Sheet()
>>> for file in glob.glob("*.csv"):
...     merged.row += pyexcel.get_sheet(file_name=file)
>>> merged.save_as("merged.csv")

```

### How do I read a book, process it and save to a new book

Yes, you can do that. The code looks like this:

```

import pyexcel

book = pyexcel.get_book(file_name="yourfile.xls")
for sheet in book:
    # do you processing with sheet
    # do filtering?
    pass
book.save_as("output.xls")

```

### What would happen if I save a multi sheet book into "csv" file

Well, you will get one csv file per each sheet. Suppose you have these code:

```

>>> content = {
...     'Sheet 1':
...         [
...             [1.0, 2.0, 3.0],
...             [4.0, 5.0, 6.0],
...             [7.0, 8.0, 9.0]
...         ],
...     'Sheet 2':
...         [
...             ['X', 'Y', 'Z'],
...             [1.0, 2.0, 3.0],
...             [4.0, 5.0, 6.0]
...         ],
...     'Sheet 3':
...         [
...             ['O', 'P', 'Q'],
...             [3.0, 2.0, 1.0],

```

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```

...         [4.0, 3.0, 2.0]
...     ]
... }
>>> book = pyexcel.Book(content)
>>> book.save_as("myfile.csv")

```

You will end up with three csv files:

```

>>> import glob
>>> outputfiles = glob.glob("myfile_*.csv")
>>> for file in sorted(outputfiles):
...     print(file)
...
myfile__Sheet 1__0.csv
myfile__Sheet 2__1.csv
myfile__Sheet 3__2.csv

```

and their content is the value of the dictionary at the corresponding key

Alternatively, you could use `save_book_as()` function

```

>>> pyexcel.save_book_as(bookdict=content, dest_file_name="myfile.csv")

```

### After I have saved my multiple sheet book in csv format, how do I get them back

First of all, you can read them back individual as csv file using `meth:~pyexcel.get_sheet` method. Secondly, the pyexcel can do the magic to load all of them back into a book. You will just need to provide the common name before the separator “\_”:

```

>>> book2 = pyexcel.get_book(file_name="myfile.csv")
>>> book2
Sheet 1:
+-----+-----+-----+
| 1.0 | 2.0 | 3.0 |
+-----+-----+-----+
| 4.0 | 5.0 | 6.0 |
+-----+-----+-----+
| 7.0 | 8.0 | 9.0 |
+-----+-----+-----+
Sheet 2:
+-----+-----+-----+
| X   | Y   | Z   |
+-----+-----+-----+
| 1.0 | 2.0 | 3.0 |
+-----+-----+-----+
| 4.0 | 5.0 | 6.0 |
+-----+-----+-----+
Sheet 3:
+-----+-----+-----+
| O   | P   | Q   |
+-----+-----+-----+
| 3.0 | 2.0 | 1.0 |
+-----+-----+-----+
| 4.0 | 3.0 | 2.0 |
+-----+-----+-----+

```

## 2.4.7 Working with databases

### How to import an excel sheet to a database using SQLAlchemy

**Note:** You can find the complete code of this example in examples folder on github

Before going ahead, let's import the needed components and initialize sql engine and table base:

```
>>> import os
>>> import pyexcel as p
>>> from sqlalchemy import create_engine
>>> from sqlalchemy.ext.declarative import declarative_base
>>> from sqlalchemy import Column, Integer, String, Float, Date
>>> from sqlalchemy.orm import sessionmaker
>>> engine = create_engine("sqlite:///birth.db")
>>> Base = declarative_base()
>>> Session = sessionmaker(bind=engine)
```

Let's suppose we have the following database model:

```
>>> class BirthRegister(Base):
...     __tablename__='birth'
...     id=Column(Integer, primary_key=True)
...     name=Column(String)
...     weight=Column(Float)
...     birth=Column(Date)
```

Let's create the table:

```
>>> Base.metadata.create_all(engine)
```

Now here is a sample excel file to be saved to the table:

Here is the code to import it:

```
>>> session = Session() # obtain a sql session
>>> p.save_as(file_name="birth.xls", name_columns_by_row=0, dest_session=session,
↳dest_table=BirthRegister)
```

Done it. It is that simple. Let's verify what has been imported to make sure.

```
>>> sheet = p.get_sheet(session=session, table=BirthRegister)
>>> sheet
birth:
+-----+-----+-----+-----+
| birth      | id | name  | weight |
+-----+-----+-----+-----+
| 2015-02-03 | 1  | Adam  | 3.4    |
+-----+-----+-----+-----+
| 2014-11-12 | 2  | Smith | 4.2    |
+-----+-----+-----+-----+
```

## 2.5 Old tutorial

### 2.5.1 Work with excel files

**Warning:** The pyexcel DOES NOT consider Fonts, Styles, Formulas and Charts at all. When you load a stylish excel and update it, you definitely will lose all those styles.

#### Open a csv file

Read a csv file is simple:

```
>>> import pyexcel as p
>>> sheet = p.get_sheet(file_name="example.csv")
>>> sheet
example.csv:
+---+---+---+
| 1 | 4 | 7 |
+---+---+---+
| 2 | 5 | 8 |
+---+---+---+
| 3 | 6 | 9 |
+---+---+---+
```

The same applies to a tsv file:

```
>>> sheet = p.get_sheet(file_name="example.tsv")
>>> sheet
example.tsv:
+---+---+---+
| 1 | 4 | 7 |
+---+---+---+
| 2 | 5 | 8 |
+---+---+---+
| 3 | 6 | 9 |
+---+---+---+
```

Meanwhile, a tab separated file can be read as csv too. You can specify a delimiter parameter.

```
>>> with open('tab_example.csv', 'w') as f:
...     unused = f.write('I\tam\ttab\tseparated\tcsv\n') # for passing doctest
...     unused = f.write('You\tneed\tdelimiter\tparameter\n') # unused is added
>>> sheet = p.get_sheet(file_name="tab_example.csv", delimiter='\t')
>>> sheet
tab_example.csv:
+-----+-----+-----+-----+-----+
| I   | am   | tab   | separated | csv |
+-----+-----+-----+-----+-----+
| You | need | delimiter | parameter |   |
+-----+-----+-----+-----+-----+
```

#### Add a new row to an existing file

Suppose you have one data file as the following:



And you want to add a new row:

12, 11, 10

Here is the code:

```
>>> import pyexcel as pe
>>> sheet = pe.get_sheet(file_name="example.xls")
>>> sheet.row += [12, 11, 10]
>>> sheet.save_as("new_example.xls")
>>> pe.get_sheet(file_name="new_example.xls")
pyexcel_sheet1:
+-----+-----+-----+
| Column 1 | Column 2 | Column 3 |
+-----+-----+-----+
| 1        | 4        | 7        |
+-----+-----+-----+
| 2        | 5        | 8        |
+-----+-----+-----+
| 3        | 6        | 9        |
+-----+-----+-----+
| 12       | 11       | 10       |
+-----+-----+-----+
```

### Update an existing row to an existing file

Suppose you want to update the last row of the example file as:

['N/A', 'N/A', 'N/A']

Here is the sample code:

```
.. code-block:: python
```

```
>>> import pyexcel as pe
>>> sheet = pe.get_sheet(file_name="example.xls")
>>> sheet.row[3] = ['N/A', 'N/A', 'N/A']
>>> sheet.save_as("new_example1.xls")
>>> pe.get_sheet(file_name="new_example1.xls")
pyexcel_sheet1:
+-----+-----+-----+
| Column 1 | Column 2 | Column 3 |
+-----+-----+-----+
| 1        | 4        | 7        |
+-----+-----+-----+
| 2        | 5        | 8        |
+-----+-----+-----+
| N/A     | N/A     | N/A     |
+-----+-----+-----+
```

### Add a new column to an existing file

And you want to add a column instead:

["Column 4", 10, 11, 12]

Here is the code:

```
>>> import pyexcel as pe
>>> sheet = pe.get_sheet(file_name="example.xls")
>>> sheet.column += ["Column 4", 10, 11, 12]
>>> sheet.save_as("new_example2.xls")
>>> pe.get_sheet(file_name="new_example2.xls")
pyexcel_sheet1:
+-----+-----+-----+-----+
| Column 1 | Column 2 | Column 3 | Column 4 |
+-----+-----+-----+-----+
| 1        | 4        | 7        | 10       |
+-----+-----+-----+-----+
| 2        | 5        | 8        | 11       |
+-----+-----+-----+-----+
| 3        | 6        | 9        | 12       |
+-----+-----+-----+-----+
```

### Update an existing column to an existing file

Again let's update "Column 3" with:

[100, 200, 300]

Here is the sample code:

```
>>> import pyexcel as pe
>>> sheet = pe.get_sheet(file_name="example.xls")
>>> sheet.column[2] = ["Column 3", 100, 200, 300]
>>> sheet.save_as("new_example3.xls")
>>> pe.get_sheet(file_name="new_example3.xls")
pyexcel_sheet1:
+-----+-----+-----+
| Column 1 | Column 2 | Column 3 |
+-----+-----+-----+
| 1        | 4        | 100     |
+-----+-----+-----+
| 2        | 5        | 200     |
+-----+-----+-----+
| 3        | 6        | 300     |
+-----+-----+-----+
```

Alternatively, you could have done like this:

```
>>> import pyexcel as pe
>>> sheet = pe.get_sheet(file_name="example.xls", name_columns_by_row=0)
>>> sheet.column["Column 3"] = [100, 200, 300]
>>> sheet.save_as("new_example4.xls")
>>> pe.get_sheet(file_name="new_example4.xls")
pyexcel_sheet1:
+-----+-----+-----+
| Column 1 | Column 2 | Column 3 |
+-----+-----+-----+
| 1        | 4        | 100     |
+-----+-----+-----+
| 2        | 5        | 200     |
+-----+-----+-----+
| 3        | 6        | 300     |
+-----+-----+-----+
```

How about the same alternative solution to previous row based example? Well, you'd better to have the following kind of data:

And then you want to update "Row 3" with for example:

```
[100, 200, 300]
```

These code would do the job:

```
>>> import pyexcel as pe
>>> sheet = pe.get_sheet(file_name="row_example.xls", name_rows_by_column=0)
>>> sheet.row["Row 3"] = [100, 200, 300]
>>> sheet.save_as("new_example5.xls")
>>> pe.get_sheet(file_name="new_example5.xls")
pyexcel_sheet1:
+-----+-----+-----+
| Row 1 | 1     | 2     | 3     |
+-----+-----+-----+
| Row 2 | 4     | 5     | 6     |
+-----+-----+-----+
| Row 3 | 100   | 200   | 300   |
+-----+-----+-----+
```

## 2.5.2 Work with excel files in memory

Excel files in memory can be manipulated directly without saving it to physical disk and vice versa. This is useful in excel file handling at file upload or in excel file download. For example:

```
>>> import pyexcel
>>> content = "1,2,3\n3,4,5"
>>> sheet = pyexcel.get_sheet(file_type="csv", file_content=content)
>>> sheet.csv
'1,2,3\r\n3,4,5\r\n'
```

### file type as its attributes

Since version 0.3.0, each supported file types became an attribute of the Sheet and Book class. What it means is that:

1. Read the content in memory
2. Set the content in memory

For example, after you have your Sheet and Book instance, you could access its content in a support file type by using its dot notation. The code in previous section could be rewritten as:

```
>>> import pyexcel
>>> content = "1,2,3\n3,4,5"
>>> sheet = pyexcel.Sheet()
>>> sheet.csv = content
>>> sheet.array
[[1, 2, 3], [3, 4, 5]]
```

### Read any supported excel and respond its content in json

You can find a real world example in `examples/memoryfile/` directory: `pyexcel_server.py`. Here is the example snippet

```
1 def upload():
2     if request.method == 'POST' and 'excel' in request.files:
3         # handle file upload
4         filename = request.files['excel'].filename
5         extension = filename.split(".")[1]
6         # Obtain the file extension and content
7         # pass a tuple instead of a file name
8         content = request.files['excel'].read()
9         if sys.version_info[0] > 2:
10            # in order to support python 3
11            # have to decode bytes to str
12            content = content.decode('utf-8')
13            sheet = pe.get_sheet(file_type=extension, file_content=content)
14            # then use it as usual
15            sheet.name_columns_by_row(0)
16            # respond with a json
17            return jsonify({"result": sheet.dict})
18            return render_template('upload.html')
```

`request.files['excel']` in line 4 holds the file object. line 5 finds out the file extension. line 13 obtains a sheet instance. line 15 uses the first row as data header. line 17 sends the json representation of the excel file back to client browser.

### Write to memory and respond to download

```
1 data = [
2     [...],
3     ...
4 ]
5
6 @app.route('/download')
7 def download():
8     sheet = pe.Sheet(data)
9     output = make_response(sheet.csv)
10    output.headers["Content-Disposition"] = "attachment; filename=export.csv"
11    output.headers["Content-type"] = "text/csv"
12    return output
```

`make_response` is a Flask utility to make a memory content as http response.

---

**Note:** You can find the corresponding source code at [examples/memoryfile](#)

---

### Relevant packages

Readily made plugins have been made on top of this example. Here is a list of them:

framework	plugin/middleware/extension
Flask	Flask-Excel
Django	django-excel
Pyramid	pyramid-excel

And you may make your own by using [pyexcel-webio](#)

## 2.5.3 Sheet: Data conversion

### How to obtain records from an excel sheet

Suppose you want to process the following excel data :

Here are the example code:

```
>>> import pyexcel as pe
>>> records = pe.get_records(file_name="your_file.xls")
>>> for record in records:
...     print("%s is aged at %d" % (record['Name'], record['Age']))
Adam is aged at 28
Beatrice is aged at 29
Ceri is aged at 30
Dean is aged at 26
```

### How to save an python array as an excel file

Suppose you have the following array:

```
>>> data = [[1, 2, 3], [4, 5, 6], [7, 8, 9]]
```

And here is the code to save it as an excel file

```
>>> import pyexcel
>>> pyexcel.save_as(array=data, dest_file_name="example.xls")
```

Let's verify it:

```
>>> pyexcel.get_sheet(file_name="example.xls")
pyexcel_sheet1:
+---+---+---+
| 1 | 2 | 3 |
+---+---+---+
| 4 | 5 | 6 |
+---+---+---+
| 7 | 8 | 9 |
+---+---+---+
```

### How to save an python array as a csv file with special delimiter

Suppose you have the following array:

```
>>> data = [[1, 2, 3], [4, 5, 6], [7, 8, 9]]
```

And here is the code to save it as an excel file

```
>>> import pyexcel
>>> pyexcel.save_as(array=data,
...                 dest_file_name="example.csv",
...                 dest_delimiter=':')
```

Let's verify it:

```
>>> with open("example.csv") as f:
...     for line in f.readlines():
...         print(line.rstrip())
...
1:2:3
4:5:6
7:8:9
```

## How to get a dictionary from an excel sheet

Suppose you have a csv, xls, xlsx file as the following:

The following code will give you data series in a dictionary:

```
>>> import pyexcel
>>> from pyexcel._compact import OrderedDict
>>> my_dict = pyexcel.get_dict(file_name="example_series.xls", name_columns_by_row=0)
>>> isinstance(my_dict, OrderedDict)
True
>>> for key, values in my_dict.items():
...     print({str(key): values})
{'Column 1': [1, 4, 7]}
{'Column 2': [2, 5, 8]}
{'Column 3': [3, 6, 9]}
```

Please note that my\_dict is an OrderedDict.

## How to obtain a dictionary from a multiple sheet book

Suppose you have a multiple sheet book as the following:

Here is the code to obtain those sheets as a single dictionary:

```
>>> import pyexcel
>>> import json
>>> book_dict = pyexcel.get_book_dict(file_name="book.xls")
>>> isinstance(book_dict, OrderedDict)
True
>>> for key, item in book_dict.items():
...     print(json.dumps({key: item}))
{"Sheet 1": [[1, 2, 3], [4, 5, 6], [7, 8, 9]]}
{"Sheet 2": [{"X", "Y", "Z"}, [1, 2, 3], [4, 5, 6]]}
{"Sheet 3": [{"O", "P", "Q"}, [3, 2, 1], [4, 3, 2]]}
```

## How to save a dictionary of two dimensional array as an excel file

Suppose you want to save the below dictionary to an excel file

```
>>> a_dictionary_of_two_dimensional_arrays = {
...     'Sheet 1':
...         [
...             [1.0, 2.0, 3.0],
...             [4.0, 5.0, 6.0],
...             [7.0, 8.0, 9.0]
```

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```

...     ],
...     'Sheet 2':
...     [
...         ['X', 'Y', 'Z'],
...         [1.0, 2.0, 3.0],
...         [4.0, 5.0, 6.0]
...     ],
...     'Sheet 3':
...     [
...         ['O', 'P', 'Q'],
...         [3.0, 2.0, 1.0],
...         [4.0, 3.0, 2.0]
...     ]
... }

```

Here is the code:

```

>>> pyexcel.save_book_as(
...     bookdict=a_dictionary_of_two_dimensional_arrays,
...     dest_file_name="book.xls"
... )

```

If you want to preserve the order of sheets in your dictionary, you have to pass on an ordered dictionary to the function itself. For example:

```

>>> data = OrderedDict()
>>> data.update({"Sheet 2": a_dictionary_of_two_dimensional_arrays['Sheet 2']})
>>> data.update({"Sheet 1": a_dictionary_of_two_dimensional_arrays['Sheet 1']})
>>> data.update({"Sheet 3": a_dictionary_of_two_dimensional_arrays['Sheet 3']})
>>> pyexcel.save_book_as(bookdict=data, dest_file_name="book.xls")

```

Let's verify its order:

```

>>> book_dict = pyexcel.get_book_dict(file_name="book.xls")
>>> for key, item in book_dict.items():
...     print(json.dumps({key: item}))
{"Sheet 2": [{"X", "Y", "Z"}, [1, 2, 3], [4, 5, 6]]}
{"Sheet 1": [[1, 2, 3], [4, 5, 6], [7, 8, 9]]}
{"Sheet 3": [{"O", "P", "Q"}, [3, 2, 1], [4, 3, 2]]}

```

Please notice that “Sheet 2” is the first item in the *book\_dict*, meaning the order of sheets are preserved.

## How to import an excel sheet to a database using SQLAlchemy

**Note:** You can find the complete code of this example in examples folder on github

Before going ahead, let's import the needed components and initialize sql engine and table base:

```

>>> from sqlalchemy import create_engine
>>> from sqlalchemy.ext.declarative import declarative_base
>>> from sqlalchemy import Column, Integer, String, Float, Date
>>> from sqlalchemy.orm import sessionmaker
>>> engine = create_engine("sqlite:///birth.db")

```

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```
>>> Base = declarative_base()
>>> Session = sessionmaker(bind=engine)
```

Let's suppose we have the following database model:

```
>>> class BirthRegister(Base):
...     __tablename__='birth'
...     id=Column(Integer, primary_key=True)
...     name=Column(String)
...     weight=Column(Float)
...     birth=Column(Date)
```

Let's create the table:

```
>>> Base.metadata.create_all(engine)
```

Now here is a sample excel file to be saved to the table:

Here is the code to import it:

```
>>> session = Session() # obtain a sql session
>>> pyexcel.save_as(file_name="birth.xls", name_columns_by_row=0, dest_
↳session=session, dest_table=BirthRegister)
```

Done it. It is that simple. Let's verify what has been imported to make sure.

```
>>> sheet = pyexcel.get_sheet(session=session, table=BirthRegister)
>>> sheet
birth:
+-----+-----+-----+-----+
| birth      | id | name  | weight |
+-----+-----+-----+-----+
| 2015-02-03 | 1  | Adam  | 3.4    |
+-----+-----+-----+-----+
| 2014-11-12 | 2  | Smith | 4.2    |
+-----+-----+-----+-----+
```

## How to open an xls file and save it as csv

Suppose we want to save previous used example 'birth.xls' as a csv file

```
>>> import pyexcel
>>> pyexcel.save_as(file_name="birth.xls", dest_file_name="birth.csv")
```

Again it is really simple. Let's verify what we have gotten:

```
>>> sheet = pyexcel.get_sheet(file_name="birth.csv")
>>> sheet
birth.csv:
+-----+-----+-----+
| name  | weight | birth      |
+-----+-----+-----+
| Adam  | 3.4    | 03/02/15  |
+-----+-----+-----+
| Smith | 4.2    | 12/11/14  |
+-----+-----+-----+
```



**Note:** Please note that csv(comma separate value) file is pure text file. Formula, charts, images and formatting in xls file will disappear no matter which transcoding tool you use. Hence, pyexcel is a quick alternative for this transcoding job.

## How to open an xls file and save it as xlsx

**Warning:** Formula, charts, images and formatting in xls file will disappear as pyexcel does not support Formula, charts, images and formatting.

Let use previous example and save it as ods instead

```
>>> import pyexcel
>>> pyexcel.save_as(file_name="birth.xls",
...                 dest_file_name="birth.xlsx") # change the file extension
```

Again let's verify what we have gotten:

```
>>> sheet = pyexcel.get_sheet(file_name="birth.xlsx")
>>> sheet
pyexcel_sheet1:
+-----+-----+-----+
| name  | weight | birth  |
+-----+-----+-----+
| Adam  | 3.4    | 03/02/15 |
+-----+-----+-----+
| Smith | 4.2    | 12/11/14 |
+-----+-----+-----+
```

## How to open a xls multiple sheet excel book and save it as csv

Well, you write similar codes as before but you will need to use `save_book_as()` function.

### 2.5.4 Dot notation for data source

Since version 0.3.0, the data source becomes an attribute of the pyexcel native classes. All support data format is a dot notation away.

#### For sheet

##### Get content

```
>>> import pyexcel
>>> content = "1,2,3\n3,4,5"
>>> sheet = pyexcel.get_sheet(file_type="csv", file_content=content)
>>> sheet.tsv
'1\t2\t3\r\n3\t4\t5\r\n'
>>> print(sheet.simple)
```

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```
csv:
- - -
1 2 3
3 4 5
- - -
```

What's more, you could as well set value to an attribute, for example:

```
>>> import pyexcel
>>> content = "1,2,3\n3,4,5"
>>> sheet = pyexcel.Sheet()
>>> sheet.csv = content
>>> sheet.array
[[1, 2, 3], [3, 4, 5]]
```

You can get the direct access to underneath stream object. In some situation, it is desired.

```
>>> stream = sheet.stream.tsv
```

The returned stream object has tsv formatted content for reading.

## Set content

What you could further do is to set a memory stream of any supported file format to a sheet. For example:

```
>>> another_sheet = pyexcel.Sheet()
>>> another_sheet.xls = sheet.xls
>>> another_sheet.content
+---+---+---+
| 1 | 2 | 3 |
+---+---+---+
| 3 | 4 | 5 |
+---+---+---+
```

Yet, it is possible assign a absolute url to an online excel file to an instance of *pyexcel.Sheet*.

```
>>> another_sheet.url = "https://github.com/pyexcel/pyexcel/raw/master/examples/
↳basics/multiple-sheets-example.xls"
>>> another_sheet.content
+---+---+---+
| 1 | 2 | 3 |
+---+---+---+
| 4 | 5 | 6 |
+---+---+---+
| 7 | 8 | 9 |
+---+---+---+
```

## For book

The same dot notation is available to *pyexcel.Book* as well.

## Get content

```

>>> book_dict = {
...     'Sheet 2':
...     [
...         ['X', 'Y', 'Z'],
...         [1.0, 2.0, 3.0],
...         [4.0, 5.0, 6.0]
...     ],
...     'Sheet 3':
...     [
...         ['O', 'P', 'Q'],
...         [3.0, 2.0, 1.0],
...         [4.0, 3.0, 2.0]
...     ],
...     'Sheet 1':
...     [
...         [1.0, 2.0, 3.0],
...         [4.0, 5.0, 6.0],
...         [7.0, 8.0, 9.0]
...     ]
... }
>>> book = pyexcel.get_book(bookdict=book_dict)
>>> book
Sheet 1:
+-----+-----+-----+
| 1.0 | 2.0 | 3.0 |
+-----+-----+-----+
| 4.0 | 5.0 | 6.0 |
+-----+-----+-----+
| 7.0 | 8.0 | 9.0 |
+-----+-----+-----+
Sheet 2:
+-----+-----+-----+
| X   | Y   | Z   |
+-----+-----+-----+
| 1.0 | 2.0 | 3.0 |
+-----+-----+-----+
| 4.0 | 5.0 | 6.0 |
+-----+-----+-----+
Sheet 3:
+-----+-----+-----+
| O   | P   | Q   |
+-----+-----+-----+
| 3.0 | 2.0 | 1.0 |
+-----+-----+-----+
| 4.0 | 3.0 | 2.0 |
+-----+-----+-----+
>>> print(book.rst)
Sheet 1:
= = =
1 2 3
4 5 6
7 8 9
= = =
Sheet 2:
=== === ===

```

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```

X      Y      Z
1.0    2.0    3.0
4.0    5.0    6.0
====  ====  ====
Sheet 3:
====  ====  ====
O      P      Q
3.0    2.0    1.0
4.0    3.0    2.0
====  ====  ====

```

You can get the direct access to underneath stream object. In some situation, it is desired.

```
>>> stream = sheet.stream.plain
```

The returned stream object has the content formatted in plain format for further reading.

## Set content

Surely, you could set content to an instance of *pyexcel.Book*.

```

>>> other_book = pyexcel.Book()
>>> other_book.bookdict = book_dict
>>> print(other_book.plain)
Sheet 1:
1 2 3
4 5 6
7 8 9
Sheet 2:
X      Y      Z
1.0    2.0    3.0
4.0    5.0    6.0
Sheet 3:
O      P      Q
3.0    2.0    1.0
4.0    3.0    2.0

```

You can set via 'xls' attribute too.

```

>>> another_book = pyexcel.Book()
>>> another_book.xls = other_book.xls
>>> print(another_book.mediawiki)
Sheet 1:
{| class="wikitable" style="text-align: left;"
|+ <!-- caption -->
|-
| align="right"| 1 || align="right"| 2 || align="right"| 3
|-
| align="right"| 4 || align="right"| 5 || align="right"| 6
|-
| align="right"| 7 || align="right"| 8 || align="right"| 9
|}
Sheet 2:
{| class="wikitable" style="text-align: left;"
|+ <!-- caption -->

```

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```

|-
| X || Y || Z
|-
| 1 || 2 || 3
|-
| 4 || 5 || 6
|}
Sheet 3:
{| class="wikitable" style="text-align: left;"
|+ <!-- caption -->
|-
| O || P || Q
|-
| 3 || 2 || 1
|-
| 4 || 3 || 2
|}

```

### How about setting content via a url?

```

>>> another_book.url = "https://github.com/pyexcel/pyexcel/raw/master/examples/basics/
↳multiple-sheets-example.xls"
>>> another_book
Sheet 1:
+---+---+---+
| 1 | 2 | 3 |
+---+---+---+
| 4 | 5 | 6 |
+---+---+---+
| 7 | 8 | 9 |
+---+---+---+
Sheet 2:
+---+---+---+
| X | Y | Z |
+---+---+---+
| 1 | 2 | 3 |
+---+---+---+
| 4 | 5 | 6 |
+---+---+---+
Sheet 3:
+---+---+---+
| O | P | Q |
+---+---+---+
| 3 | 2 | 1 |
+---+---+---+
| 4 | 3 | 2 |
+---+---+---+

```

### Getters and Setters

You can pass on source specific parameters to getter and setter functions.

```

>>> content = "1-2-3\n3-4-5"
>>> sheet = pyexcel.Sheet()
>>> sheet.set_csv(content, delimiter="-")

```

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```
>>> sheet.csv
'1,2,3\r\n3,4,5\r\n'
>>> sheet.get_csv(delimiter="|")
'1|2|3\r\n3|4|5\r\n'
```

## 2.5.5 Read partial data

Here the code to get an array of data from your excel file.

The following code will give you the data in json:

```
>>> import pyexcel
>>> # "example.csv", "example.xlsx", "example.xlsxm"
>>> my_array = pyexcel.get_array(file_name="example.xls")
>>> my_array
[[1, 2, 3], [4, 5, 6], [7, 8, 9]]
```

## Pagination

When you are dealing with huge amount of data, e.g. 64GB, obviously you would not like to fill up your memory with those data. Hence pagination feature is developed to read partial data into memory for processing. You can paginate by row, by column and by both.

Please note that *pyexcel-xls*, *pyexcel-xlsx*, *pyexcel-ods* and *pyexcel-ods3* will read all data into memory. And pagination code here only limits the data returned to your program. With that said, csv readers, *pyexcel-xlsxr* and *pyexcel-ods* DOES read partial data into memory.

Let's assume the following file is a huge csv file:

```
>>> import datetime
>>> import pyexcel as pe
>>> data = [
...     [1, 21, 31],
...     [2, 22, 32],
...     [3, 23, 33],
...     [4, 24, 34],
...     [5, 25, 35],
...     [6, 26, 36]
... ]
>>> pe.save_as(array=data, dest_file_name="your_file.csv")
```

And let's pretend to read partial data:

```
>>> pe.get_sheet(file_name="your_file.csv", start_row=2, row_limit=3)
your_file.csv:
+---+---+---+
| 3 | 23 | 33 |
+---+---+---+
| 4 | 24 | 34 |
+---+---+---+
| 5 | 25 | 35 |
+---+---+---+
```

And you could as well do the same for columns:

```
>>> pe.get_sheet(file_name="your_file.csv", start_column=1, column_limit=2)
your_file.csv:
+----+----+
| 21 | 31 |
+----+----+
| 22 | 32 |
+----+----+
| 23 | 33 |
+----+----+
| 24 | 34 |
+----+----+
| 25 | 35 |
+----+----+
| 26 | 36 |
+----+----+
```

Obvious, you could do both at the same time:

```
>>> pe.get_sheet(file_name="your_file.csv",
...             start_row=2, row_limit=3,
...             start_column=1, column_limit=2)
your_file.csv:
+----+----+
| 23 | 33 |
+----+----+
| 24 | 34 |
+----+----+
| 25 | 35 |
+----+----+
```

The pagination support is available across all pyexcel plugins.

---

**Note:** No column pagination support for query sets as data source.

---

## Formatting while transcoding a big data file

If you are transcoding a big data set, conventional formatting method would not help unless a on-demand free RAM is available. However, there is a way to minimize the memory footprint of pyexcel while the formatting is performed.

Let's continue from previous example. Suppose we want to transcode "your\_file.csv" to "your\_file.xls" but increase each element by 1.

What we can do is to define a row renderer function as the following:

```
>>> def increment_by_one(row):
...     for element in row:
...         yield element + 1
```

Then pass it onto save\_as function using row\_renderer:

```
>>> pe.isave_as(file_name="your_file.csv",
...             row_renderer=increment_by_one,
...             dest_file_name="your_file.xlsx")
```

**Note:** If the data content is from a generator, `isave_as` has to be used.

---

We can verify if it was done correctly:

```
>>> pe.get_sheet(file_name="your_file.xlsx")
your_file.csv:
+---+---+---+
| 2 | 22 | 32 |
+---+---+---+
| 3 | 23 | 33 |
+---+---+---+
| 4 | 24 | 34 |
+---+---+---+
| 5 | 25 | 35 |
+---+---+---+
| 6 | 26 | 36 |
+---+---+---+
| 7 | 27 | 37 |
+---+---+---+
```

## 2.5.6 Sheet: Data Access

### Iterate a csv file

Here is the way to read the csv file and iterate through each row:

```
>>> sheet = pyexcel.get_sheet(file_name='tutorial.csv')
>>> for row in sheet:
...     print("%s: %s" % (row[0], row[1]))
Name: Age
Chu Chu: 10
Mo mo: 11
```

Often people wanted to use `csv.Dict` reader to read it because it has a header. Here is how you do it with `pyexcel`:

```
1 >>> sheet = pyexcel.get_sheet(file_name='tutorial.csv')
2 >>> sheet.name_columns_by_row(0)
3 >>> for row in sheet:
4 ...     print("%s: %s" % (row[0], row[1]))
5 Chu Chu: 10
6 Mo mo: 11
```

Line 2 remove the header from the actual content. The removed header can be used to access its columns using the name itself, for example:

```
>>> sheet.column['Age']
[10, 11]
```

### Random access to individual cell

Top left corner of a sheet is (0, 0), meaning both row index and column index start from 0. To randomly access a cell of `Sheet` instance, two syntax are available:



```
sheet[row, column]
```

This syntax helps you iterate the data by row and by column. If you use excel positions, the syntax below help you get the cell instantly without converting alphabet column index to integer:

```
sheet['A1']
```

Please note that with excel positions, top left corner is 'A1'.

For example: suppose you have the following data sheet,

here is the example code showing how you can randomly access a cell:

```
>>> sheet = pyexcel.get_sheet(file_name="example.xls")
>>> sheet.content
+-----+----+----+----+
| Example | X | Y | Z |
+-----+----+----+----+
| a       | 1 | 2 | 3 |
+-----+----+----+----+
| b       | 4 | 5 | 6 |
+-----+----+----+----+
| c       | 7 | 8 | 9 |
+-----+----+----+----+
>>> print(sheet[3, 2])
8
>>> print(sheet["D3"])
6
>>> sheet[2, 3] = 10
>>> print(sheet[2, 3])
10
```

**Note:** In order to set a value to a cell, please use `sheet[row_index, column_index] = new_value`

## Random access to rows and columns

Continue with previous excel file, you can access row and column separately:

```
>>> sheet.row[1]
['a', 1, 2, 3]
>>> sheet.column[2]
['Y', 2, 5, 8]
```

## Use custom names instead of index

Alternatively, it is possible to use the first row to refer to each columns:

```
>>> sheet.name_columns_by_row(0)
>>> print(sheet[1, "Y"])
5
>>> sheet[1, "Y"] = 100
>>> print(sheet[1, "Y"])
100
```

You have noticed the row index has been changed. It is because first row is taken as the column names, hence all rows after the first row are shifted. Now accessing the columns are changed too:

```
>>> sheet.column['Y']
[2, 100, 8]
```

Hence access the same cell, this statement also works:

```
>>> sheet.column['Y'][1]
100
```

Further more, it is possible to use first column to refer to each rows:

```
>>> sheet.name_rows_by_column(0)
```

To access the same cell, we can use this line:

```
>>> sheet.row["b"][1]
100
```

For the same reason, the row index has been reduced by 1. Since we have named columns and rows, it is possible to access the same cell like this:

```
>>> print(sheet["b", "Y"])
100
>>> sheet["b", "Y"] = 200
>>> print(sheet["b", "Y"])
200
```

---

**Note:** When you have named your rows and columns, in order to set a value to a cell, please use `sheet[row_name, column_name] = new_value`

---

For multiple sheet file, you can regard it as three dimensional array if you use *Book*. So, you access each cell via this syntax:

```
book[sheet_index][row, column]
```

or:

```
book["sheet_name"][row, column]
```

Suppose you have the following sheets:

And you can randomly access a cell in a sheet:

```
>>> book = pyexcel.get_book(file_name="example.xls")
>>> print(book["Sheet 1"][0,0])
1
>>> print(book[0][0,0]) # the same cell
1
```

---

**Tip:** With pyexcel, you can regard single sheet reader as an two dimensional array and multi-sheet excel book reader as a ordered dictionary of two dimensional arrays.

---

## Reading a single sheet excel file

Suppose you have a csv, xls, xlsx file as the following:

The following code will give you the data in json:

```
>>> import json
>>> # "example.csv", "example.xlsx", "example.xlsm"
>>> sheet = pyexcel.get_sheet(file_name="example.xls")
>>> print(json.dumps(sheet.to_array()))
[[1, 2, 3], [4, 5, 6], [7, 8, 9]]
```

## Read the sheet as a dictionary

Suppose you have a csv, xls, xlsx file as the following:

The following code will give you data series in a dictionary:

```
>>> # "example.xls", "example.xlsx", "example.xlsm"
>>> sheet = pyexcel.get_sheet(file_name="example_series.xls", name_columns_by_row=0)
```

```
>>> sheet.to_dict()
OrderedDict([('Column 1', [1, 4, 7]), ('Column 2', [2, 5, 8]), ('Column 3', [3, 6, 9])])
```

## Can I get an array of dictionaries per each row?

Suppose you have the following data:

The following code will produce what you want:

```
>>> # "example.csv", "example.xlsx", "example.xlsm"
>>> sheet = pyexcel.get_sheet(file_name="example.xls", name_columns_by_row=0)
>>> records = sheet.to_records()
>>> for record in records:
...     keys = sorted(record.keys())
...     print("{")
...     for key in keys:
...         print("'{}': {}".format(key, record[key]))
...     print("}")
{
'X':1
'Y':2
'Z':3
}
{
'X':4
'Y':5
'Z':6
}
{
'X':7
'Y':8
'Z':9
}
```

## Writing a single sheet excel file

Suppose you have an array as the following:

1	2	3
4	5	6
7	8	9

The following code will write it as an excel file of your choice:

```
.. testcode::
```

```
>>> array = [[1, 2, 3], [4, 5, 6], [7, 8, 9]]
>>> # "output.xls" "output.xlsx" "output.ods" "output.xlsm"
>>> sheet = pyexcel.Sheet(array)
>>> sheet.save_as("output.csv")
```

Suppose you have a dictionary as the following:

The following code will write it as an excel file of your choice:

```
>>> example_dict = {"Column 1": [1, 2, 3], "Column 2": [4, 5, 6], "Column 3": [7, 8, 9]}
>>> # "output.xls" "output.xlsx" "output.ods" "output.xlsm"
>>> sheet = pyexcel.get_sheet(adict=example_dict)
>>> sheet.save_as("output.csv")
```

## Write multiple sheet excel file

Suppose you have previous data as a dictionary and you want to save it as multiple sheet excel file:

```
>>> content = {
...     'Sheet 1':
...     [
...         [1.0, 2.0, 3.0],
...         [4.0, 5.0, 6.0],
...         [7.0, 8.0, 9.0]
...     ],
...     'Sheet 2':
...     [
...         ['X', 'Y', 'Z'],
...         [1.0, 2.0, 3.0],
...         [4.0, 5.0, 6.0]
...     ],
...     'Sheet 3':
...     [
...         ['O', 'P', 'Q'],
...         [3.0, 2.0, 1.0],
...         [4.0, 3.0, 2.0]
...     ]
... }
>>> book = pyexcel.get_book(bookdict=content)
>>> book.save_as("output.xls")
```

You shall get a xls file

## Read multiple sheet excel file

Let's read the previous file back:

```
>>> book = pyexcel.get_book(file_name="output.xls")
>>> sheets = book.to_dict()
>>> for name in sheets.keys():
...     print(name)
Sheet 1
Sheet 2
Sheet 3
```

## Work with data series in a single sheet

Suppose you have the following data in any of the supported excel formats again:

```
>>> sheet = pyexcel.get_sheet(file_name="example_series.xls", name_columns_by_row=0)
```

## Play with data

You can get headers:

```
>>> print(list(sheet.colnames))
['Column 1', 'Column 2', 'Column 3']
```

You can use a utility function to get all in a dictionary:

```
>>> sheet.to_dict()
OrderedDict([('Column 1', [1, 4, 7]), ('Column 2', [2, 5, 8]), ('Column 3', [3, 6, 9])])
```

Maybe you want to get only the data without the column headers. You can call `rows()` instead:

```
>>> list(sheet.rows())
[[1, 2, 3], [4, 5, 6], [7, 8, 9]]
```

You can get data from the bottom to the top one by calling `rrows()` instead:

```
>>> list(sheet.rrows())
[[7, 8, 9], [4, 5, 6], [1, 2, 3]]
```

You might want the data arranged vertically. You can call `columns()` instead:

```
>>> list(sheet.columns())
[[1, 4, 7], [2, 5, 8], [3, 6, 9]]
```

You can get columns in reverse sequence as well by calling `rcolumns()` instead:

```
>>> list(sheet.rcolumns())
[[3, 6, 9], [2, 5, 8], [1, 4, 7]]
```

Do you want to flatten the data? You can get the content in one dimensional array. If you are interested in playing with one dimensional enumeration, you can check out these functions `enumerate()`, `reverse()`, `vertical()`, and `rvertical()`:

```
>>> list(sheet.enumerate())
[1, 2, 3, 4, 5, 6, 7, 8, 9]
>>> list(sheet.reverse())
[9, 8, 7, 6, 5, 4, 3, 2, 1]
>>> list(sheet.vertical())
[1, 4, 7, 2, 5, 8, 3, 6, 9]
>>> list(sheet.rvertical())
[9, 6, 3, 8, 5, 2, 7, 4, 1]
```

## 2.5.7 Sheet: Data manipulation

The data in a sheet is represented by *Sheet* which maintains the data as a list of lists. You can regard *Sheet* as a two dimensional array with additional iterators. Random access to individual column and row is exposed by `Column` and `Row`

### Column manipulation

Suppose have one data file as the following:

```
>>> sheet = pyexcel.get_sheet(file_name="example.xls", name_columns_by_row=0)
>>> sheet
pyexcel sheet:
+-----+-----+-----+
| Column 1 | Column 2 | Column 3 |
+=====+=====+=====+
| 1         | 4         | 7         |
+-----+-----+-----+
| 2         | 5         | 8         |
+-----+-----+-----+
| 3         | 6         | 9         |
+-----+-----+-----+
```

And you want to update `Column 2` with these data: `[11, 12, 13]`

```
>>> sheet.column["Column 2"] = [11, 12, 13]
>>> sheet.column[1]
[11, 12, 13]
>>> sheet
pyexcel sheet:
+-----+-----+-----+
| Column 1 | Column 2 | Column 3 |
+=====+=====+=====+
| 1         | 11        | 7         |
+-----+-----+-----+
| 2         | 12        | 8         |
+-----+-----+-----+
| 3         | 13        | 9         |
+-----+-----+-----+
```

### Remove one column of a data file

If you want to remove `Column 2`, you can just call:

```
>>> del sheet.column["Column 2"]
>>> sheet.column["Column 3"]
[7, 8, 9]
```

The sheet content will become:

```
>>> sheet
pyexcel sheet:
+-----+-----+
| Column 1 | Column 3 |
+=====+=====+
| 1        | 7        |
+-----+-----+
| 2        | 8        |
+-----+-----+
| 3        | 9        |
+-----+-----+
```

### Append more columns to a data file

Continue from previous example. Suppose you want add two more columns to the data file

Column 4	Column 5
10	13
11	14
12	15

Here is the example code to append two extra columns:

```
>>> extra_data = [
...     ["Column 4", "Column 5"],
...     [10, 13],
...     [11, 14],
...     [12, 15]
... ]
>>> sheet2 = pyexcel.Sheet(extra_data)
>>> sheet.column += sheet2
>>> sheet.column["Column 4"]
[10, 11, 12]
>>> sheet.column["Column 5"]
[13, 14, 15]
```

Here is what you will get:

```
>>> sheet
pyexcel sheet:
+-----+-----+-----+-----+
| Column 1 | Column 3 | Column 4 | Column 5 |
+=====+=====+=====+=====+
| 1        | 7        | 10       | 13       |
+-----+-----+-----+-----+
| 2        | 8        | 11       | 14       |
+-----+-----+-----+-----+
| 3        | 9        | 12       | 15       |
+-----+-----+-----+-----+
```

## Cherry pick some columns to be removed

Suppose you have the following data:

```
>>> data = [
...     ['a', 'b', 'c', 'd', 'e', 'f', 'g', 'h'],
...     [1,2,3,4,5,6,7,9],
... ]
>>> sheet = pyexcel.Sheet(data, name_columns_by_row=0)
>>> sheet
pyexcel sheet:
+---+---+---+---+---+---+---+---+
| a | b | c | d | e | f | g | h |
+---+---+---+---+---+---+---+---+
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 9 |
+---+---+---+---+---+---+---+---+
```

And you want to remove columns named as: 'a', 'c', 'e', 'h'. This is how you do it:

```
>>> del sheet.column['a', 'c', 'e', 'h']
>>> sheet
pyexcel sheet:
+---+---+---+---+
| b | d | f | g |
+---+---+---+---+
| 2 | 4 | 6 | 7 |
+---+---+---+---+
```

## What if the headers are in a different row

Suppose you have the following data:

```
>>> sheet
pyexcel sheet:
+-----+-----+-----+
| 1       | 2       | 3       |
+-----+-----+-----+
| Column 1 | Column 2 | Column 3 |
+-----+-----+-----+
| 4       | 5       | 6       |
+-----+-----+-----+
```

The way to name your columns is to use index 1:

```
>>> sheet.name_columns_by_row(1)
```

Here is what you get:

```
>>> sheet
pyexcel sheet:
+-----+-----+-----+
| Column 1 | Column 2 | Column 3 |
+-----+-----+-----+
| 1       | 2       | 3       |
+-----+-----+-----+
```

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```
| 4 | 5 | 6 |
+-----+
```

## Row manipulation

Suppose you have the following data:

```
>>> sheet
pyexcel sheet:
+---+---+---+---+
| a | b | c | Row 1 |
+---+---+---+---+
| e | f | g | Row 2 |
+---+---+---+---+
| 1 | 2 | 3 | Row 3 |
+---+---+---+---+
```

You can name your rows by column index at 3:

```
>>> sheet.name_rows_by_column(3)
>>> sheet
pyexcel sheet:
+-----+---+---+---+
| Row 1 | a | b | c |
+-----+---+---+---+
| Row 2 | e | f | g |
+-----+---+---+---+
| Row 3 | 1 | 2 | 3 |
+-----+---+---+---+
```

Then you can access rows by its name:

```
>>> sheet.row["Row 1"]
['a', 'b', 'c']
```

## 2.5.8 Sheet: Data filtering

use `filter()` function to apply a filter immediately. The content is modified.

Suppose you have the following data in any of the supported excel formats:

Column 1	Column 2	Column 3
1	4	7
2	5	8
3	6	9

```
>>> import pyexcel
```

```
>>> sheet = pyexcel.get_sheet(file_name="example_series.xls", name_columns_by_row=0)
>>> sheet.content
+-----+---+---+---+
| Column 1 | Column 2 | Column 3 |
```

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```

+=====+=====+=====+
| 1      | 2      | 3      |
+-----+-----+-----+
| 4      | 5      | 6      |
+-----+-----+-----+
| 7      | 8      | 9      |
+-----+-----+-----+

```

## Filter out some data

You may want to filter odd rows and print them in an array of dictionaries:

```

>>> sheet.filter(row_indices=[0, 2])
>>> sheet.content
+-----+-----+-----+
| Column 1 | Column 2 | Column 3 |
+=====+=====+=====+
| 4      | 5      | 6      |
+-----+-----+-----+

```

Let's try to further filter out even columns:

```

>>> sheet.filter(column_indices=[1])
>>> sheet.content
+-----+-----+
| Column 1 | Column 3 |
+=====+=====+
| 4      | 6      |
+-----+-----+

```

## Save the data

Let's save the previous filtered data:

```

>>> sheet.save_as("example_series_filter.xls")

```

When you open *example\_series\_filter.xls*, you will find these data

Column 1	Column 3
2	8

## How to filter out empty rows in my sheet?

Suppose you have the following data in a sheet and you want to remove those rows with blanks:

```

>>> import pyexcel as pe
>>> sheet = pe.Sheet([[1,2,3],[' ',' ',' '],[' ',' ',' '], [1,2,3]])

```

You can use `pyexcel.filters.RowValueFilter`, which examines each row, return `True` if the row should be filtered out. So, let's define a filter function:

```
>>> def filter_row(row_index, row):
...     result = [element for element in row if element != '']
...     return len(result)==0
```

And then apply the filter on the sheet:

```
>>> del sheet.row[filter_row]
>>> sheet
pyexcel sheet:
+---+---+---+
| 1 | 2 | 3 |
+---+---+---+
| 1 | 2 | 3 |
+---+---+---+
```

## 2.5.9 Sheet: Formatting

Previous section has assumed the data is in the format that you want. In reality, you have to manipulate the data types a bit to suit your needs. Hence, formatters comes into the scene. use `format()` to apply formatter immediately.

---

**Note:** `int`, `float` and `datetime` values are automatically detected in `csv` files since `pyexcel` version 0.2.2

---

### Convert a column of numbers to strings

Suppose you have the following data:

```
>>> import pyexcel
>>> data = [
...     ["userid", "name"],
...     [10120, "Adam"],
...     [10121, "Bella"],
...     [10122, "Cedar"]
... ]
>>> sheet = pyexcel.Sheet(data)
>>> sheet.name_columns_by_row(0)
>>> sheet.column["userid"]
[10120, 10121, 10122]
```

As you can see, `userid` column is of `int` type. Next, let's convert the column to string format:

```
>>> sheet.column.format("userid", str)
>>> sheet.column["userid"]
['10120', '10121', '10122']
```

### Cleanse the cells in a spread sheet

Sometimes, the data in a spreadsheet may have unwanted strings in all or some cells. Let's take an example. Suppose we have a spread sheet that contains all strings but it as random spaces before and after the text values. Some field had weird characters, such as “&nbsp;&nbsp; &nbsp;   ”:

```
>>> data = [
...     ["      Version", "      Comments", "      Author &nbsp;"],
...     [" v0.0.1      ", " Release versions", "      &nbsp;Eda"],
...     ["&nbsp; v0.0.2   ", "Useful updates &nbsp; &nbsp; ", " &nbsp;&nbsp;Freud"]
... ]
>>> sheet = pyexcel.Sheet(data)
>>> sheet.content
+-----+-----+-----+
|      Version |      Comments      |      Author &nbsp; |
+-----+-----+-----+
| v0.0.1      | Release versions   |      &nbsp;Eda |
+-----+-----+-----+
| &nbsp; v0.0.2   | Useful updates &nbsp; &nbsp; | &nbsp;&nbsp;Freud |
+-----+-----+-----+
```

Now try to create a custom cleanse function:

```
.. code-block:: python
```

```
>>> def cleanse_func(v):
...     v = v.replace("&nbsp;", "")
...     v = v.rstrip().strip()
...     return v
... 
```

Then let's create a SheetFormatter and apply it:

```
.. code-block:: python
```

```
>>> sheet.map(cleanse_func)
```

So in the end, you get this:

```
>>> sheet.content
+-----+-----+-----+
| Version | Comments      | Author |
+-----+-----+-----+
| v0.0.1  | Release versions | Eda    |
+-----+-----+-----+
| v0.0.2  | Useful updates  | Freud  |
+-----+-----+-----+
```

## 2.5.10 Book: Sheet operations

### Access to individual sheets

You can access individual sheet of a book via attribute:

```
>>> book = pyexcel.get_book(file_name="book.xls")
>>> book.sheet3
sheet3:
+---+---+---+
| 1 | 2 | 3 |
+---+---+---+
```

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```
| 4 | 5 | 6 |
+---+---+---+
| 7 | 8 | 9 |
+---+---+---+
```

or via array notations:

```
>>> book["sheet 1"] # there is a space in the sheet name
sheet 1:
+---+---+---+
| 1 | 2 | 3 |
+---+---+---+
| 1 | 2 | 3 |
+---+---+---+
| 4 | 5 | 6 |
+---+---+---+
```

## Merge excel books

Suppose you have two excel books and each had three sheets. You can merge them and get a new book:

You also can merge individual sheets:

```
>>> book1 = pyexcel.get_book(file_name="book1.xls")
>>> book2 = pyexcel.get_book(file_name="book2.xlsx")
>>> merged_book = book1 + book2
>>> merged_book = book1["Sheet 1"] + book2["Sheet 2"]
>>> merged_book = book1["Sheet 1"] + book2
>>> merged_book = book1 + book2["Sheet 2"]
```

## Manipulate individual sheets

### merge sheets into a single sheet

Suppose you want to merge many csv files row by row into a new sheet.

```
>>> import glob
>>> merged = pyexcel.Sheet()
>>> for file in glob.glob("*.csv"):
...     merged.row += pyexcel.get_sheet(file_name=file)
>>> merged.save_as("merged.csv")
```

## How do I read a book, process it and save to a new book

Yes, you can do that. The code looks like this:

```
import pyexcel

book = pyexcel.get_book(file_name="yourfile.xls")
for sheet in book:
    # do you processing with sheet
    # do filtering?
```

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```
pass
book.save_as("output.xls")
```

### What would happen if I save a multi sheet book into “csv” file

Well, you will get one csv file per each sheet. Suppose you have these code:

```
>>> content = {
...     'Sheet 1':
...     [
...         [1.0, 2.0, 3.0],
...         [4.0, 5.0, 6.0],
...         [7.0, 8.0, 9.0]
...     ],
...     'Sheet 2':
...     [
...         ['X', 'Y', 'Z'],
...         [1.0, 2.0, 3.0],
...         [4.0, 5.0, 6.0]
...     ],
...     'Sheet 3':
...     [
...         ['O', 'P', 'Q'],
...         [3.0, 2.0, 1.0],
...         [4.0, 3.0, 2.0]
...     ]
... }
>>> book = pyexcel.Book(content)
>>> book.save_as("myfile.csv")
```

You will end up with three csv files:

```
>>> import glob
>>> outputfiles = glob.glob("myfile_*.csv")
>>> for file in sorted(outputfiles):
...     print(file)
...
myfile__Sheet 1__0.csv
myfile__Sheet 2__1.csv
myfile__Sheet 3__2.csv
```

and their content is the value of the dictionary at the corresponding key

Alternatively, you could use `save_book_as()` function

```
>>> pyexcel.save_book_as(bookdict=content, dest_file_name="myfile.csv")
```

### After I have saved my multiple sheet book in csv format, how do I get them back

First of all, you can read them back individual as csv file using `meth:~pyexcel.get_sheet` method. Secondly, the pyexcel can do the magic to load all of them back into a book. You will just need to provide the common name before the separator “\_\_”:

```

>>> book2 = pyexcel.get_book(file_name="myfile.csv")
>>> book2
Sheet 1:
+-----+-----+-----+
| 1.0 | 2.0 | 3.0 |
+-----+-----+-----+
| 4.0 | 5.0 | 6.0 |
+-----+-----+-----+
| 7.0 | 8.0 | 9.0 |
+-----+-----+-----+
Sheet 2:
+-----+-----+-----+
| X   | Y   | Z   |
+-----+-----+-----+
| 1.0 | 2.0 | 3.0 |
+-----+-----+-----+
| 4.0 | 5.0 | 6.0 |
+-----+-----+-----+
Sheet 3:
+-----+-----+-----+
| O   | P   | Q   |
+-----+-----+-----+
| 3.0 | 2.0 | 1.0 |
+-----+-----+-----+
| 4.0 | 3.0 | 2.0 |
+-----+-----+-----+

```

## 2.6 Cook book

### 2.6.1 Recipes

**Warning:** The pyexcel DOES NOT consider Fonts, Styles and Charts at all. In the resulting excel files, fonts, styles and charts will not be transferred.

These recipes give a one-stop utility functions for known use cases. Similar functionality can be achieved using other application interfaces.

#### Update one column of a data file

Suppose you have one data file as the following:

example.xls

Column 1	Column 2	Column 3
1	4	7
2	5	8
3	6	9

And you want to update Column 2 with these data: [11, 12, 13]

Here is the code:

```
>>> from pyexcel.cookbook import update_columns
>>> custom_column = {"Column 2": [11, 12, 13]}
>>> update_columns("example.xls", custom_column, "output.xls")
```

Your output.xls will have these data:

Column 1	Column 2	Column 3
1	11	7
2	12	8
3	13	9

### Update one row of a data file

Suppose you have the same data file:

example.xls

Row 1	1	2	3
Row 2	4	5	6
Row 3	7	8	9

And you want to update the second row with these data: [7, 4, 1]

Here is the code:

```
>>> from pyexcel.cookbook import update_rows
>>> custom_row = {"Row 1": [11, 12, 13]}
>>> update_rows("example.xls", custom_row, "output.xls")
>>> pyexcel.get_sheet(file_name="output.xls")
pyexcel sheet:
+-----+-----+-----+-----+
| Row 1 | 11 | 12 | 13 |
+-----+-----+-----+-----+
| Row 2 | 4  | 5  | 6  |
+-----+-----+-----+-----+
| Row 3 | 7  | 8  | 9  |
+-----+-----+-----+-----+
```

### Merge two files into one

Suppose you want to merge the following two data files:

example.csv

Column 1	Column 2	Column 3
1	4	7
2	5	8
3	6	9

example.xls



Column 4	Column 5
10	12
11	13

The following code will merge the tow into one file, say “output.xls”:

```
>>> from pyexcel.cookbook import merge_two_files
>>> merge_two_files("example.csv", "example.xls", "output.xls")
```

The output.xls would have the following data:

Column 1	Column 2	Column 3	Column 4	Column 5
1	4	7	10	12
2	5	8	11	13
3	6	9		

### Select candidate columns of two files and form a new one

Suppose you have these two files:

example.ods

Column 1	Column 2	Column 3	Column 4	Column 5
1	4	7	10	13
2	5	8	11	14
3	6	9	12	15

example.xls

Column 6	Column 7	Column 8	Column 9	Column 10
16	17	18	19	20

```
>>> data = [
...     ["Column 1", "Column 2", "Column 3", "Column 4", "Column 5"],
...     [1, 4, 7, 10, 13],
...     [2, 5, 8, 11, 14],
...     [3, 6, 9, 12, 15]
... ]
>>> s = pyexcel.Sheet(data)
>>> s.save_as("example.csv")
>>> data = [
...     ["Column 6", "Column 7", "Column 8", "Column 9", "Column 10"],
...     [16, 17, 18, 19, 20]
... ]
>>> s = pyexcel.Sheet(data)
>>> s.save_as("example.xls")
```

And you want to filter out column 2 and 4 from example.ods, filter out column 6 and 7 and merge them:

Column 1	Column 3	Column 5	Column 8	Column 9	Column 10
1	7	13	18	19	20
2	8	14			
3	9	15			

The following code will do the job:

```
>>> from pyexcel.cookbook import merge_two_readers
>>> sheet1 = pyexcel.get_sheet(file_name="example.csv", name_columns_by_row=0)
>>> sheet2 = pyexcel.get_sheet(file_name="example.xls", name_columns_by_row=0)
>>> del sheet1.column[1, 3, 5]
>>> del sheet2.column[0, 1]
>>> merge_two_readers(sheet1, sheet2, "output.xls")
```

### Merge two files into a book where each file become a sheet

Suppose you want to merge the following two data files:

example.csv

Column 1	Column 2	Column 3
1	4	7
2	5	8
3	6	9

example.xls

Column 4	Column 5
10	12
11	13

```
>>> data = [
...     ["Column 1", "Column 2", "Column 3"],
...     [1, 2, 3],
...     [4, 5, 6],
...     [7, 8, 9]
... ]
>>> s = pyexcel.Sheet(data)
>>> s.save_as("example.csv")
>>> data = [
...     ["Column 4", "Column 5"],
...     [10, 12],
...     [11, 13]
... ]
>>> s = pyexcel.Sheet(data)
>>> s.save_as("example.xls")
```

The following code will merge the tow into one file, say “output.xls”:

```
>>> from pyexcel.cookbook import merge_all_to_a_book
>>> merge_all_to_a_book(["example.csv", "example.xls"], "output.xls")
```

The output.xls would have the following data:

*example.csv* as sheet name and inside the sheet, you have:

Column 1	Column 2	Column 3
1	4	7
2	5	8
3	6	9

*example.ods* as sheet name and inside the sheet, you have:

Column 4	Column 5
10	12
11	13

## Merge all excel files in directory into a book where each file become a sheet

The following code will merge every excel files into one file, say “output.xls”:

```
from pyexcel.cookbook import merge_all_to_a_book
import glob

merge_all_to_a_book(glob.glob("your_csv_directory\*.csv"), "output.xls")
```

You can mix and match with other excel formats: xls, xlsx and ods. For example, if you are sure you have only xls, xlsx, ods and csv files in *your\_excel\_file\_directory*, you can do the following:

```
from pyexcel.cookbook import merge_all_to_a_book
import glob

merge_all_to_a_book(glob.glob("your_excel_file_directory\*.?*"), "output.xls")
```

## Split a book into single sheet files

Suppose you have many sheets in a work book and you would like to separate each into a single sheet excel file. You can easily do this:

```
>>> from pyexcel.cookbook import split_a_book
>>> split_a_book("megabook.xls", "output.xls")
>>> import glob
>>> outputfiles = glob.glob("*_output.xls")
>>> for file in sorted(outputfiles):
...     print(file)
...
Sheet 1_output.xls
Sheet 2_output.xls
Sheet 3_output.xls
```

for the output file, you can specify any of the supported formats

## Extract just one sheet from a book

Suppose you just want to extract one sheet from many sheets that exists in a work book and you would like to separate it into a single sheet excel file. You can easily do this:

```
>>> from pyexcel.cookbook import extract_a_sheet_from_a_book
>>> extract_a_sheet_from_a_book("megabook.xls", "Sheet 1", "output.xls")
>>> if os.path.exists("Sheet 1_output.xls"):
...     print("Sheet 1_output.xls exists")
...
Sheet 1_output.xls exists
```

for the output file, you can specify any of the supported formats

## 2.6.2 Loading from other sources

### Get back into pyexcel

#### list

```
>>> import pyexcel as p
>>> two_dimensional_list = [
...     [1, 2, 3, 4],
...     [5, 6, 7, 8],
...     [9, 10, 11, 12],
... ]
>>> sheet = p.get_sheet(array=two_dimensional_list)
>>> sheet
pyexcel_sheet1:
+---+---+---+---+
| 1 | 2 | 3 | 4 |
+---+---+---+---+
| 5 | 6 | 7 | 8 |
+---+---+---+---+
| 9 | 10 | 11 | 12 |
+---+---+---+---+
```

#### dict

```
>>> a_dictionary_of_key_value_pair = {
...     "IE": 0.2,
...     "Firefox": 0.3
... }
>>> sheet = p.get_sheet(adict=a_dictionary_of_key_value_pair)
>>> sheet
pyexcel_sheet1:
+-----+-----+
| Firefox | IE |
+-----+-----+
| 0.3     | 0.2 |
+-----+-----+
```

```

>>> a_dictionary_of_one_dimensional_arrays = {
...     "Column 1": [1, 2, 3, 4],
...     "Column 2": [5, 6, 7, 8],
...     "Column 3": [9, 10, 11, 12],
... }
>>> sheet = p.get_sheet(adict=a_dictionary_of_one_dimensional_arrays)
>>> sheet
pyexcel_sheet1:
+-----+-----+-----+
| Column 1 | Column 2 | Column 3 |
+-----+-----+-----+
| 1        | 5        | 9        |
+-----+-----+-----+
| 2        | 6        | 10       |
+-----+-----+-----+
| 3        | 7        | 11       |
+-----+-----+-----+
| 4        | 8        | 12       |
+-----+-----+-----+

```

## records

```

>>> a_list_of_dictionaries = [
...     {
...         "Name": 'Adam',
...         "Age": 28
...     },
...     {
...         "Name": 'Beatrice',
...         "Age": 29
...     },
...     {
...         "Name": 'Ceri',
...         "Age": 30
...     },
...     {
...         "Name": 'Dean',
...         "Age": 26
...     }
... ]
>>> sheet = p.get_sheet(records=a_list_of_dictionaries)
>>> sheet
pyexcel_sheet1:
+-----+-----+
| Age | Name      |
+-----+-----+
| 28  | Adam     |
+-----+-----+
| 29  | Beatrice |
+-----+-----+
| 30  | Ceri     |
+-----+-----+
| 26  | Dean     |
+-----+-----+

```

**book dict**

```

>>> a_dictionary_of_two_dimensional_arrays = {
...     'Sheet 1':
...     [
...         [1.0, 2.0, 3.0],
...         [4.0, 5.0, 6.0],
...         [7.0, 8.0, 9.0]
...     ],
...     'Sheet 2':
...     [
...         ['X', 'Y', 'Z'],
...         [1.0, 2.0, 3.0],
...         [4.0, 5.0, 6.0]
...     ],
...     'Sheet 3':
...     [
...         ['O', 'P', 'Q'],
...         [3.0, 2.0, 1.0],
...         [4.0, 3.0, 2.0]
...     ]
... }
>>> book = p.get_book(bookdict=a_dictionary_of_two_dimensional_arrays)
>>> book
Sheet 1:
+-----+-----+-----+
| 1.0 | 2.0 | 3.0 |
+-----+-----+-----+
| 4.0 | 5.0 | 6.0 |
+-----+-----+-----+
| 7.0 | 8.0 | 9.0 |
+-----+-----+-----+
Sheet 2:
+-----+-----+-----+
| X   | Y   | Z   |
+-----+-----+-----+
| 1.0 | 2.0 | 3.0 |
+-----+-----+-----+
| 4.0 | 5.0 | 6.0 |
+-----+-----+-----+
Sheet 3:
+-----+-----+-----+
| O   | P   | Q   |
+-----+-----+-----+
| 3.0 | 2.0 | 1.0 |
+-----+-----+-----+
| 4.0 | 3.0 | 2.0 |
+-----+-----+-----+

```

**How to load a sheet from a url**

Suppose you have excel file somewhere hosted:

```

>>> sheet = pe.get_sheet(url='http://yourdomain.com/test.csv')
>>> sheet

```

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```

csv:
+---+---+---+
| 1 | 2 | 3 |
+---+---+---+

```

## For sheet

### Get content

```

>>> another_sheet = p.Sheet()
>>> another_sheet.url = "https://github.com/pyexcel/pyexcel/raw/master/examples/
↳basics/multiple-sheets-example.xls"
>>> another_sheet.content
+---+---+---+
| 1 | 2 | 3 |
+---+---+---+
| 4 | 5 | 6 |
+---+---+---+
| 7 | 8 | 9 |
+---+---+---+

```

## For book

### How about setting content via a url?

```

>>> another_book = p.Book()
>>> another_book.url = "https://github.com/pyexcel/pyexcel/raw/master/examples/basics/
↳multiple-sheets-example.xls"
>>> another_book
Sheet 1:
+---+---+---+
| 1 | 2 | 3 |
+---+---+---+
| 4 | 5 | 6 |
+---+---+---+
| 7 | 8 | 9 |
+---+---+---+
Sheet 2:
+---+---+---+
| X | Y | Z |
+---+---+---+
| 1 | 2 | 3 |
+---+---+---+
| 4 | 5 | 6 |
+---+---+---+
Sheet 3:
+---+---+---+
| O | P | Q |
+---+---+---+
| 3 | 2 | 1 |
+---+---+---+

```

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4   3   2
+---+---+---+

## 2.7 Real world cases

### 2.7.1 Questions and Answers

1. Python flask writing to a csv file and reading it
2. PyQt: Import .xls file and populate QTableWidgetItem?
3. How do I write data to csv file in columns and rows from a list in python?
4. How to write dictionary values to a csv file using Python
5. Python convert csv to xlsx
6. How to read data from excel and set data type
7. Remove or keep specific columns in csv file
8. How can I put a CSV file in an array?

### 2.7.2 How to inject csv data to database

Here is [real case](#) in the stack-overflow. Due to the author's ignorance, the user would like to have the code in matlab than Python. Hence, I am sharing my pyexcel solution here.

#### Problem definition

Here is my CSV file:

PDB_Id	123442	234335	234336	3549867
a001	6	0	0	8
b001	4	2	0	0
c003	0	0	0	5

I want to put this data in a MYSQL table in the form:

PROTEIN_ID	PROTEIN_KEY	VALUE_OF_KEY
a001	123442	6
a001	234335	0
a001	234336	0
a001	3549867	8
b001	123442	4
b001	234335	2
b001	234336	0
b001	234336	0
c003	123442	0
c003	234335	0
c003	234336	0
c003	3549867	5

I have created table with the following code:



```
sql = """CREATE TABLE ALLPROTEINS (
    Protein_ID CHAR(20),
    PROTEIN_KEY INT ,
    VALUE_OF_KEY INT
)"""
```

I need the code for insert.

## Pyexcel solution

If you could insert an id field to act as the primary key, it can be mapped using sqlalchemy's ORM:

```
$ sqlite3 /tmp/stack2.db
sqlite> CREATE TABLE ALLPROTEINS (
...>         ID INT,
...>         Protein_ID CHAR(20),
...>         PROTEIN_KEY INT,
...>         VALUE_OF_KEY INT
...>         );
```

Here is the data mapping script vis sqlalchemy:

```
>>> # mapping your database via sqlalchemy
>>> from sqlalchemy import create_engine
>>> from sqlalchemy.ext.declarative import declarative_base
>>> from sqlalchemy import Column, Integer, String
>>> from sqlalchemy.orm import sessionmaker
>>> # checkout http://docs.sqlalchemy.org/en/latest/dialects/index.html
>>> # for a different database server
>>> engine = create_engine("sqlite:///tmp/stack2.db")
>>> Base = declarative_base()
>>> class Proteins(Base):
...     __tablename__ = 'ALLPROTEINS'
...     id = Column(Integer, primary_key=True, autoincrement=True) # <-- appended_
    ↪field
...     protein_id = Column(String(20))
...     protein_key = Column(Integer)
...     value_of_key = Column(Integer)
>>> Session = sessionmaker(bind=engine)
>>>
```

Here is the short script to get data inserted into the database:

```
>>> import pyexcel as p
>>> from itertools import product
>>> # data insertion code starts here
>>> sheet = p.get_sheet(file_name="csv-to-mysql-in-matlab-code.csv", delimiter='\t')
>>> sheet.name_columns_by_row(0)
>>> sheet.name_rows_by_column(0)
>>> print(sheet)
csv-to-mysql-in-matlab-code.csv:
+-----+-----+-----+-----+-----+
|       | 123442 | 234335 | 234336 | 3549867 |
+=====+=====+=====+=====+=====+
| a001 | 6       | 0       | 0       | 8       |
+-----+-----+-----+-----+-----+

```

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```

| b001 | 4      | 2      | 0      | 0      |
+-----+-----+-----+-----+
| c003 | 0      | 0      | 0      | 5      |
+-----+-----+-----+-----+
>>> results = []
>>> for protein_id, protein_key in product(sheet.rownames, sheet.colnames):
...     results.append([protein_id, protein_key, sheet[str(protein_id), protein_key]])
>>>
>>> sheet2 = p.get_sheet(array=results)
>>> sheet2.colnames = ['protein_id', 'protein_key', 'value_of_key']
>>> print(sheet2)
pyexcel_sheet1:
+-----+-----+-----+
| protein_id | protein_key | value_of_key |
+-----+-----+-----+
| a001      | 123442     | 6            |
+-----+-----+-----+
| a001      | 234335     | 0            |
+-----+-----+-----+
| a001      | 234336     | 0            |
+-----+-----+-----+
| a001      | 3549867    | 8            |
+-----+-----+-----+
| b001      | 123442     | 4            |
+-----+-----+-----+
| b001      | 234335     | 2            |
+-----+-----+-----+
| b001      | 234336     | 0            |
+-----+-----+-----+
| b001      | 3549867    | 0            |
+-----+-----+-----+
| c003      | 123442     | 0            |
+-----+-----+-----+
| c003      | 234335     | 0            |
+-----+-----+-----+
| c003      | 234336     | 0            |
+-----+-----+-----+
| c003      | 3549867    | 5            |
+-----+-----+-----+
>>> sheet2.save_to_database(session=Session(), table=Proteins)

```

Here is the data inserted:

```

$ sqlite3 /tmp/stack2.db
sqlite> select * from allproteins
...> ;
|a001|123442|6
|a001|234335|0
|a001|234336|0
|a001|3549867|8
|b001|123442|4
|b001|234335|2
|b001|234336|0
|b001|234336|0
|c003|123442|0
|c003|234335|0
|c003|234336|0

```

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|c003|3549867|5

## 2.8 API documentation

### 2.8.1 API Reference

This is intended for users of pyexcel.

#### Signature functions

##### Obtaining data from excel file

<code>get_array(**keywords)</code>	Obtain an array from an excel source
<code>get_dict([name_columns_by_row])</code>	Obtain a dictionary from an excel source
<code>get_records([name_columns_by_row])</code>	Obtain a list of records from an excel source
<code>get_book_dict(**keywords)</code>	Obtain a dictionary of two dimensional arrays
<code>get_book(**keywords)</code>	Get an instance of <i>Book</i> from an excel source
<code>get_sheet(**keywords)</code>	Get an instance of <i>Sheet</i> from an excel source
<code>iget_book(**keywords)</code>	Get an instance of <i>BookStream</i> from an excel source
<code>iget_array(**keywords)</code>	Obtain a generator of an two dimensional array from an excel source
<code>iget_records([custom_headers])</code>	Obtain a generator of a list of records from an excel source
<code>free_resources()</code>	Close file handles opened by signature functions that starts with 'i'

#### pyexcel.get\_array

`pyexcel.get_array(**keywords)`

Obtain an array from an excel source

It accepts the same parameters as `get_sheet()` but return an array instead.

##### Examples on start\_row, start\_column

Let's assume the following file is a huge csv file:

```
>>> import datetime
>>> import pyexcel as pe
>>> data = [
...     [1, 21, 31],
...     [2, 22, 32],
...     [3, 23, 33],
...     [4, 24, 34],
...     [5, 25, 35],
...     [6, 26, 36]
... ]
>>> pe.save_as(array=data, dest_file_name="your_file.csv")
```

And let's pretend to read partial data:

```
>>> pe.get_sheet(file_name="your_file.csv", start_row=2, row_limit=3)
your_file.csv:
+----+-----+-----+
| 3 | 23 | 33 |
+----+-----+-----+
| 4 | 24 | 34 |
+----+-----+-----+
| 5 | 25 | 35 |
+----+-----+-----+
```

And you could as well do the same for columns:

```
>>> pe.get_sheet(file_name="your_file.csv", start_column=1, column_limit=2)
your_file.csv:
+-----+-----+
| 21 | 31 |
+-----+-----+
| 22 | 32 |
+-----+-----+
| 23 | 33 |
+-----+-----+
| 24 | 34 |
+-----+-----+
| 25 | 35 |
+-----+-----+
| 26 | 36 |
+-----+-----+
```

Obvious, you could do both at the same time:

```
>>> pe.get_sheet(file_name="your_file.csv",
...             start_row=2, row_limit=3,
...             start_column=1, column_limit=2)
your_file.csv:
+-----+-----+
| 23 | 33 |
+-----+-----+
| 24 | 34 |
+-----+-----+
| 25 | 35 |
+-----+-----+
```

The pagination support is available across all pyexcel plugins.

---

**Note:** No column pagination support for query sets as data source.

---

#### *Formatting while transcoding a big data file*

If you are transcoding a big data set, conventional formatting method would not help unless a on-demand free RAM is available. However, there is a way to minimize the memory footprint of pyexcel while the formatting is performed.

Let's continue from previous example. Suppose we want to transcode "your\_file.csv" to "your\_file.xls" but increase each element by 1.

What we can do is to define a row renderer function as the following:

```
>>> def increment_by_one(row):
...     for element in row:
...         yield element + 1
```

Then pass it onto save\_as function using row\_renderer:

```
>>> pe.isave_as(file_name="your_file.csv",
...             row_renderer=increment_by_one,
...             dest_file_name="your_file.xlsx")
```

**Note:** If the data content is from a generator, isave\_as has to be used.

We can verify if it was done correctly:

```
>>> pe.get_sheet(file_name="your_file.xlsx")
your_file.csv:
+---+---+---+
| 2 | 22 | 32 |
+---+---+---+
| 3 | 23 | 33 |
+---+---+---+
| 4 | 24 | 34 |
+---+---+---+
| 5 | 25 | 35 |
+---+---+---+
| 6 | 26 | 36 |
+---+---+---+
| 7 | 27 | 37 |
+---+---+---+
```

Not all parameters are needed. Here is a table

source	parameters
loading from file	file_name, sheet_name, keywords
loading from string	file_content, file_type, sheet_name, keywords
loading from stream	file_stream, file_type, sheet_name, keywords
loading from sql	session, table
loading from sql in django	model
loading from query sets	any query sets(sqlalchemy or django)
loading from dictionary	adict, with_keys
loading from records	records
loading from array	array
loading from an url	url

### Parameters

**file\_name** : a file with supported file extension

**file\_content** : the file content

**file\_stream** : the file stream

**file\_type** : the file type in *file\_content* or *file\_stream*

**session** : database session

**table** : database table

**model**: a django model

**adict**: a dictionary of one dimensional arrays

**url** : a download http url for your excel file

**with\_keys** : load with previous dictionary's keys, default is True

**records** : a list of dictionaries that have the same keys

**array** : a two dimensional array, a list of lists

**sheet\_name** : sheet name. if sheet\_name is not given, the default sheet at index 0 is loaded

**start\_row** [int] defaults to 0. It allows you to skip rows at the beginning

**row\_limit**: int defaults to -1, meaning till the end of the whole sheet. It allows you to skip the tailing rows.

**start\_column** [int] defaults to 0. It allows you to skip columns on your left hand side

**column\_limit**: int defaults to -1, meaning till the end of the columns. It allows you to skip the tailing columns.

**skip\_row\_func**: It allows you to write your own row skipping functions.

The protocol is to return `pyexcel_io.constants.SKIP_DATA` if skipping data, `pyexcel_io.constants.TAKE_DATA` to read data, `pyexcel_io.constants.STOP_ITERATION` to exit the reading procedure

**skip\_column\_func**: It allows you to write your own column skipping functions.

The protocol is to return `pyexcel_io.constants.SKIP_DATA` if skipping data, `pyexcel_io.constants.TAKE_DATA` to read data, `pyexcel_io.constants.STOP_ITERATION` to exit the reading procedure

**skip\_empty\_rows**: bool Defaults to False. Toggle it to True if the rest of empty rows are useless, but it does affect the number of rows.

**row\_renderer**: You could choose to write a custom row renderer when the data is being read.

**auto\_detect\_float** : defaults to True

**auto\_detect\_int** : defaults to True

**auto\_detect\_datetime** : defaults to True

**ignore\_infinity** : defaults to True

**library** : choose a specific pyexcel-io plugin for reading

**source\_library** : choose a specific data source plugin for reading

**parser\_library** : choose a pyexcel parser plugin for reading

**skip\_hidden\_sheets**: default is True. Please toggle it to read hidden sheets

#### Parameters related to csv file format

for csv, `fmtparams` are accepted

**delimiter** : field separator

**lineterminator** : line terminator

**encoding**: csv specific. Specify the file encoding the csv file. For example: `encoding='latin1'`. Especially, `encoding='utf-8-sig'` would add utf 8 bom header if used in renderer, or would parse a csv with utf bom header used in parser.

**escapechar** : A one-character string used by the writer to escape the delimiter if quoting is set to QUOTE\_NONE and the quotechar if doublequote is False.

**quotechar** : A one-character string used to quote fields containing special characters, such as the delimiter or quotechar, or which contain new-line characters. It defaults to ""

**quoting** : Controls when quotes should be generated by the writer and recognised by the reader. It can take on any of the QUOTE\_\* constants (see section Module Contents) and defaults to QUOTE\_MINIMAL.

**skipinitialspace** : When True, whitespace immediately following the delimiter is ignored. The default is False.

**pep\_0515\_off** : When True in python version 3.6, PEP-0515 is turned on. The default is False

**Parameters related to xls file format**: Please note the following parameters apply to pyexcel-xls. more details can be found in `xlrd.open_workbook()`

**logfile**: An open file to which messages and diagnostics are written.

**verbosity**: Increases the volume of trace material written to the logfile.

**use\_mmap**: Whether to use the mmap module is determined heuristically. Use this arg to override the result.

Current heuristic: mmap is used if it exists.

**encoding\_override**: Used to overcome missing or bad codepage information in older-version files.

**formatting\_info**: The default is False, which saves memory.

When True, formatting information will be read from the spreadsheet file. This provides all cells, including empty and blank cells. Formatting information is available for each cell.

**ragged\_rows**: The default of False means all rows are padded out with empty cells so that all rows have the same size as found in ncols.

True means that there are no empty cells at the ends of rows. This can result in substantial memory savings if rows are of widely varying sizes. See also the `row_len()` method.

## pyexcel.get\_dict

`pyexcel.get_dict` (*name\_columns\_by\_row=0, \*\*keywords*)

Obtain a dictionary from an excel source

It accepts the same parameters as `get_sheet()` but return a dictionary instead.

Specifically: `name_columns_by_row` : specify a row to be a dictionary key. It is default to 0 or first row.

If you would use a column index 0 instead, you should do:

```
get_dict(name_columns_by_row=-1, name_rows_by_column=0)
```

### Examples on start\_row, start\_column

Let's assume the following file is a huge csv file:

```
>>> import datetime
>>> import pyexcel as pe
>>> data = [
...     [1, 21, 31],
...     [2, 22, 32],
...     [3, 23, 33],
...     [4, 24, 34],
...     [5, 25, 35],
```

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```
...     [6, 26, 36]
... ]
>>> pe.save_as(array=data, dest_file_name="your_file.csv")
```

And let's pretend to read partial data:

```
>>> pe.get_sheet(file_name="your_file.csv", start_row=2, row_limit=3)
your_file.csv:
+----+----+----+
| 3 | 23 | 33 |
+----+----+----+
| 4 | 24 | 34 |
+----+----+----+
| 5 | 25 | 35 |
+----+----+----+
```

And you could as well do the same for columns:

```
>>> pe.get_sheet(file_name="your_file.csv", start_column=1, column_limit=2)
your_file.csv:
+----+----+
| 21 | 31 |
+----+----+
| 22 | 32 |
+----+----+
| 23 | 33 |
+----+----+
| 24 | 34 |
+----+----+
| 25 | 35 |
+----+----+
| 26 | 36 |
+----+----+
```

Obvious, you could do both at the same time:

```
>>> pe.get_sheet(file_name="your_file.csv",
...     start_row=2, row_limit=3,
...     start_column=1, column_limit=2)
your_file.csv:
+----+----+
| 23 | 33 |
+----+----+
| 24 | 34 |
+----+----+
| 25 | 35 |
+----+----+
```

The pagination support is available across all pyexcel plugins.

---

**Note:** No column pagination support for query sets as data source.

---

#### *Formatting while transcoding a big data file*

If you are transcoding a big data set, conventional formatting method would not help unless a on-demand free RAM is available. However, there is a way to minimize the memory footprint of pyexcel while the formatting



is performed.

Let's continue from previous example. Suppose we want to transcode "your\_file.csv" to "your\_file.xls" but increase each element by 1.

What we can do is to define a row renderer function as the following:

```
>>> def increment_by_one(row):
...     for element in row:
...         yield element + 1
```

Then pass it onto save\_as function using row\_renderer:

```
>>> pe.isave_as(file_name="your_file.csv",
...             row_renderer=increment_by_one,
...             dest_file_name="your_file.xlsx")
```

**Note:** If the data content is from a generator, isave\_as has to be used.

We can verify if it was done correctly:

```
>>> pe.get_sheet(file_name="your_file.xlsx")
your_file.csv:
+---+---+---+
| 2 | 22 | 32 |
+---+---+---+
| 3 | 23 | 33 |
+---+---+---+
| 4 | 24 | 34 |
+---+---+---+
| 5 | 25 | 35 |
+---+---+---+
| 6 | 26 | 36 |
+---+---+---+
| 7 | 27 | 37 |
+---+---+---+
```

Not all parameters are needed. Here is a table

source	parameters
loading from file	file_name, sheet_name, keywords
loading from string	file_content, file_type, sheet_name, keywords
loading from stream	file_stream, file_type, sheet_name, keywords
loading from sql	session, table
loading from sql in django	model
loading from query sets	any query sets(sqlalchemy or django)
loading from dictionary	adict, with_keys
loading from records	records
loading from array	array
loading from an url	url

### Parameters

**file\_name** : a file with supported file extension

**file\_content** : the file content

**file\_stream** : the file stream

**file\_type** : the file type in *file\_content* or *file\_stream*

**session** : database session

**table** : database table

**model**: a django model

**adict**: a dictionary of one dimensional arrays

**url** : a download http url for your excel file

**with\_keys** : load with previous dictionary's keys, default is True

**records** : a list of dictionaries that have the same keys

**array** : a two dimensional array, a list of lists

**sheet\_name** : sheet name. if sheet\_name is not given, the default sheet at index 0 is loaded

**start\_row** [int] defaults to 0. It allows you to skip rows at the beginning

**row\_limit**: **int** defaults to -1, meaning till the end of the whole sheet. It allows you to skip the tailing rows.

**start\_column** [int] defaults to 0. It allows you to skip columns on your left hand side

**column\_limit**: **int** defaults to -1, meaning till the end of the columns. It allows you to skip the tailing columns.

**skip\_row\_func**: It allows you to write your own row skipping functions.

The protocol is to return `pyexcel_io.constants.SKIP_DATA` if skipping data, `pyexcel_io.constants.TAKE_DATA` to read data, `pyexcel_io.constants.STOP_ITERATION` to exit the reading procedure

**skip\_column\_func**: It allows you to write your own column skipping functions.

The protocol is to return `pyexcel_io.constants.SKIP_DATA` if skipping data, `pyexcel_io.constants.TAKE_DATA` to read data, `pyexcel_io.constants.STOP_ITERATION` to exit the reading procedure

**skip\_empty\_rows**: **bool** Defaults to False. Toggle it to True if the rest of empty rows are useless, but it does affect the number of rows.

**row\_renderer**: You could choose to write a custom row renderer when the data is being read.

**auto\_detect\_float** : defaults to True

**auto\_detect\_int** : defaults to True

**auto\_detect\_datetime** : defaults to True

**ignore\_infinity** : defaults to True

**library** : choose a specific pyexcel-io plugin for reading

**source\_library** : choose a specific data source plugin for reading

**parser\_library** : choose a pyexcel parser plugin for reading

**skip\_hidden\_sheets**: default is True. Please toggle it to read hidden sheets

#### Parameters related to csv file format

for csv, `fmtparams` are accepted

**delimiter** : field separator

**lineterminator** : line terminator

**encoding:** csv specific. Specify the file encoding the csv file. For example: `encoding='latin1'`. Especially, `encoding='utf-8-sig'` would add utf 8 bom header if used in `renderer`, or would parse a csv with utf bom header used in `parser`.

**escapechar :** A one-character string used by the writer to escape the delimiter if quoting is set to `QUOTE_NONE` and the `quotechar` if `doublequote` is `False`.

**quotechar :** A one-character string used to quote fields containing special characters, such as the delimiter or `quotechar`, or which contain new-line characters. It defaults to `''''`

**quoting :** Controls when quotes should be generated by the writer and recognised by the reader. It can take on any of the `QUOTE_*` constants (see section Module Contents) and defaults to `QUOTE_MINIMAL`.

**skipinitialspace :** When `True`, whitespace immediately following the delimiter is ignored. The default is `False`.

**pep\_0515\_off :** When `True` in python version 3.6, PEP-0515 is turned on. The default is `False`

**Parameters related to xls file format:** Please note the following parameters apply to `pyexcel-xls`. more details can be found in `xlrd.open_workbook()`

**logfile:** An open file to which messages and diagnostics are written.

**verbosity:** Increases the volume of trace material written to the logfile.

**use\_mmap:** Whether to use the `mmap` module is determined heuristically. Use this arg to override the result.

Current heuristic: `mmap` is used if it exists.

**encoding\_override:** Used to overcome missing or bad codepage information in older-version files.

**formatting\_info:** The default is `False`, which saves memory.

When `True`, formatting information will be read from the spreadsheet file. This provides all cells, including empty and blank cells. Formatting information is available for each cell.

**ragged\_rows:** The default of `False` means all rows are padded out with empty cells so that all rows have the same size as found in `ncols`.

`True` means that there are no empty cells at the ends of rows. This can result in substantial memory savings if rows are of widely varying sizes. See also the `row_len()` method.

## pyexcel.get\_records

`pyexcel.get_records` (*name\_columns\_by\_row=0, \*\*keywords*)

Obtain a list of records from an excel source

It accepts the same parameters as `get_sheet()` but return a list of dictionary(records) instead.

Specifically: `name_columns_by_row` : specify a row to be a dictionary key. It is default to 0 or first row.

If you would use a column index 0 instead, you should do:

```
get_records(name_columns_by_row=-1, name_rows_by_column=0)
```

### Examples on start\_row, start\_column

Let's assume the following file is a huge csv file:

```
>>> import datetime
>>> import pyexcel as pe
>>> data = [
...     [1, 21, 31],
```

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```
...     [2, 22, 32],
...     [3, 23, 33],
...     [4, 24, 34],
...     [5, 25, 35],
...     [6, 26, 36]
... ]
>>> pe.save_as(array=data, dest_file_name="your_file.csv")
```

And let's pretend to read partial data:

```
>>> pe.get_sheet(file_name="your_file.csv", start_row=2, row_limit=3)
your_file.csv:
+----+-----+-----+
| 3 | 23 | 33 |
+----+-----+-----+
| 4 | 24 | 34 |
+----+-----+-----+
| 5 | 25 | 35 |
+----+-----+-----+
```

And you could as well do the same for columns:

```
>>> pe.get_sheet(file_name="your_file.csv", start_column=1, column_limit=2)
your_file.csv:
+----+-----+
| 21 | 31 |
+----+-----+
| 22 | 32 |
+----+-----+
| 23 | 33 |
+----+-----+
| 24 | 34 |
+----+-----+
| 25 | 35 |
+----+-----+
| 26 | 36 |
+----+-----+
```

Obviously, you could do both at the same time:

```
>>> pe.get_sheet(file_name="your_file.csv",
...               start_row=2, row_limit=3,
...               start_column=1, column_limit=2)
your_file.csv:
+----+-----+
| 23 | 33 |
+----+-----+
| 24 | 34 |
+----+-----+
| 25 | 35 |
+----+-----+
```

The pagination support is available across all pyexcel plugins.

---

**Note:** No column pagination support for query sets as data source.

---

*Formatting while transcoding a big data file*

If you are transcoding a big data set, conventional formatting method would not help unless a on-demand free RAM is available. However, there is a way to minimize the memory footprint of pyexcel while the formatting is performed.

Let's continue from previous example. Suppose we want to transcode "your\_file.csv" to "your\_file.xls" but increase each element by 1.

What we can do is to define a row renderer function as the following:

```
>>> def increment_by_one(row):
...     for element in row:
...         yield element + 1
```

Then pass it onto save\_as function using row\_renderer:

```
>>> pe.isave_as(file_name="your_file.csv",
...             row_renderer=increment_by_one,
...             dest_file_name="your_file.xls")
```

**Note:** If the data content is from a generator, isave\_as has to be used.

We can verify if it was done correctly:

```
>>> pe.get_sheet(file_name="your_file.xlsx")
your_file.csv:
+---+---+---+
| 2 | 22 | 32 |
+---+---+---+
| 3 | 23 | 33 |
+---+---+---+
| 4 | 24 | 34 |
+---+---+---+
| 5 | 25 | 35 |
+---+---+---+
| 6 | 26 | 36 |
+---+---+---+
| 7 | 27 | 37 |
+---+---+---+
```

Not all parameters are needed. Here is a table

source	parameters
loading from file	file_name, sheet_name, keywords
loading from string	file_content, file_type, sheet_name, keywords
loading from stream	file_stream, file_type, sheet_name, keywords
loading from sql	session, table
loading from sql in django	model
loading from query sets	any query sets(sqlalchemy or django)
loading from dictionary	adict, with_keys
loading from records	records
loading from array	array
loading from an url	url

**Parameters**

**file\_name** : a file with supported file extension

**file\_content** : the file content

**file\_stream** : the file stream

**file\_type** : the file type in *file\_content* or *file\_stream*

**session** : database session

**table** : database table

**model**: a django model

**adict**: a dictionary of one dimensional arrays

**url** : a download http url for your excel file

**with\_keys** : load with previous dictionary's keys, default is True

**records** : a list of dictionaries that have the same keys

**array** : a two dimensional array, a list of lists

**sheet\_name** : sheet name. if sheet\_name is not given, the default sheet at index 0 is loaded

**start\_row** [int] defaults to 0. It allows you to skip rows at the beginning

**row\_limit**: **int** defaults to -1, meaning till the end of the whole sheet. It allows you to skip the tailing rows.

**start\_column** [int] defaults to 0. It allows you to skip columns on your left hand side

**column\_limit**: **int** defaults to -1, meaning till the end of the columns. It allows you to skip the tailing columns.

**skip\_row\_func**: It allows you to write your own row skipping functions.

The protocol is to return `pyexcel_io.constants.SKIP_DATA` if skipping data, `pyexcel_io.constants.TAKE_DATA` to read data, `pyexcel_io.constants.STOP_ITERATION` to exit the reading procedure

**skip\_column\_func**: It allows you to write your own column skipping functions.

The protocol is to return `pyexcel_io.constants.SKIP_DATA` if skipping data, `pyexcel_io.constants.TAKE_DATA` to read data, `pyexcel_io.constants.STOP_ITERATION` to exit the reading procedure

**skip\_empty\_rows**: **bool** Defaults to False. Toggle it to True if the rest of empty rows are useless, but it does affect the number of rows.

**row\_renderer**: You could choose to write a custom row renderer when the data is being read.

**auto\_detect\_float** : defaults to True

**auto\_detect\_int** : defaults to True

**auto\_detect\_datetime** : defaults to True

**ignore\_infinity** : defaults to True

**library** : choose a specific pyexcel-io plugin for reading

**source\_library** : choose a specific data source plugin for reading

**parser\_library** : choose a pyexcel parser plugin for reading

**skip\_hidden\_sheets**: default is True. Please toggle it to read hidden sheets

#### Parameters related to csv file format

for csv, `fmtparams` are accepted

**delimiter** : field separator

**lineterminator** : line terminator

**encoding**: csv specific. Specify the file encoding the csv file. For example: `encoding='latin1'`. Especially, `encoding='utf-8-sig'` would add utf 8 bom header if used in `renderer`, or would parse a csv with utf bom header used in `parser`.

**escapechar** : A one-character string used by the writer to escape the delimiter if quoting is set to `QUOTE_NONE` and the `quotechar` if `doublequote` is `False`.

**quotechar** : A one-character string used to quote fields containing special characters, such as the delimiter or `quotechar`, or which contain new-line characters. It defaults to `"`

**quoting** : Controls when quotes should be generated by the writer and recognised by the reader. It can take on any of the `QUOTE_*` constants (see section Module Contents) and defaults to `QUOTE_MINIMAL`.

**skipinitialspace** : When `True`, whitespace immediately following the delimiter is ignored. The default is `False`.

**pep\_0515\_off** : When `True` in python version 3.6, PEP-0515 is turned on. The default is `False`

**Parameters related to xls file format**: Please note the following parameters apply to `pyexcel-xls`. more details can be found in `xlrd.open_workbook()`

**logfile**: An open file to which messages and diagnostics are written.

**verbosity**: Increases the volume of trace material written to the logfile.

**use\_mmap**: Whether to use the `mmap` module is determined heuristically. Use this arg to override the result.

Current heuristic: `mmap` is used if it exists.

**encoding\_override**: Used to overcome missing or bad codepage information in older-version files.

**formatting\_info**: The default is `False`, which saves memory.

When `True`, formatting information will be read from the spreadsheet file. This provides all cells, including empty and blank cells. Formatting information is available for each cell.

**ragged\_rows**: The default of `False` means all rows are padded out with empty cells so that all rows have the same size as found in `ncols`.

`True` means that there are no empty cells at the ends of rows. This can result in substantial memory savings if rows are of widely varying sizes. See also the `row_len()` method.

## pyexcel.get\_book\_dict

`pyexcel.get_book_dict(**keywords)`

Obtain a dictionary of two dimensional arrays

It accepts the same parameters as `get_book()` but return a dictionary instead.

Here is a table of parameters:

source	parameters
loading from file	<code>file_name</code> , <code>keywords</code>
loading from string	<code>file_content</code> , <code>file_type</code> , <code>keywords</code>
loading from stream	<code>file_stream</code> , <code>file_type</code> , <code>keywords</code>
loading from sql	<code>session</code> , <code>tables</code>
loading from django models	<code>models</code>
loading from dictionary	<code>bookdict</code>
loading from an url	<code>url</code>

Where the dictionary should have text as keys and two dimensional array as values.

#### Parameters

**file\_name** : a file with supported file extension

**file\_content** : the file content

**file\_stream** : the file stream

**file\_type** : the file type in *file\_content* or *file\_stream*

**session** : database session

**tables** : a list of database table

**models** : a list of django models

**bookdict** : a dictionary of two dimensional arrays

**url** : a download http url for your excel file

**sheets**: a list of mixed sheet names and sheet indices to be read. This is done to keep Pandas compactibility. With this parameter, more than one sheet can be read and you have the control to read the sheets of your interest instead of all available sheets.

**auto\_detect\_float** : defaults to True

**auto\_detect\_int** : defaults to True

**auto\_detect\_datetime** : defaults to True

**ignore\_infinity** : defaults to True

**library** : choose a specific pyexcel-io plugin for reading

**source\_library** : choose a specific data source plugin for reading

**parser\_library** : choose a pyexcel parser plugin for reading

**skip\_hidden\_sheets**: default is True. Please toggle it to read hidden sheets

#### Parameters related to csv file format

for csv, `fmtparams` are accepted

**delimiter** : field separator

**lineterminator** : line terminator

**encoding**: csv specific. Specify the file encoding the csv file. For example: `encoding='latin1'`. Especially, `encoding='utf-8-sig'` would add utf 8 bom header if used in renderer, or would parse a csv with utf brom header used in parser.

**escapechar** : A one-character string used by the writer to escape the delimiter if quoting is set to `QUOTE_NONE` and the quotechar if `doublequote` is `False`.

**quotechar** : A one-character string used to quote fields containing special characters, such as the delimiter or quotechar, or which contain new-line characters. It defaults to `''''`

**quoting** : Controls when quotes should be generated by the writer and recognised by the reader. It can take on any of the `QUOTE_*` constants (see section Module Contents) and defaults to `QUOTE_MINIMAL`.

**skipinitialspace** : When `True`, whitespace immediately following the delimiter is ignored. The default is `False`.

**pep\_0515\_off** : When `True` in python version 3.6, PEP-0515 is turned on. The default is `False`



## pyexcel.get\_book

`pyexcel.get_book(**keywords)`

Get an instance of *Book* from an excel source

Here is a table of parameters:

source	parameters
loading from file	file_name, keywords
loading from string	file_content, file_type, keywords
loading from stream	file_stream, file_type, keywords
loading from sql	session, tables
loading from django models	models
loading from dictionary	bookdict
loading from an url	url

Where the dictionary should have text as keys and two dimensional array as values.

### Parameters

**file\_name** : a file with supported file extension

**file\_content** : the file content

**file\_stream** : the file stream

**file\_type** : the file type in *file\_content* or *file\_stream*

**session** : database session

**tables** : a list of database table

**models** : a list of django models

**bookdict** : a dictionary of two dimensional arrays

**url** : a download http url for your excel file

**sheets**: a list of mixed sheet names and sheet indices to be read. This is done to keep Pandas compactibility.

With this parameter, more than one sheet can be read and you have the control to read the sheets of your interest instead of all available sheets.

**auto\_detect\_float** : defaults to True

**auto\_detect\_int** : defaults to True

**auto\_detect\_datetime** : defaults to True

**ignore\_infinity** : defaults to True

**library** : choose a specific pyexcel-io plugin for reading

**source\_library** : choose a specific data source plugin for reading

**parser\_library** : choose a pyexcel parser plugin for reading

**skip\_hidden\_sheets**: default is True. Please toggle it to read hidden sheets

### Parameters related to csv file format

for csv, `fmtparams` are accepted

**delimiter** : field separator

**lineterminator** : line terminator

**encoding:** csv specific. Specify the file encoding the csv file. For example: `encoding='latin1'`. Especially, `encoding='utf-8-sig'` would add utf 8 bom header if used in renderer, or would parse a csv with utf bom header used in parser.

**escapechar:** A one-character string used by the writer to escape the delimiter if quoting is set to `QUOTE_NONE` and the quotechar if doublequote is `False`.

**quotechar:** A one-character string used to quote fields containing special characters, such as the delimiter or quotechar, or which contain new-line characters. It defaults to `"`

**quoting:** Controls when quotes should be generated by the writer and recognised by the reader. It can take on any of the `QUOTE_*` constants (see section Module Contents) and defaults to `QUOTE_MINIMAL`.

**skipinitialspace:** When `True`, whitespace immediately following the delimiter is ignored. The default is `False`.

**pep\_0515\_off:** When `True` in python version 3.6, PEP-0515 is turned on. The default is `False`

## pyexcel.get\_sheet

`pyexcel.get_sheet` (\*\*keywords)

Get an instance of *Sheet* from an excel source

### Examples on start\_row, start\_column

Let's assume the following file is a huge csv file:

```
>>> import datetime
>>> import pyexcel as pe
>>> data = [
...     [1, 21, 31],
...     [2, 22, 32],
...     [3, 23, 33],
...     [4, 24, 34],
...     [5, 25, 35],
...     [6, 26, 36]
... ]
>>> pe.save_as(array=data, dest_file_name="your_file.csv")
```

And let's pretend to read partial data:

```
>>> pe.get_sheet(file_name="your_file.csv", start_row=2, row_limit=3)
your_file.csv:
+---+---+---+
| 3 | 23 | 33 |
+---+---+---+
| 4 | 24 | 34 |
+---+---+---+
| 5 | 25 | 35 |
+---+---+---+
```

And you could as well do the same for columns:

```
>>> pe.get_sheet(file_name="your_file.csv", start_column=1, column_limit=2)
your_file.csv:
+---+---+
| 21 | 31 |
+---+---+
| 22 | 32 |
```

(continues on next page)

(continued from previous page)

```
+----+----+
| 23 | 33 |
+----+----+
| 24 | 34 |
+----+----+
| 25 | 35 |
+----+----+
| 26 | 36 |
+----+----+
```

Obvious, you could do both at the same time:

```
>>> pe.get_sheet(file_name="your_file.csv",
...              start_row=2, row_limit=3,
...              start_column=1, column_limit=2)
your_file.csv:
+----+----+
| 23 | 33 |
+----+----+
| 24 | 34 |
+----+----+
| 25 | 35 |
+----+----+
```

The pagination support is available across all pyexcel plugins.

---

**Note:** No column pagination support for query sets as data source.

---

#### *Formatting while transcoding a big data file*

If you are transcoding a big data set, conventional formatting method would not help unless a on-demand free RAM is available. However, there is a way to minimize the memory footprint of pyexcel while the formatting is performed.

Let's continue from previous example. Suppose we want to transcode "your\_file.csv" to "your\_file.xls" but increase each element by 1.

What we can do is to define a row renderer function as the following:

```
>>> def increment_by_one(row):
...     for element in row:
...         yield element + 1
```

Then pass it onto save\_as function using row\_renderer:

```
>>> pe.isave_as(file_name="your_file.csv",
...              row_renderer=increment_by_one,
...              dest_file_name="your_file.xlsx")
```

---

**Note:** If the data content is from a generator, isave\_as has to be used.

---

We can verify if it was done correctly:

```
>>> pe.get_sheet(file_name="your_file.xlsx")
your_file.csv:
+---+-----+
| 2 | 22 | 32 |
+---+-----+
| 3 | 23 | 33 |
+---+-----+
| 4 | 24 | 34 |
+---+-----+
| 5 | 25 | 35 |
+---+-----+
| 6 | 26 | 36 |
+---+-----+
| 7 | 27 | 37 |
+---+-----+
```

Not all parameters are needed. Here is a table

source	parameters
loading from file	file_name, sheet_name, keywords
loading from string	file_content, file_type, sheet_name, keywords
loading from stream	file_stream, file_type, sheet_name, keywords
loading from sql	session, table
loading from sql in django	model
loading from query sets	any query sets(sqlalchemy or django)
loading from dictionary	adict, with_keys
loading from records	records
loading from array	array
loading from an url	url

**Parameters**

**file\_name** : a file with supported file extension

**file\_content** : the file content

**file\_stream** : the file stream

**file\_type** : the file type in *file\_content* or *file\_stream*

**session** : database session

**table** : database table

**model**: a django model

**adict**: a dictionary of one dimensional arrays

**url** : a download http url for your excel file

**with\_keys** : load with previous dictionary's keys, default is True

**records** : a list of dictionaries that have the same keys

**array** : a two dimensional array, a list of lists

**sheet\_name** : sheet name. if sheet\_name is not given, the default sheet at index 0 is loaded

**start\_row** [int] defaults to 0. It allows you to skip rows at the beginning

**row\_limit: int** defaults to -1, meaning till the end of the whole sheet. It allows you to skip the tailing rows.

**start\_column** [int] defaults to 0. It allows you to skip columns on your left hand side

**column\_limit: int** defaults to -1, meaning till the end of the columns. It allows you to skip the tailing columns.

**skip\_row\_func:** It allows you to write your own row skipping functions.

The protocol is to return `pyexcel_io.constants.SKIP_DATA` if skipping data, `pyexcel_io.constants.TAKE_DATA` to read data, `pyexcel_io.constants.STOP_ITERATION` to exit the reading procedure

**skip\_column\_func:** It allows you to write your own column skipping functions.

The protocol is to return `pyexcel_io.constants.SKIP_DATA` if skipping data, `pyexcel_io.constants.TAKE_DATA` to read data, `pyexcel_io.constants.STOP_ITERATION` to exit the reading procedure

**skip\_empty\_rows: bool** Defaults to False. Toggle it to True if the rest of empty rows are useless, but it does affect the number of rows.

**row\_renderer:** You could choose to write a custom row renderer when the data is being read.

**auto\_detect\_float :** defaults to True

**auto\_detect\_int :** defaults to True

**auto\_detect\_datetime :** defaults to True

**ignore\_infinity :** defaults to True

**library :** choose a specific pyexcel-io plugin for reading

**source\_library :** choose a specific data source plugin for reading

**parser\_library :** choose a pyexcel parser plugin for reading

**skip\_hidden\_sheets:** default is True. Please toggle it to read hidden sheets

#### Parameters related to csv file format

for csv, `fmtparams` are accepted

**delimiter :** field separator

**lineterminator :** line terminator

**encoding:** csv specific. Specify the file encoding the csv file. For example: `encoding='latin1'`. Especially, `encoding='utf-8-sig'` would add utf 8 bom header if used in renderer, or would parse a csv with utf bom header used in parser.

**escapechar :** A one-character string used by the writer to escape the delimiter if quoting is set to `QUOTE_NONE` and the quotechar if `doublequote` is False.

**quotechar :** A one-character string used to quote fields containing special characters, such as the delimiter or quotechar, or which contain new-line characters. It defaults to `''''`

**quoting :** Controls when quotes should be generated by the writer and recognised by the reader. It can take on any of the `QUOTE_*` constants (see section Module Contents) and defaults to `QUOTE_MINIMAL`.

**skipinitialspace :** When True, whitespace immediately following the delimiter is ignored. The default is False.

**pep\_0515\_off :** When True in python version 3.6, PEP-0515 is turned on. The default is False

**Parameters related to xls file format:** Please note the following parameters apply to pyexcel-xls. more details can be found in `xlrd.open_workbook()`

**logfile:** An open file to which messages and diagnostics are written.

**verbosity:** Increases the volume of trace material written to the logfile.

**use\_mmap:** Whether to use the mmap module is determined heuristically. Use this arg to override the result.

Current heuristic: mmap is used if it exists.

**encoding\_override:** Used to overcome missing or bad codepage information in older-version files.

**formatting\_info:** The default is False, which saves memory.

When True, formatting information will be read from the spreadsheet file. This provides all cells, including empty and blank cells. Formatting information is available for each cell.

**ragged\_rows:** The default of False means all rows are padded out with empty cells so that all rows have the same size as found in ncols.

True means that there are no empty cells at the ends of rows. This can result in substantial memory savings if rows are of widely varying sizes. See also the row\_len() method.

## pyexcel.iget\_book

`pyexcel.iget_book(**keywords)`

Get an instance of `BookStream` from an excel source

First use case is to get all sheet names without extracting the sheets into memory.

Here is a table of parameters:

source	parameters
loading from file	file_name, keywords
loading from string	file_content, file_type, keywords
loading from stream	file_stream, file_type, keywords
loading from sql	session, tables
loading from django models	models
loading from dictionary	bookdict
loading from an url	url

Where the dictionary should have text as keys and two dimensional array as values.

### Parameters

**file\_name :** a file with supported file extension

**file\_content :** the file content

**file\_stream :** the file stream

**file\_type :** the file type in *file\_content* or *file\_stream*

**session :** database session

**tables :** a list of database table

**models :** a list of django models

**bookdict :** a dictionary of two dimensional arrays

**url :** a download http url for your excel file

**sheets:** a list of mixed sheet names and sheet indices to be read. This is done to keep Pandas compactibility.

With this parameter, more than one sheet can be read and you have the control to read the sheets of your interest instead of all available sheets.

**auto\_detect\_float :** defaults to True

**auto\_detect\_int** : defaults to True

**auto\_detect\_datetime** : defaults to True

**ignore\_infinity** : defaults to True

**library** : choose a specific pyexcel-io plugin for reading

**source\_library** : choose a specific data source plugin for reading

**parser\_library** : choose a pyexcel parser plugin for reading

**skip\_hidden\_sheets**: default is True. Please toggle it to read hidden sheets

#### Parameters related to csv file format

for csv, `fmtparams` are accepted

**delimiter** : field separator

**lineterminator** : line terminator

**encoding**: csv specific. Specify the file encoding the csv file. For example: `encoding='latin1'`. Especially, `encoding='utf-8-sig'` would add utf 8 bom header if used in renderer, or would parse a csv with utf brom header used in parser.

**escapechar** : A one-character string used by the writer to escape the delimiter if quoting is set to QUOTE\_NONE and the quotechar if doublequote is False.

**quotechar** : A one-character string used to quote fields containing special characters, such as the delimiter or quotechar, or which contain new-line characters. It defaults to `'"`

**quoting** : Controls when quotes should be generated by the writer and recognised by the reader. It can take on any of the QUOTE\_\* constants (see section Module Contents) and defaults to QUOTE\_MINIMAL.

**skipinitialspace** : When True, whitespace immediately following the delimiter is ignored. The default is False.

**pep\_0515\_off** : When True in python version 3.6, PEP-0515 is turned on. The default is False

When you use this function to work on physical files, this function will leave its file handle open. When you finish the operation on its data, you need to call `pyexcel.free_resources()` to close file handle(s).

for csv, csvz file formats, file handles will be left open. for xls, ods file formats, the file is read all into memory and is close afterwards. for xlsx, file handles will be left open in python 2.7 - 3.5 by pyexcel-xlsx(openpyxl). In other words, pyexcel-xls, pyexcel-ods, pyexcel-ods3 won't leak file handles.

## pyexcel.iget\_array

`pyexcel.iget_array(**keywords)`

Obtain a generator of an two dimensional array from an excel source

It is similiar to `pyexcel.get_array()` but it has less memory footprint.

#### Examples on start\_row, start\_column

Let's assume the following file is a huge csv file:

```
>>> import datetime
>>> import pyexcel as pe
>>> data = [
...     [1, 21, 31],
...     [2, 22, 32],
...     [3, 23, 33],
```

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```

...     [4, 24, 34],
...     [5, 25, 35],
...     [6, 26, 36]
... ]
>>> pe.save_as(array=data, dest_file_name="your_file.csv")

```

And let's pretend to read partial data:

```

>>> pe.get_sheet(file_name="your_file.csv", start_row=2, row_limit=3)
your_file.csv:
+----+-----+-----+
| 3 | 23 | 33 |
+----+-----+-----+
| 4 | 24 | 34 |
+----+-----+-----+
| 5 | 25 | 35 |
+----+-----+-----+

```

And you could as well do the same for columns:

```

>>> pe.get_sheet(file_name="your_file.csv", start_column=1, column_limit=2)
your_file.csv:
+----+-----+
| 21 | 31 |
+----+-----+
| 22 | 32 |
+----+-----+
| 23 | 33 |
+----+-----+
| 24 | 34 |
+----+-----+
| 25 | 35 |
+----+-----+
| 26 | 36 |
+----+-----+

```

Obviously, you could do both at the same time:

```

>>> pe.get_sheet(file_name="your_file.csv",
...               start_row=2, row_limit=3,
...               start_column=1, column_limit=2)
your_file.csv:
+----+-----+
| 23 | 33 |
+----+-----+
| 24 | 34 |
+----+-----+
| 25 | 35 |
+----+-----+

```

The pagination support is available across all pyexcel plugins.

---

**Note:** No column pagination support for query sets as data source.

---

*Formatting while transcoding a big data file*



If you are transcoding a big data set, conventional formatting method would not help unless a on-demand free RAM is available. However, there is a way to minimize the memory footprint of pyexcel while the formatting is performed.

Let's continue from previous example. Suppose we want to transcode "your\_file.csv" to "your\_file.xls" but increase each element by 1.

What we can do is to define a row renderer function as the following:

```
>>> def increment_by_one(row):
...     for element in row:
...         yield element + 1
```

Then pass it onto save\_as function using row\_renderer:

```
>>> pe.isave_as(file_name="your_file.csv",
...              row_renderer=increment_by_one,
...              dest_file_name="your_file.xlsx")
```

---

**Note:** If the data content is from a generator, isave\_as has to be used.

---

We can verify if it was done correctly:

```
>>> pe.get_sheet(file_name="your_file.xlsx")
your_file.csv:
+---+---+---+
| 2 | 22 | 32 |
+---+---+---+
| 3 | 23 | 33 |
+---+---+---+
| 4 | 24 | 34 |
+---+---+---+
| 5 | 25 | 35 |
+---+---+---+
| 6 | 26 | 36 |
+---+---+---+
| 7 | 27 | 37 |
+---+---+---+
```

Not all parameters are needed. Here is a table

source	parameters
loading from file	file_name, sheet_name, keywords
loading from string	file_content, file_type, sheet_name, keywords
loading from stream	file_stream, file_type, sheet_name, keywords
loading from sql	session, table
loading from sql in django	model
loading from query sets	any query sets(sqlalchemy or django)
loading from dictionary	adict, with_keys
loading from records	records
loading from array	array
loading from an url	url

### Parameters

**file\_name** : a file with supported file extension

**file\_content** : the file content

**file\_stream** : the file stream

**file\_type** : the file type in *file\_content* or *file\_stream*

**session** : database session

**table** : database table

**model**: a django model

**adict**: a dictionary of one dimensional arrays

**url** : a download http url for your excel file

**with\_keys** : load with previous dictionary's keys, default is True

**records** : a list of dictionaries that have the same keys

**array** : a two dimensional array, a list of lists

**sheet\_name** : sheet name. if sheet\_name is not given, the default sheet at index 0 is loaded

**start\_row** [int] defaults to 0. It allows you to skip rows at the beginning

**row\_limit**: int defaults to -1, meaning till the end of the whole sheet. It allows you to skip the tailing rows.

**start\_column** [int] defaults to 0. It allows you to skip columns on your left hand side

**column\_limit**: int defaults to -1, meaning till the end of the columns. It allows you to skip the tailing columns.

**skip\_row\_func**: It allows you to write your own row skipping functions.

The protocol is to return `pyexcel_io.constants.SKIP_DATA` if skipping data, `pyexcel_io.constants.TAKE_DATA` to read data, `pyexcel_io.constants.STOP_ITERATION` to exit the reading procedure

**skip\_column\_func**: It allows you to write your own column skipping functions.

The protocol is to return `pyexcel_io.constants.SKIP_DATA` if skipping data, `pyexcel_io.constants.TAKE_DATA` to read data, `pyexcel_io.constants.STOP_ITERATION` to exit the reading procedure

**skip\_empty\_rows**: bool Defaults to False. Toggle it to True if the rest of empty rows are useless, but it does affect the number of rows.

**row\_renderer**: You could choose to write a custom row renderer when the data is being read.

**auto\_detect\_float** : defaults to True

**auto\_detect\_int** : defaults to True

**auto\_detect\_datetime** : defaults to True

**ignore\_infinity** : defaults to True

**library** : choose a specific pyexcel-io plugin for reading

**source\_library** : choose a specific data source plugin for reading

**parser\_library** : choose a pyexcel parser plugin for reading

**skip\_hidden\_sheets**: default is True. Please toggle it to read hidden sheets

#### Parameters related to csv file format

for csv, `fmtparams` are accepted

**delimiter** : field separator

**lineterminator** : line terminator

**encoding**: csv specific. Specify the file encoding the csv file. For example: `encoding='latin1'`. Especially, `encoding='utf-8-sig'` would add utf 8 bom header if used in `render`, or would parse a csv with utf bom header used in `parser`.

**escapechar** : A one-character string used by the writer to escape the delimiter if quoting is set to `QUOTE_NONE` and the `quotechar` if `doublequote` is `False`.

**quotechar** : A one-character string used to quote fields containing special characters, such as the delimiter or `quotechar`, or which contain new-line characters. It defaults to `'"`

**quoting** : Controls when quotes should be generated by the writer and recognised by the reader. It can take on any of the `QUOTE_*` constants (see section `Module Contents`) and defaults to `QUOTE_MINIMAL`.

**skipinitialspace** : When `True`, whitespace immediately following the delimiter is ignored. The default is `False`.

**pep\_0515\_off** : When `True` in python version 3.6, PEP-0515 is turned on. The default is `False`

**Parameters related to xls file format**: Please note the following parameters apply to `pyexcel-xls`. more details can be found in `xlrd.open_workbook()`

**logfile**: An open file to which messages and diagnostics are written.

**verbosity**: Increases the volume of trace material written to the logfile.

**use\_mmap**: Whether to use the `mmap` module is determined heuristically. Use this arg to override the result.

Current heuristic: `mmap` is used if it exists.

**encoding\_override**: Used to overcome missing or bad codepage information in older-version files.

**formatting\_info**: The default is `False`, which saves memory.

When `True`, formatting information will be read from the spreadsheet file. This provides all cells, including empty and blank cells. Formatting information is available for each cell.

**ragged\_rows**: The default of `False` means all rows are padded out with empty cells so that all rows have the same size as found in `ncols`.

`True` means that there are no empty cells at the ends of rows. This can result in substantial memory savings if rows are of widely varying sizes. See also the `row_len()` method.

When you use this function to work on physical files, this function will leave its file handle open. When you finish the operation on its data, you need to call `pyexcel.free_resources()` to close file handle(s).

for `csv`, `csvz` file formats, file handles will be left open. for `xls`, `ods` file formats, the file is read all into memory and is close afterwards. for `xlsx`, file handles will be left open in python 2.7 - 3.5 by `pyexcel-xlsx(openpyxl)`. In other words, `pyexcel-xls`, `pyexcel-ods`, `pyexcel-ods3` won't leak file handles.

## pyexcel.iget\_records

`pyexcel.iget_records` (*custom\_headers=None, \*\*keywords*)

Obtain a generator of a list of records from an excel source

It is similiar to `pyexcel.get_records()` but it has less memory footprint but requires the headers to be in the first row. And the data matrix should be of equal length. It should consume less memory and should work well with large files.

### Examples on start\_row, start\_column

Let's assume the following file is a huge csv file:

```
>>> import datetime
>>> import pyexcel as pe
>>> data = [
...     [1, 21, 31],
...     [2, 22, 32],
...     [3, 23, 33],
...     [4, 24, 34],
...     [5, 25, 35],
...     [6, 26, 36]
... ]
>>> pe.save_as(array=data, dest_file_name="your_file.csv")
```

And let's pretend to read partial data:

```
>>> pe.get_sheet(file_name="your_file.csv", start_row=2, row_limit=3)
your_file.csv:
+----+-----+-----+
| 3 | 23 | 33 |
+----+-----+-----+
| 4 | 24 | 34 |
+----+-----+-----+
| 5 | 25 | 35 |
+----+-----+-----+
```

And you could as well do the same for columns:

```
>>> pe.get_sheet(file_name="your_file.csv", start_column=1, column_limit=2)
your_file.csv:
+----+-----+
| 21 | 31 |
+----+-----+
| 22 | 32 |
+----+-----+
| 23 | 33 |
+----+-----+
| 24 | 34 |
+----+-----+
| 25 | 35 |
+----+-----+
| 26 | 36 |
+----+-----+
```

Obviously, you could do both at the same time:

```
>>> pe.get_sheet(file_name="your_file.csv",
...     start_row=2, row_limit=3,
...     start_column=1, column_limit=2)
your_file.csv:
+----+-----+
| 23 | 33 |
+----+-----+
| 24 | 34 |
+----+-----+
| 25 | 35 |
+----+-----+
```

The pagination support is available across all pyexcel plugins.

---

**Note:** No column pagination support for query sets as data source.

---

### *Formatting while transcoding a big data file*

If you are transcoding a big data set, conventional formatting method would not help unless a on-demand free RAM is available. However, there is a way to minimize the memory footprint of pyexcel while the formatting is performed.

Let's continue from previous example. Suppose we want to transcode "your\_file.csv" to "your\_file.xls" but increase each element by 1.

What we can do is to define a row renderer function as the following:

```
>>> def increment_by_one(row):
...     for element in row:
...         yield element + 1
```

Then pass it onto save\_as function using row\_renderer:

```
>>> pe.isave_as(file_name="your_file.csv",
...              row_renderer=increment_by_one,
...              dest_file_name="your_file.xlsx")
```

---

**Note:** If the data content is from a generator, isave\_as has to be used.

---

We can verify if it was done correctly:

```
>>> pe.get_sheet(file_name="your_file.xlsx")
your_file.csv:
+---+---+---+
| 2 | 22 | 32 |
+---+---+---+
| 3 | 23 | 33 |
+---+---+---+
| 4 | 24 | 34 |
+---+---+---+
| 5 | 25 | 35 |
+---+---+---+
| 6 | 26 | 36 |
+---+---+---+
| 7 | 27 | 37 |
+---+---+---+
```

Not all parameters are needed. Here is a table

source	parameters
loading from file	file_name, sheet_name, keywords
loading from string	file_content, file_type, sheet_name, keywords
loading from stream	file_stream, file_type, sheet_name, keywords
loading from sql	session, table
loading from sql in django	model
loading from query sets	any query sets(sqlalchemy or django)
loading from dictionary	adict, with_keys
loading from records	records
loading from array	array
loading from an url	url

### Parameters

**file\_name** : a file with supported file extension

**file\_content** : the file content

**file\_stream** : the file stream

**file\_type** : the file type in *file\_content* or *file\_stream*

**session** : database session

**table** : database table

**model**: a django model

**adict**: a dictionary of one dimensional arrays

**url** : a download http url for your excel file

**with\_keys** : load with previous dictionary's keys, default is True

**records** : a list of dictionaries that have the same keys

**array** : a two dimensional array, a list of lists

**sheet\_name** : sheet name. if sheet\_name is not given, the default sheet at index 0 is loaded

**start\_row** [int] defaults to 0. It allows you to skip rows at the beginning

**row\_limit**: int defaults to -1, meaning till the end of the whole sheet. It allows you to skip the tailing rows.

**start\_column** [int] defaults to 0. It allows you to skip columns on your left hand side

**column\_limit**: int defaults to -1, meaning till the end of the columns. It allows you to skip the tailing columns.

**skip\_row\_func**: It allows you to write your own row skipping functions.

The protocol is to return `pyexcel_io.constants.SKIP_DATA` if skipping data, `pyexcel_io.constants.TAKE_DATA` to read data, `pyexcel_io.constants.STOP_ITERATION` to exit the reading procedure

**skip\_column\_func**: It allows you to write your own column skipping functions.

The protocol is to return `pyexcel_io.constants.SKIP_DATA` if skipping data, `pyexcel_io.constants.TAKE_DATA` to read data, `pyexcel_io.constants.STOP_ITERATION` to exit the reading procedure

**skip\_empty\_rows**: bool Defaults to False. Toggle it to True if the rest of empty rows are useless, but it does affect the number of rows.

**row\_renderer**: You could choose to write a custom row renderer when the data is being read.

**auto\_detect\_float** : defaults to True

**auto\_detect\_int** : defaults to True

**auto\_detect\_datetime** : defaults to True

**ignore\_infinity** : defaults to True

**library** : choose a specific pyexcel-io plugin for reading

**source\_library** : choose a specific data source plugin for reading

**parser\_library** : choose a pyexcel parser plugin for reading

**skip\_hidden\_sheets**: default is True. Please toggle it to read hidden sheets

#### Parameters related to csv file format

for csv, `fmtparams` are accepted

**delimiter** : field separator

**lineterminator** : line terminator

**encoding**: csv specific. Specify the file encoding the csv file. For example: `encoding='latin1'`. Especially, `encoding='utf-8-sig'` would add utf 8 bom header if used in `renderer`, or would parse a csv with utf bom header used in `parser`.

**escapechar** : A one-character string used by the writer to escape the delimiter if quoting is set to `QUOTE_NONE` and the `quotechar` if `doublequote` is `False`.

**quotechar** : A one-character string used to quote fields containing special characters, such as the delimiter or `quotechar`, or which contain new-line characters. It defaults to `''''`

**quoting** : Controls when quotes should be generated by the writer and recognised by the reader. It can take on any of the `QUOTE_*` constants (see section Module Contents) and defaults to `QUOTE_MINIMAL`.

**skipinitialspace** : When `True`, whitespace immediately following the delimiter is ignored. The default is `False`.

**pep\_0515\_off** : When `True` in python version 3.6, PEP-0515 is turned on. The default is `False`

**Parameters related to xls file format**: Please note the following parameters apply to `pyexcel-xls`. more details can be found in `xlrd.open_workbook()`

**logfile**: An open file to which messages and diagnostics are written.

**verbosity**: Increases the volume of trace material written to the logfile.

**use\_mmap**: Whether to use the `mmap` module is determined heuristically. Use this arg to override the result.

Current heuristic: `mmap` is used if it exists.

**encoding\_override**: Used to overcome missing or bad codepage information in older-version files.

**formatting\_info**: The default is `False`, which saves memory.

When `True`, formatting information will be read from the spreadsheet file. This provides all cells, including empty and blank cells. Formatting information is available for each cell.

**ragged\_rows**: The default of `False` means all rows are padded out with empty cells so that all rows have the same size as found in `ncols`.

`True` means that there are no empty cells at the ends of rows. This can result in substantial memory savings if rows are of widely varying sizes. See also the `row_len()` method.

When you use this function to work on physical files, this function will leave its file handle open. When you finish the operation on its data, you need to call `pyexcel.free_resources()` to close file handle(s).

for csv, csvz file formats, file handles will be left open. for xls, ods file formats, the file is read all into memory and is close afterwards. for xlsx, file handles will be left open in python 2.7 - 3.5 by pyexcel-xlsx(openpyxl). In other words, pyexcel-xls, pyexcel-ods, pyexcel-ods3 won't leak file handles.

### pyexcel.free\_resources

`pyexcel.free_resources()`

Close file handles opened by signature functions that starts with 'i'

for csv, csvz file formats, file handles will be left open. for xls, ods file formats, the file is read all into memory and is close afterwards. for xlsx, file handles will be left open in python 2.7 - 3.5 by pyexcel-xlsx(openpyxl). In other words, pyexcel-xls, pyexcel-ods, pyexcel-ods3 won't leak file handles.

### Saving data to excel file

<code>save_as(**keywords)</code>	Save a sheet from a data source to another one
<code>isave_as(**keywords)</code>	Save a sheet from a data source to another one with less memory
<code>save_book_as(**keywords)</code>	Save a book from a data source to another one
<code>isave_book_as(**keywords)</code>	Save a book from a data source to another one

### pyexcel.save\_as

`pyexcel.save_as(**keywords)`

Save a sheet from a data source to another one

It accepts two sets of keywords. Why two sets? one set is source, the other set is destination. In order to distinguish the two sets, source set will be exactly the same as the ones for `pyexcel.get_sheet()`; destination set are exactly the same as the ones for `pyexcel.Sheet.save_as` but require a 'dest' prefix.

Saving to source	parameters
file	dest_file_name, dest_sheet_name, dest_force_file_type keywords with prefix 'dest'
memory	dest_file_type, dest_content, dest_sheet_name, keywords with prefix 'dest'
sql	dest_session, dest_table, dest_initializer, dest_mapdict
django model	dest_model, dest_initializer, dest_mapdict, dest_batch_size

### Examples on start\_row, start\_column

Let's assume the following file is a huge csv file:

```
>>> import datetime
>>> import pyexcel as pe
>>> data = [
...     [1, 21, 31],
...     [2, 22, 32],
...     [3, 23, 33],
...     [4, 24, 34],
...     [5, 25, 35],
...     [6, 26, 36]
... ]
>>> pe.save_as(array=data, dest_file_name="your_file.csv")
```

And let's pretend to read partial data:



```
>>> pe.get_sheet(file_name="your_file.csv", start_row=2, row_limit=3)
your_file.csv:
+----+-----+-----+
| 3 | 23 | 33 |
+----+-----+-----+
| 4 | 24 | 34 |
+----+-----+-----+
| 5 | 25 | 35 |
+----+-----+-----+
```

And you could as well do the same for columns:

```
>>> pe.get_sheet(file_name="your_file.csv", start_column=1, column_limit=2)
your_file.csv:
+----+-----+
| 21 | 31 |
+----+-----+
| 22 | 32 |
+----+-----+
| 23 | 33 |
+----+-----+
| 24 | 34 |
+----+-----+
| 25 | 35 |
+----+-----+
| 26 | 36 |
+----+-----+
```

Obvious, you could do both at the same time:

```
>>> pe.get_sheet(file_name="your_file.csv",
...             start_row=2, row_limit=3,
...             start_column=1, column_limit=2)
your_file.csv:
+----+-----+
| 23 | 33 |
+----+-----+
| 24 | 34 |
+----+-----+
| 25 | 35 |
+----+-----+
```

The pagination support is available across all pyexcel plugins.

---

**Note:** No column pagination support for query sets as data source.

---

#### *Formatting while transcoding a big data file*

If you are transcoding a big data set, conventional formatting method would not help unless a on-demand free RAM is available. However, there is a way to minimize the memory footprint of pyexcel while the formatting is performed.

Let's continue from previous example. Suppose we want to transcode "your\_file.csv" to "your\_file.xls" but increase each element by 1.

What we can do is to define a row renderer function as the following:

```
>>> def increment_by_one(row):
...     for element in row:
...         yield element + 1
```

Then pass it onto save\_as function using row\_renderer:

```
>>> pe.isave_as(file_name="your_file.csv",
...             row_renderer=increment_by_one,
...             dest_file_name="your_file.xlsx")
```

**Note:** If the data content is from a generator, isave\_as has to be used.

We can verify if it was done correctly:

```
>>> pe.get_sheet(file_name="your_file.xlsx")
your_file.csv:
+---+---+---+
| 2 | 22 | 32 |
+---+---+---+
| 3 | 23 | 33 |
+---+---+---+
| 4 | 24 | 34 |
+---+---+---+
| 5 | 25 | 35 |
+---+---+---+
| 6 | 26 | 36 |
+---+---+---+
| 7 | 27 | 37 |
+---+---+---+
```

Not all parameters are needed. Here is a table

source	parameters
loading from file	file_name, sheet_name, keywords
loading from string	file_content, file_type, sheet_name, keywords
loading from stream	file_stream, file_type, sheet_name, keywords
loading from sql	session, table
loading from sql in django	model
loading from query sets	any query sets(sqlalchemy or django)
loading from dictionary	adict, with_keys
loading from records	records
loading from array	array
loading from an url	url

### Parameters

**file\_name** : a file with supported file extension

**file\_content** : the file content

**file\_stream** : the file stream

**file\_type** : the file type in *file\_content* or *file\_stream*

**session** : database session

**table** : database table

**model**: a django model

**adict**: a dictionary of one dimensional arrays

**url** : a download http url for your excel file

**with\_keys** : load with previous dictionary's keys, default is True

**records** : a list of dictionaries that have the same keys

**array** : a two dimensional array, a list of lists

**sheet\_name** : sheet name. if sheet\_name is not given, the default sheet at index 0 is loaded

**start\_row** [int] defaults to 0. It allows you to skip rows at the beginning

**row\_limit**: int defaults to -1, meaning till the end of the whole sheet. It allows you to skip the tailing rows.

**start\_column** [int] defaults to 0. It allows you to skip columns on your left hand side

**column\_limit**: int defaults to -1, meaning till the end of the columns. It allows you to skip the tailing columns.

**skip\_row\_func**: It allows you to write your own row skipping functions.

The protocol is to return `pyexcel_io.constants.SKIP_DATA` if skipping data, `pyexcel_io.constants.TAKE_DATA` to read data, `pyexcel_io.constants.STOP_ITERATION` to exit the reading procedure

**skip\_column\_func**: It allows you to write your own column skipping functions.

The protocol is to return `pyexcel_io.constants.SKIP_DATA` if skipping data, `pyexcel_io.constants.TAKE_DATA` to read data, `pyexcel_io.constants.STOP_ITERATION` to exit the reading procedure

**skip\_empty\_rows**: bool Defaults to False. Toggle it to True if the rest of empty rows are useless, but it does affect the number of rows.

**row\_renderer**: You could choose to write a custom row renderer when the data is being read.

**auto\_detect\_float** : defaults to True

**auto\_detect\_int** : defaults to True

**auto\_detect\_datetime** : defaults to True

**ignore\_infinity** : defaults to True

**library** : choose a specific pyexcel-io plugin for reading

**source\_library** : choose a specific data source plugin for reading

**parser\_library** : choose a pyexcel parser plugin for reading

**skip\_hidden\_sheets**: default is True. Please toggle it to read hidden sheets

#### Parameters related to csv file format

for csv, `fmtparams` are accepted

**delimiter** : field separator

**lineterminator** : line terminator

**encoding**: csv specific. Specify the file encoding the csv file. For example: `encoding='latin1'`. Especially, `encoding='utf-8-sig'` would add utf 8 bom header if used in renderer, or would parse a csv with utf bom header used in parser.

**escapechar** : A one-character string used by the writer to escape the delimiter if quoting is set to QUOTE\_NONE and the quotechar if doublequote is False.

**quotechar** : A one-character string used to quote fields containing special characters, such as the delimiter or quotechar, or which contain new-line characters. It defaults to ""

**quoting** : Controls when quotes should be generated by the writer and recognised by the reader. It can take on any of the QUOTE\_\* constants (see section Module Contents) and defaults to QUOTE\_MINIMAL.

**skipinitialspace** : When True, whitespace immediately following the delimiter is ignored. The default is False.

**pep\_0515\_off** : When True in python version 3.6, PEP-0515 is turned on. The default is False

**Parameters related to xls file format:** Please note the following parameters apply to pyexcel-xls. more details can be found in `xlrd.open_workbook()`

**logfile**: An open file to which messages and diagnostics are written.

**verbosity**: Increases the volume of trace material written to the logfile.

**use\_mmap**: Whether to use the mmap module is determined heuristically. Use this arg to override the result.

Current heuristic: mmap is used if it exists.

**encoding\_override**: Used to overcome missing or bad codepage information in older-version files.

**formatting\_info**: The default is False, which saves memory.

When True, formatting information will be read from the spreadsheet file. This provides all cells, including empty and blank cells. Formatting information is available for each cell.

**ragged\_rows**: The default of False means all rows are padded out with empty cells so that all rows have the same size as found in ncols.

True means that there are no empty cells at the ends of rows. This can result in substantial memory savings if rows are of widely varying sizes. See also the `row_len()` method.

**dest\_file\_name**: another file name.

**dest\_file\_type**: this is needed if you want to save to memory

**dest\_session**: the target database session

**dest\_table**: the target destination table

**dest\_model**: the target django model

**dest\_mapdict**: a mapping dictionary see `pyexcel.Sheet.save_to_memory()`

**dest\_initializer**: a custom initializer function for table or model

**dest\_mapdict**: nominate headers

**dest\_batch\_size**: object creation batch size. it is Django specific

**dest\_library**: choose a specific pyexcel-io plugin for writing

**dest\_source\_library**: choose a specific data source plugin for writing

**dest\_renderer\_library**: choose a pyexcel parser plugin for writing

if csv file is destination format, python csv `fmtparams` are accepted

for example: `dest_lineterminator` will replace default ‘ ‘ to the one you specified

In addition, this function use `pyexcel.Sheet` to render the data which could have performance penalty. In exchange, parameters for `pyexcel.Sheet` can be passed on, e.g. `name_columns_by_row`.

## pyexcel.isave\_as

`pyexcel.isave_as(**keywords)`

Save a sheet from a data source to another one with less memory

It is simliar to `pyexcel.save_as()` except that it does not accept parameters for `pyexcel.Sheet`. And it read when it writes.

It accepts two sets of keywords. Why two sets? one set is source, the other set is destination. In order to distinguish the two sets, source set will be exactly the same as the ones for `pyexcel.get_sheet()`; destination set are exactly the same as the ones for `pyexcel.Sheet.save_as` but require a 'dest' prefix.

Saving to source	parameters
file	dest_file_name, dest_sheet_name, dest_force_file_type keywords with prefix 'dest'
memory	dest_file_type, dest_content, dest_sheet_name, keywords with prefix 'dest'
sql	dest_session, dest_table, dest_initializer, dest_mapdict
django model	dest_model, dest_initializer, dest_mapdict, dest_batch_size

### Examples on start\_row, start\_column

Let's assume the following file is a huge csv file:

```
>>> import datetime
>>> import pyexcel as pe
>>> data = [
...     [1, 21, 31],
...     [2, 22, 32],
...     [3, 23, 33],
...     [4, 24, 34],
...     [5, 25, 35],
...     [6, 26, 36]
... ]
>>> pe.save_as(array=data, dest_file_name="your_file.csv")
```

And let's pretend to read partial data:

```
>>> pe.get_sheet(file_name="your_file.csv", start_row=2, row_limit=3)
your_file.csv:
+----+-----+
| 3 | 23 | 33 |
+----+-----+
| 4 | 24 | 34 |
+----+-----+
| 5 | 25 | 35 |
+----+-----+
```

And you could as well do the same for columns:

```
>>> pe.get_sheet(file_name="your_file.csv", start_column=1, column_limit=2)
your_file.csv:
+----+-----+
| 21 | 31 |
+----+-----+
| 22 | 32 |
+----+-----+
| 23 | 33 |
+----+-----+
```

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```
| 24 | 34 |
+----+----+
| 25 | 35 |
+----+----+
| 26 | 36 |
+----+----+
```

Obvious, you could do both at the same time:

```
>>> pe.get_sheet(file_name="your_file.csv",
...               start_row=2, row_limit=3,
...               start_column=1, column_limit=2)
your_file.csv:
+----+----+
| 23 | 33 |
+----+----+
| 24 | 34 |
+----+----+
| 25 | 35 |
+----+----+
```

The pagination support is available across all pyexcel plugins.

---

**Note:** No column pagination support for query sets as data source.

---

#### *Formatting while transcoding a big data file*

If you are transcoding a big data set, conventional formatting method would not help unless a on-demand free RAM is available. However, there is a way to minimize the memory footprint of pyexcel while the formatting is performed.

Let's continue from previous example. Suppose we want to transcode "your\_file.csv" to "your\_file.xls" but increase each element by 1.

What we can do is to define a row renderer function as the following:

```
>>> def increment_by_one(row):
...     for element in row:
...         yield element + 1
```

Then pass it onto save\_as function using row\_renderer:

```
>>> pe.isave_as(file_name="your_file.csv",
...              row_renderer=increment_by_one,
...              dest_file_name="your_file.xlsx")
```

---

**Note:** If the data content is from a generator, isave\_as has to be used.

---

We can verify if it was done correctly:

```
>>> pe.get_sheet(file_name="your_file.xlsx")
your_file.csv:
+----+----+----+
| 2 | 22 | 32 |
```

(continues on next page)

(continued from previous page)

```

+---+---+---+
| 3 | 23 | 33 |
+---+---+---+
| 4 | 24 | 34 |
+---+---+---+
| 5 | 25 | 35 |
+---+---+---+
| 6 | 26 | 36 |
+---+---+---+
| 7 | 27 | 37 |
+---+---+---+

```

Not all parameters are needed. Here is a table

source	parameters
loading from file	file_name, sheet_name, keywords
loading from string	file_content, file_type, sheet_name, keywords
loading from stream	file_stream, file_type, sheet_name, keywords
loading from sql	session, table
loading from sql in django	model
loading from query sets	any query sets(sqlalchemy or django)
loading from dictionary	adict, with_keys
loading from records	records
loading from array	array
loading from an url	url

### Parameters

**file\_name** : a file with supported file extension

**file\_content** : the file content

**file\_stream** : the file stream

**file\_type** : the file type in *file\_content* or *file\_stream*

**session** : database session

**table** : database table

**model**: a django model

**adict**: a dictionary of one dimensional arrays

**url** : a download http url for your excel file

**with\_keys** : load with previous dictionary's keys, default is True

**records** : a list of dictionaries that have the same keys

**array** : a two dimensional array, a list of lists

**sheet\_name** : sheet name. if sheet\_name is not given, the default sheet at index 0 is loaded

**start\_row** [int] defaults to 0. It allows you to skip rows at the beginning

**row\_limit**: int defaults to -1, meaning till the end of the whole sheet. It allows you to skip the tailing rows.

**start\_column** [int] defaults to 0. It allows you to skip columns on your left hand side

**column\_limit**: int defaults to -1, meaning till the end of the columns. It allows you to skip the tailing columns.

**skip\_row\_func:** It allows you to write your own row skipping functions.

The protocol is to return `pyexcel_io.constants.SKIP_DATA` if skipping data, `pyexcel_io.constants.TAKE_DATA` to read data, `pyexcel_io.constants.STOP_ITERATION` to exit the reading procedure

**skip\_column\_func:** It allows you to write your own column skipping functions.

The protocol is to return `pyexcel_io.constants.SKIP_DATA` if skipping data, `pyexcel_io.constants.TAKE_DATA` to read data, `pyexcel_io.constants.STOP_ITERATION` to exit the reading procedure

**skip\_empty\_rows:** **bool** Defaults to False. Toggle it to True if the rest of empty rows are useless, but it does affect the number of rows.

**row\_renderer:** You could choose to write a custom row renderer when the data is being read.

**auto\_detect\_float :** defaults to True

**auto\_detect\_int :** defaults to True

**auto\_detect\_datetime :** defaults to True

**ignore\_infinity :** defaults to True

**library :** choose a specific pyexcel-io plugin for reading

**source\_library :** choose a specific data source plugin for reading

**parser\_library :** choose a pyexcel parser plugin for reading

**skip\_hidden\_sheets:** default is True. Please toggle it to read hidden sheets

#### Parameters related to csv file format

for csv, `fmtparams` are accepted

**delimiter :** field separator

**lineterminator :** line terminator

**encoding:** csv specific. Specify the file encoding the csv file. For example: `encoding='latin1'`. Especially, `encoding='utf-8-sig'` would add utf 8 bom header if used in renderer, or would parse a csv with utf bom header used in parser.

**escapechar :** A one-character string used by the writer to escape the delimiter if quoting is set to `QUOTE_NONE` and the quotechar if `doublequote` is False.

**quotechar :** A one-character string used to quote fields containing special characters, such as the delimiter or quotechar, or which contain new-line characters. It defaults to `''''`

**quoting :** Controls when quotes should be generated by the writer and recognised by the reader. It can take on any of the `QUOTE_*` constants (see section Module Contents) and defaults to `QUOTE_MINIMAL`.

**skipinitialspace :** When True, whitespace immediately following the delimiter is ignored. The default is False.

**pep\_0515\_off :** When True in python version 3.6, PEP-0515 is turned on. The default is False

**Parameters related to xls file format:** Please note the following parameters apply to pyexcel-xls. more details can be found in `xlrd.open_workbook()`

**logfile:** An open file to which messages and diagnostics are written.

**verbosity:** Increases the volume of trace material written to the logfile.

**use\_mmap:** Whether to use the mmap module is determined heuristically. Use this arg to override the result.

Current heuristic: mmap is used if it exists.



**encoding\_override:** Used to overcome missing or bad codepage information in older-version files.

**formatting\_info:** The default is False, which saves memory.

When True, formatting information will be read from the spreadsheet file. This provides all cells, including empty and blank cells. Formatting information is available for each cell.

**ragged\_rows:** The default of False means all rows are padded out with empty cells so that all rows have the same size as found in ncols.

True means that there are no empty cells at the ends of rows. This can result in substantial memory savings if rows are of widely varying sizes. See also the `row_len()` method.

**dest\_file\_name:** another file name.

**dest\_file\_type:** this is needed if you want to save to memory

**dest\_session:** the target database session

**dest\_table:** the target destination table

**dest\_model:** the target django model

**dest\_mapdict:** a mapping dictionary see `pyexcel.Sheet.save_to_memory()`

**dest\_initializer:** a custom initializer function for table or model

**dest\_mapdict:** nominate headers

**dest\_batch\_size:** object creation batch size. it is Django specific

**dest\_library:** choose a specific pyexcel-io plugin for writing

**dest\_source\_library:** choose a specific data source plugin for writing

**dest\_renderer\_library:** choose a pyexcel parser plugin for writing

if csv file is destination format, python csv `fmtparams` are accepted

for example: `dest_lineterminator` will replace default ‘ ‘ to the one you specified

In addition, this function use `pyexcel.Sheet` to render the data which could have performance penalty. In exchange, parameters for `pyexcel.Sheet` can be passed on, e.g. `name_columns_by_row`.

When you use this function to work on physical files, this function will leave its file handle open. When you finish the operation on its data, you need to call `pyexcel.free_resources()` to close file handle(s).

for csv, csvz file formats, file handles will be left open. for xls, ods file formats, the file is read all into memory and is close afterwards. for xlsx, file handles will be left open in python 2.7 - 3.5 by `pyexcel-xlsx(openpyxl)`. In other words, `pyexcel-xls`, `pyexcel-ods`, `pyexcel-ods3` won't leak file handles.

## pyexcel.save\_book\_as

`pyexcel.save_book_as(**keywords)`

Save a book from a data source to another one

Here is a table of parameters:

source	parameters
loading from file	file_name, keywords
loading from string	file_content, file_type, keywords
loading from stream	file_stream, file_type, keywords
loading from sql	session, tables
loading from django models	models
loading from dictionary	bookdict
loading from an url	url

Where the dictionary should have text as keys and two dimensional array as values.

### Parameters

**file\_name** : a file with supported file extension

**file\_content** : the file content

**file\_stream** : the file stream

**file\_type** : the file type in *file\_content* or *file\_stream*

**session** : database session

**tables** : a list of database table

**models** : a list of django models

**bookdict** : a dictionary of two dimensional arrays

**url** : a download http url for your excel file

**sheets**: a list of mixed sheet names and sheet indices to be read. This is done to keep Pandas compactibility. With this parameter, more than one sheet can be read and you have the control to read the sheets of your interest instead of all available sheets.

**auto\_detect\_float** : defaults to True

**auto\_detect\_int** : defaults to True

**auto\_detect\_datetime** : defaults to True

**ignore\_infinity** : defaults to True

**library** : choose a specific pyexcel-io plugin for reading

**source\_library** : choose a specific data source plugin for reading

**parser\_library** : choose a pyexcel parser plugin for reading

**skip\_hidden\_sheets**: default is True. Please toggle it to read hidden sheets

### Parameters related to csv file format

for csv, `fmtparams` are accepted

**delimiter** : field separator

**lineterminator** : line terminator

**encoding**: csv specific. Specify the file encoding the csv file. For example: `encoding='latin1'`. Especially, `encoding='utf-8-sig'` would add utf 8 bom header if used in renderer, or would parse a csv with utf brom header used in parser.

**escapechar** : A one-character string used by the writer to escape the delimiter if quoting is set to `QUOTE_NONE` and the `quotechar` if `doublequote` is False.

**quotechar** : A one-character string used to quote fields containing special characters, such as the delimiter or quotechar, or which contain new-line characters. It defaults to ‘”’

**quoting** : Controls when quotes should be generated by the writer and recognised by the reader. It can take on any of the QUOTE\_\* constants (see section Module Contents) and defaults to QUOTE\_MINIMAL.

**skipinitialspace** : When True, whitespace immediately following the delimiter is ignored. The default is False.

**pep\_0515\_off** : When True in python version 3.6, PEP-0515 is turned on. The default is False

**dest\_file\_name**: another file name.

**dest\_file\_type**: this is needed if you want to save to memory

**dest\_session** : the target database session

**dest\_tables** : the list of target destination tables

**dest\_models** : the list of target destination django models

**dest\_mapdicts** : a list of mapping dictionaries

**dest\_initializers** : table initialization functions

**dest\_mapdicts** : to nominate a model or table fields. Optional

**dest\_batch\_size** : batch creation size. Optional

Where the dictionary should have text as keys and two dimensional array as values.

Saving to source	parameters
file	dest_file_name, dest_sheet_name, keywords with prefix ‘dest’
memory	dest_file_type, dest_content, dest_sheet_name, keywords with prefix ‘dest’
sql	dest_session, dest_tables, dest_table_init_func, dest_mapdict
django model	dest_models, dest_initializers, dest_mapdict, dest_batch_size

## pyexcel.isave\_book\_as

`pyexcel.isave_book_as (**keywords)`

Save a book from a data source to another one

It is simliar to `pyexcel.save_book_as ()` but it read when it writes. This function provide some speedup but the output data is not made uniform.

Here is a table of parameters:

source	parameters
loading from file	file_name, keywords
loading from string	file_content, file_type, keywords
loading from stream	file_stream, file_type, keywords
loading from sql	session, tables
loading from django models	models
loading from dictionary	bookdict
loading from an url	url

Where the dictionary should have text as keys and two dimensional array as values.

### Parameters

**file\_name** : a file with supported file extension

**file\_content** : the file content

**file\_stream** : the file stream

**file\_type** : the file type in *file\_content* or *file\_stream*

**session** : database session

**tables** : a list of database table

**models** : a list of django models

**bookdict** : a dictionary of two dimensional arrays

**url** : a download http url for your excel file

**sheets**: a list of mixed sheet names and sheet indices to be read. This is done to keep Pandas compactibility. With this parameter, more than one sheet can be read and you have the control to read the sheets of your interest instead of all available sheets.

**auto\_detect\_float** : defaults to True

**auto\_detect\_int** : defaults to True

**auto\_detect\_datetime** : defaults to True

**ignore\_infinity** : defaults to True

**library** : choose a specific pyexcel-io plugin for reading

**source\_library** : choose a specific data source plugin for reading

**parser\_library** : choose a pyexcel parser plugin for reading

**skip\_hidden\_sheets**: default is True. Please toggle it to read hidden sheets

#### Parameters related to csv file format

for csv, `fmtparams` are accepted

**delimiter** : field separator

**lineterminator** : line terminator

**encoding**: csv specific. Specify the file encoding the csv file. For example: `encoding='latin1'`. Especially, `encoding='utf-8-sig'` would add utf 8 bom header if used in renderer, or would parse a csv with utf brom header used in parser.

**escapechar** : A one-character string used by the writer to escape the delimiter if quoting is set to QUOTE\_NONE and the quotechar if doublequote is False.

**quotechar** : A one-character string used to quote fields containing special characters, such as the delimiter or quotechar, or which contain new-line characters. It defaults to `''''`

**quoting** : Controls when quotes should be generated by the writer and recognised by the reader. It can take on any of the QUOTE\_\* constants (see section Module Contents) and defaults to QUOTE\_MINIMAL.

**skipinitialspace** : When True, whitespace immediately following the delimiter is ignored. The default is False.

**pep\_0515\_off** : When True in python version 3.6, PEP-0515 is turned on. The default is False

**dest\_file\_name**: another file name.

**dest\_file\_type**: this is needed if you want to save to memory

**dest\_session** : the target database session

**dest\_tables** : the list of target destination tables

**dest\_models** : the list of target destination django models

**dest\_mapdicts** : a list of mapping dictionaries

**dest\_initializers** : table initialization functions

**dest\_mapdicts** : to nominate a model or table fields. Optional

**dest\_batch\_size** : batch creation size. Optional

Where the dictionary should have text as keys and two dimensional array as values.

Saving to source	parameters
file	dest_file_name, dest_sheet_name, keywords with prefix 'dest'
memory	dest_file_type, dest_content, dest_sheet_name, keywords with prefix 'dest'
sql	dest_session, dest_tables, dest_table_init_func, dest_mapdict
django model	dest_models, dest_initializers, dest_mapdict, dest_batch_size

When you use this function to work on physical files, this function will leave its file handle open. When you finish the operation on its data, you need to call `pyexcel.free_resources()` to close file handle(s).

for csv, csvz file formats, file handles will be left open. for xls, ods file formats, the file is read all into memory and is close afterwards. for xlsx, file handles will be left open in python 2.7 - 3.5 by pyexcel-xlsx(openpyxl). In other words, pyexcel-xls, pyexcel-ods, pyexcel-ods3 won't leak file handles.

These flags can be passed on all signature functions:

### auto\_detect\_int

Automatically convert float values to integers if the float number has no decimal values(e.g. 1.00). By default, it does the detection. Setting it to False will turn on this behavior

It has no effect on pyexcel-xlsx because it does that by default.

### auto\_detect\_float

Automatically convert text to float values if possible. This applies only pyexcel-io where csv, tsv, csvz and tsvz formats are supported. By default, it does the detection. Setting it to False will turn on this behavior

### auto\_detect\_datetime

Automatically convert text to python datetime if possible. This applies only pyexcel-io where csv, tsv, csvz and tsvz formats are supported. By default, it does the detection. Setting it to False will turn on this behavior

### library

Name a pyexcel plugin to handle a file format. In the situation where multiple plugins were pip installed, it is confusing for pyexcel on which plugin to handle the file format. For example, both pyexcel-xlsx and pyexcel-xls reads xlsx format. Now since version 0.2.2, you can pass on `library="pyexcel-xls"` to handle xlsx in a specific function call.

It is better to uninstall the unwanted pyexcel plugin using pip if two plugins for the same file type are not absolutely necessary.

## Cookbook

<code>merge_csv_to_a_book(filelist[, outfilename])</code>	merge a list of csv files into a excel book
<code>merge_all_to_a_book(filelist[, outfilename])</code>	merge a list of excel files into a excel book
<code>split_a_book(file_name[, outfilename])</code>	Split a file into separate sheets
<code>extract_a_sheet_from_a_book(file_name, sheetname)</code>	Extract a sheet from a excel book

### pyexcel.merge\_csv\_to\_a\_book

`pyexcel.merge_csv_to_a_book` (*filelist*, *outfilename*='merged.xls')  
merge a list of csv files into a excel book

#### Parameters

- **filelist** (*list*) – a list of accessible file path
- **outfilename** (*str*) – save the sheet as

### pyexcel.merge\_all\_to\_a\_book

`pyexcel.merge_all_to_a_book` (*filelist*, *outfilename*='merged.xls')  
merge a list of excel files into a excel book

#### Parameters

- **filelist** (*list*) – a list of accessible file path
- **outfilename** (*str*) – save the sheet as

### pyexcel.split\_a\_book

`pyexcel.split_a_book` (*file\_name*, *outfilename*=None)  
Split a file into separate sheets

#### Parameters

- **file\_name** (*str*) – an accessible file name
- **outfilename** (*str*) – save the sheets with file suffix

### pyexcel.extract\_a\_sheet\_from\_a\_book

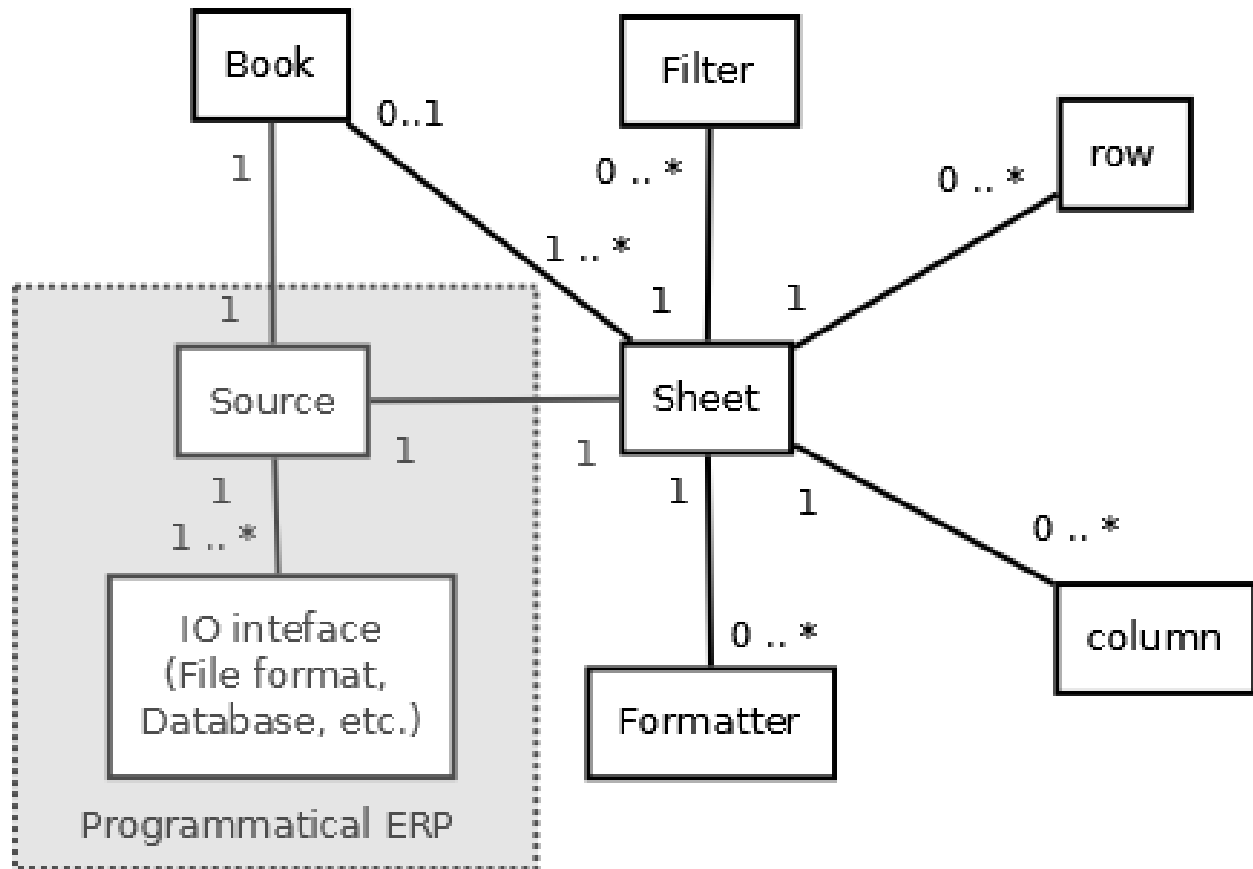
`pyexcel.extract_a_sheet_from_a_book` (*file\_name*, *sheetname*, *outfilename*=None)  
Extract a sheet from a excel book

#### Parameters

- **file\_name** (*str*) – an accessible file name
- **sheetname** (*str*) – a valid sheet name
- **outfilename** (*str*) – save the sheet as

## Book

Here's the entity relationship between Book, Sheet, Row and Column



## Constructor

---

<code>Book([sheets, filename, path])</code>	Read an excel book that has one or more sheets
---------------------------------------------	------------------------------------------------

---

## pyexcel.Book

**class** `pyexcel.Book` (*sheets=None, filename='memory', path=None*)

Read an excel book that has one or more sheets

For csv file, there will be just one sheet

`__init__` (*sheets=None, filename='memory', path=None*)

Book constructor

Selecting a specific book according to filename extension

### Parameters

- **sheets** – a dictionary of data
- **filename** – the physical file
- **path** – the relative path or absolute path

- **keywords** – additional parameters to be passed on

## Methods

<code>__init__([sheets, filename, path])</code>	Book constructor
<code>get_array(**keywords)</code>	Get data in array format
<code>get_bookdict(**keywords)</code>	Get data in bookdict format
<code>get_csv(**keywords)</code>	Get data in csv format
<code>get_csvz(**keywords)</code>	Get data in csvz format
<code>get_dict(**keywords)</code>	Get data in dict format
<code>get_fods(**_)</code>	fods getter is not defined.
<code>Book.get_grid</code>	
<code>get_handsontable(**keywords)</code>	Get data in handsontable format
<code>get_handsontable_html(**keywords)</code>	Get data in handsontable.html format
<code>Book.get_html</code>	
<code>Book.get_json</code>	
<code>Book.get_latex</code>	
<code>Book.get_latex_booktabs</code>	
<code>Book.get_mediawiki</code>	
<code>Book.get_ndjson</code>	
<code>get_ods(**keywords)</code>	Get data in ods format
<code>Book.get_orgtbl</code>	
<code>Book.get_pipe</code>	
<code>Book.get_plain</code>	
<code>get_records(**keywords)</code>	Get data in records format
<code>Book.get_rst</code>	
<code>Book.get_simple</code>	
<code>get_svg(**keywords)</code>	Get data in svg format
<code>get_texttable(**keywords)</code>	Get data in texttable format
<code>get_tsv(**keywords)</code>	Get data in tsv format
<code>get_tsvz(**keywords)</code>	Get data in tsvz format
<code>get_url(**_)</code>	url getter is not defined.
<code>get_xls(**keywords)</code>	Get data in xls format
<code>get_xlsm(**keywords)</code>	Get data in xlsm format
<code>get_xlsx(**keywords)</code>	Get data in xlsx format
<code>init([sheets, filename, path])</code>	independent function so that it could be called multiple times
<code>load_from_sheets(sheets)</code>	Load content from existing sheets
<code>number_of_sheets()</code>	Return the number of sheets
<code>plot([file_type])</code>	Visualize the data
<code>register_input</code>	<code>partial(func, *args, **keywords)</code> - new function with partial application of the given arguments and keywords.
<code>register_io</code>	<code>partial(func, *args, **keywords)</code> - new function with partial application of the given arguments and keywords.
<code>register_presentation</code>	<code>partial(func, *args, **keywords)</code> - new function with partial application of the given arguments and keywords.
<code>remove_sheet(sheet)</code>	Remove a sheet

Continued on next page



Table 13 – continued from previous page

<code>save_as(filename, **keywords)</code>	Save the content to a new file
<code>save_to_database(session, tables[, ...])</code>	Save data in sheets to database tables
<code>save_to_django_models(models[, ...])</code>	Save to database table through django model
<code>save_to_memory(file_type[, stream])</code>	Save the content to a memory stream
<code>set_array(content, **keywords)</code>	Set data in array format
<code>set_bookdict(content, **keywords)</code>	Set data in bookdict format
<code>set_csv(content, **keywords)</code>	Set data in csv format
<code>set_csvz(content, **keywords)</code>	Set data in csvz format
<code>set_dict(content, **keywords)</code>	Set data in dict format
<code>set_fods(content, **keywords)</code>	Set data in fods format
<code>Book.set_grid</code>	
<code>set_handsonatable(_y, **_z)</code>	handsonatable setter is not defined.
<code>set_handsonatable_html(_y, **_z)</code>	handsonatable.html setter is not defined.
<code>Book.set_html</code>	
<code>Book.set_json</code>	
<code>Book.set_latex</code>	
<code>Book.set_latex_booktabs</code>	
<code>Book.set_mediawiki</code>	
<code>Book.set_ndjson</code>	
<code>set_ods(content, **keywords)</code>	Set data in ods format
<code>Book.set Orgtbl</code>	
<code>Book.set_pipe</code>	
<code>Book.set_plain</code>	
<code>set_records(content, **keywords)</code>	Set data in records format
<code>Book.set_rst</code>	
<code>Book.set_simple</code>	
<code>set_svg(_y, **_z)</code>	svg setter is not defined.
<code>set_texttable(_y, **_z)</code>	texttable setter is not defined.
<code>set_tsv(content, **keywords)</code>	Set data in tsv format
<code>set_tsvz(content, **keywords)</code>	Set data in tsvz format
<code>set_url(content, **keywords)</code>	Set data in url format
<code>set_xls(content, **keywords)</code>	Set data in xls format
<code>set_xlsm(content, **keywords)</code>	Set data in xlsm format
<code>set_xlsx(content, **keywords)</code>	Set data in xlsx format
<code>sheet_by_index(index)</code>	Get the sheet with the specified index
<code>sheet_by_name(name)</code>	Get the sheet with the specified name
<code>sheet_names()</code>	Return all sheet names
<code>sort_sheets([key, reverse])</code>	
<code>to_dict()</code>	Convert the book to a dictionary

**Attributes**

<code>array</code>	Get/Set data in/from array format
<code>bookdict</code>	Get/Set data in/from bookdict format
<code>csv</code>	Get/Set data in/from csv format
<code>csvz</code>	Get/Set data in/from csvz format
<code>dict</code>	Get/Set data in/from dict format
<code>fods</code>	Set data in fods format
<code>Book.grid</code>	

Continued on next page

Table 14 – continued from previous page

<code>handsontable</code>	Get data in handsontable format
<code>handsontable_html</code>	Get data in handsontable.html format
<code>Book.html</code>	
<code>Book.json</code>	
<code>Book.latex</code>	
<code>Book.latex_booktabs</code>	
<code>Book.mediawiki</code>	
<code>Book.ndjson</code>	
<code>ods</code>	Get/Set data in/from ods format
<code>Book.orgtbl</code>	
<code>Book.pipe</code>	
<code>Book.plain</code>	
<code>records</code>	Get/Set data in/from records format
<code>Book.rst</code>	
<code>Book.simple</code>	
<code>stream</code>	Return a stream in which the content is properly encoded
<code>svg</code>	Get data in svg format
<code>texttable</code>	Get data in texttable format
<code>tsv</code>	Get/Set data in/from tsv format
<code>tsvz</code>	Get/Set data in/from tsvz format
<code>url</code>	Set data in url format
<code>xls</code>	Get/Set data in/from xls format
<code>xlsm</code>	Get/Set data in/from xlsm format
<code>xlsx</code>	Get/Set data in/from xlsx format

### Attribute

<code>Book.number_of_sheets()</code>	Return the number of sheets
<code>Book.sheet_names()</code>	Return all sheet names

### pyexcel.Book.number\_of\_sheets

`Book.number_of_sheets()`  
Return the number of sheets

### pyexcel.Book.sheet\_names

`Book.sheet_names()`  
Return all sheet names

### Conversions

<code>Book.bookdict</code>	Get/Set data in/from bookdict format
<code>Book.url</code>	Set data in url format
<code>Book.csv</code>	Get/Set data in/from csv format

Continued on next page

Table 16 – continued from previous page

<i>Book.tsv</i>	Get/Set data in/from tsv format
<i>Book.csvz</i>	Get/Set data in/from csvz format
<i>Book.tsvz</i>	Get/Set data in/from tsvz format
<i>Book.xls</i>	Get/Set data in/from xls format
<i>Book.xlsm</i>	Get/Set data in/from xlsm format
<i>Book.xlsx</i>	Get/Set data in/from xlsx format
<i>Book.ods</i>	Get/Set data in/from ods format
<i>Book.stream</i>	Return a stream in which the content is properly encoded

**pyexcel.Book.bookdict****Book.bookdict**

Get/Set data in/from bookdict format

You could obtain content in bookdict format by dot notation:

```
Book.bookdict
```

And you could as well set content by dot notation:

```
Book.bookdict = the_io_stream_in_bookdict_format
```

if you need to pass on more parameters, you could use:

```
Book.get_bookdict(**keywords)
Book.set_bookdict(the_io_stream_in_bookdict_format, **keywords)
```

**pyexcel.Book.url****Book.url**

Set data in url format

You could set content in url format by dot notation:

```
Book.url
```

if you need to pass on more parameters, you could use:

```
Book.set_url(the_io_stream_in_url_format, **keywords)
```

**pyexcel.Book.csv****Book.csv**

Get/Set data in/from csv format

You could obtain content in csv format by dot notation:

```
Book.csv
```

And you could as well set content by dot notation:

```
Book.csv = the_io_stream_in_csv_format
```

if you need to pass on more parameters, you could use:

```
Book.get_csv(**keywords)
Book.set_csv(the_io_stream_in_csv_format, **keywords)
```

## pyexcel.Book.tsv

### Book.tsv

Get/Set data in/from tsv format

You could obtain content in tsv format by dot notation:

```
Book.tsv
```

And you could as well set content by dot notation:

```
Book.tsv = the_io_stream_in_tsv_format
```

if you need to pass on more parameters, you could use:

```
Book.get_tsv(**keywords)
Book.set_tsv(the_io_stream_in_tsv_format, **keywords)
```

## pyexcel.Book.csvz

### Book.csvz

Get/Set data in/from csvz format

You could obtain content in csvz format by dot notation:

```
Book.csvz
```

And you could as well set content by dot notation:

```
Book.csvz = the_io_stream_in_csvz_format
```

if you need to pass on more parameters, you could use:

```
Book.get_csvz(**keywords)
Book.set_csvz(the_io_stream_in_csvz_format, **keywords)
```

## pyexcel.Book.tsvz

### Book.tsvz

Get/Set data in/from tsvz format

You could obtain content in tsvz format by dot notation:

```
Book.tsvz
```

And you could as well set content by dot notation:

```
Book.tsvz = the_io_stream_in_tsvz_format
```

if you need to pass on more parameters, you could use:

```
Book.get_tsvz(**keywords)
Book.set_tsvz(the_io_stream_in_tsvz_format, **keywords)
```

## pyexcel.Book.xls

### Book.xls

Get/Set data in/from xls format

You could obtain content in xls format by dot notation:

```
Book.xls
```

And you could as well set content by dot notation:

```
Book.xls = the_io_stream_in_xls_format
```

if you need to pass on more parameters, you could use:

```
Book.get_xls(**keywords)
Book.set_xls(the_io_stream_in_xls_format, **keywords)
```

## pyexcel.Book.xlsm

### Book.xlsm

Get/Set data in/from xlsm format

You could obtain content in xlsm format by dot notation:

```
Book.xlsm
```

And you could as well set content by dot notation:

```
Book.xlsm = the_io_stream_in_xlsm_format
```

if you need to pass on more parameters, you could use:

```
Book.get_xlsm(**keywords)
Book.set_xlsm(the_io_stream_in_xlsm_format, **keywords)
```

## pyexcel.Book.xlsx

### Book.xlsx

Get/Set data in/from xlsx format

You could obtain content in xlsx format by dot notation:

```
Book.xlsx
```

And you could as well set content by dot notation:

```
Book.xlsx = the_io_stream_in_xlsx_format
```

if you need to pass on more parameters, you could use:

```
Book.get_xlsx(**keywords)
Book.set_xlsx(the_io_stream_in_xlsx_format, **keywords)
```

## pyexcel.Book.ods

### Book.ods

Get/Set data in/from ods format

You could obtain content in ods format by dot notation:

```
Book.ods
```

And you could as well set content by dot notation:

```
Book.ods = the_io_stream_in_ods_format
```

if you need to pass on more parameters, you could use:

```
Book.get_ods(**keywords)
Book.set_ods(the_io_stream_in_ods_format, **keywords)
```

## pyexcel.Book.stream

### Book.stream

Return a stream in which the content is properly encoded

Example:

```
>>> import pyexcel as p
>>> b = p.get_book(bookdict={"A": [[1]]})
>>> csv_stream = b.stream.texttable
>>> print(csv_stream.getvalue())
A:
+----+
| 1 |
+----+
```

Where `b.stream.xls.getvalue()` is equivalent to `b.xls`. In some situation `b.stream.xls` is preferred than `b.xls`.

Sheet examples:

```
>>> import pyexcel as p
>>> s = p.Sheet([[1]], 'A')
>>> csv_stream = s.stream.texttable
>>> print(csv_stream.getvalue())
A:
+----+
| 1 |
+----+
```

Where `s.stream.xls.getvalue()` is equivalent to `s.xls`. In some situation `s.stream.xls` is preferred than `s.xls`.

It is similar to `save_to_memory()`.

## Save changes

<code>Book.save_as(filename, **keywords)</code>	Save the content to a new file
<code>Book.save_to_memory(file_type[, stream])</code>	Save the content to a memory stream
<code>Book.save_to_database(session, tables[, ...])</code>	Save data in sheets to database tables
<code>Book.save_to_django_models(models[, ...])</code>	Save to database table through django model

## pyexcel.Book.save\_as

`Book.save_as(filename, **keywords)`

Save the content to a new file

Keywords may vary depending on your file type, because the associated file type employs different library.

### PARAMETERS

**filename:** a file path

**library:** choose a specific pyexcel-io plugin for writing

**renderer\_library:** choose a pyexcel parser plugin for writing

### Parameters related to csv file format

for csv, `fmtparams` are accepted

**delimiter :** field separator

**lineterminator :** line terminator

**encoding:** csv specific. Specify the file encoding the csv file. For example: `encoding='latin1'`. Especially, `encoding='utf-8-sig'` would add utf 8 bom header if used in renderer, or would parse a csv with utf bom header used in parser.

**escapechar :** A one-character string used by the writer to escape the delimiter if quoting is set to `QUOTE_NONE` and the quotechar if `doublequote` is `False`.

**quotechar :** A one-character string used to quote fields containing special characters, such as the delimiter or quotechar, or which contain new-line characters. It defaults to `''''`

**quoting :** Controls when quotes should be generated by the writer and recognised by the reader. It can take on any of the `QUOTE_*` constants (see section Module Contents) and defaults to `QUOTE_MINIMAL`.

**skipinitialspace :** When `True`, whitespace immediately following the delimiter is ignored. The default is `False`.

**pep\_0515\_off :** When `True` in python version 3.6, PEP-0515 is turned on. The default is `False`

## pyexcel.Book.save\_to\_memory

`Book.save_to_memory(file_type, stream=None, **keywords)`

Save the content to a memory stream

### Parameters

- **file\_type** – what format the stream is in

- **stream** – a memory stream. Note in Python 3, for csv and tsv format, please pass an instance of StringIO. For xls,xlsx, and ods, an instance of BytesIO.

### pyexcel.Book.save\_to\_database

Book.**save\_to\_database** (*session, tables, initializers=None, mapdicts=None, auto\_commit=True*)  
Save data in sheets to database tables

#### Parameters

- **session** – database session
- **tables** – a list of database tables, that is accepted by *Sheet.save\_to\_database()*. The sequence of tables matters when there is dependencies in between the tables. For example, **Car** is made by **Car Maker**. **Car Maker** table should be specified before **Car** table.
- **initializers** – a list of intialization functions for your tables and the sequence should match tables,
- **mapdicts** – custom map dictionary for your data columns and the sequence should match tables
- **auto\_commit** – by default, data is committed.

### pyexcel.Book.save\_to\_django\_models

Book.**save\_to\_django\_models** (*models, initializers=None, mapdicts=None, \*\*keywords*)  
Save to database table through django model

#### Parameters

- **models** – a list of database models, that is accepted by *Sheet.save\_to\_django\_model()*. The sequence of tables matters when there is dependencies in between the tables. For example, **Car** is made by **Car Maker**. **Car Maker** table should be specified before **Car** table.
- **initializers** – a list of intialization functions for your tables and the sequence should match tables,
- **mapdicts** – custom map dictionary for your data columns and the sequence should match tables

optional parameters: :param batch\_size: django bulk\_create batch size :param bulk\_save: whether to use bulk\_create or to use single save

per record

## Sheet

### Constructor

---

<i>Sheet</i> ([sheet, name, name_columns_by_row, ...])	Two dimensional data container for filtering, formatting and iteration
--------------------------------------------------------	------------------------------------------------------------------------

---



## pyexcel.Sheet

```
class pyexcel.Sheet (sheet=None, name='pyexcel sheet', name_columns_by_row=-1,
                    name_rows_by_column=-1, colnames=None, rownames=None, trans-
                    pose_before=False, transpose_after=False)
```

Two dimensional data container for filtering, formatting and iteration

*Sheet* is a container for a two dimensional array, where individual cell can be any Python types. Other than numbers, value of these types: string, date, time and boolean can be mixed in the array. This differs from Numpy's matrix where each cell are of the same number type.

In order to prepare two dimensional data for your computation, formatting functions help convert array cells to required types. Formatting can be applied not only to the whole sheet but also to selected rows or columns. Custom conversion function can be passed to these formatting functions. For example, to remove extra spaces surrounding the content of a cell, a custom function is required.

Filtering functions are used to reduce the information contained in the array.

### Variables

- **name** – sheet name. use to change sheet name
- **row** – access data row by row
- **column** – access data column by column

Example:

```
>>> import pyexcel as p
>>> content = {'A': [[1]]}
>>> b = p.get_book(bookdict=content)
>>> b
A:
+----+
| 1 |
+----+
>>> b[0].name
'A'
>>> b[0].name = 'B'
>>> b
B:
+----+
| 1 |
+----+
```

```
__init__ (sheet=None, name='pyexcel sheet', name_columns_by_row=-1, name_rows_by_column=-1, colnames=None, rownames=None, transpose_before=False, transpose_after=False)
Constructor
```

### Parameters

- **sheet** – two dimensional array
- **name** – this becomes the sheet name.
- **name\_columns\_by\_row** – use a row to name all columns
- **name\_rows\_by\_column** – use a column to name all rows
- **colnames** – use an external list of strings to name the columns
- **rownames** – use an external list of strings to name the rows

## Methods

<code>__init__</code> ([sheet, name, name_columns_by_row, ...])	Constructor
<code>cell_value</code> (row, column[, new_value])	Random access to table cells
<code>column_at</code> (index)	Gets the data at the specified column
<code>column_range</code> ()	Utility function to get column range
<code>columns</code> ()	Returns a left to right column iterator
<code>contains</code> (predicate)	Has something in the table
<code>cut</code> (topleft_corner, bottomright_corner)	Get a rectangle shaped data out and clear them in position
<code>delete_columns</code> (column_indices)	Delete one or more columns
<code>delete_named_column_at</code> (name)	Works only after you named columns by a row
<code>delete_named_row_at</code> (name)	Take the first column as row names
<code>delete_rows</code> (row_indices)	Delete one or more rows
<code>enumerate</code> ()	Iterate cell by cell from top to bottom and from left to right
<code>extend_columns</code> (columns)	Take ordereddict to extend named columns
<code>extend_columns_with_rows</code> (rows)	Put rows on the right most side of the data
<code>extend_rows</code> (rows)	Take ordereddict to extend named rows
<code>filter</code> ([column_indices, row_indices])	Apply the filter with immediate effect
<code>format</code> (formatter)	Apply a formatting action for the whole sheet
<code>get_array</code> (**keywords)	Get data in array format
<code>get_bookdict</code> (**keywords)	Get data in bookdict format
<code>get_csv</code> (**keywords)	Get data in csv format
<code>get_csvz</code> (**keywords)	Get data in csvz format
<code>get_dict</code> (**keywords)	Get data in dict format
<code>get_fods</code> (**_)	fods getter is not defined.
<code>Sheet.get_grid</code>	
<code>get_handsontable</code> (**keywords)	Get data in handsontable format
<code>get_handsontable_html</code> (**keywords)	Get data in handsontable.html format
<code>Sheet.get_html</code>	
<code>get_internal_array</code> ()	present internal array
<code>Sheet.get_json</code>	
<code>Sheet.get_latex</code>	
<code>Sheet.get_latex_booktabs</code>	
<code>Sheet.get_mediawiki</code>	
<code>Sheet.get_ndjson</code>	
<code>get_ods</code> (**keywords)	Get data in ods format
<code>Sheet.get_orgtbl</code>	
<code>Sheet.get_pipe</code>	
<code>Sheet.get_plain</code>	
<code>get_records</code> (**keywords)	Get data in records format
<code>Sheet.get_rst</code>	
<code>Sheet.get_simple</code>	
<code>get_svg</code> (**keywords)	Get data in svg format
<code>get_texttable</code> (**keywords)	Get data in texttable format
<code>get_tsv</code> (**keywords)	Get data in tsv format
<code>get_tsvz</code> (**keywords)	Get data in tsvz format
<code>get_url</code> (**_)	url getter is not defined.
<code>get_xls</code> (**keywords)	Get data in xls format

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Table 19 – continued from previous page

<code>get_xlsm(**keywords)</code>	Get data in xlsm format
<code>get_xlsx(**keywords)</code>	Get data in xlsx format
<code>group_rows_by_column(column_index_or_name)</code>	Group rows with similiar column into a two dimensional array.
<code>init([sheet, name, name_columns_by_row, ...])</code>	custom initialization functions
<code>map(custom_function)</code>	Execute a function across all cells of the sheet
<code>name_columns_by_row(row_index)</code>	Use the elements of a specified row to represent individual columns
<code>name_rows_by_column(column_index)</code>	Use the elements of a specified column to represent individual rows
<code>named_column_at(name)</code>	Get a column by its name
<code>named_columns()</code>	iterate rows using column names
<code>named_row_at(name)</code>	Get a row by its name
<code>named_rows()</code>	iterate rows using row names
<code>number_of_columns()</code>	The number of columns
<code>number_of_rows()</code>	The number of rows
<code>paste(topleft_corner[, rows, columns])</code>	Paste a rectangle shaped data after a position
<code>plot([file_type])</code>	Visualize the data
<code>rcolumns()</code>	Returns a right to left column iterator
<code>region(topleft_corner, bottomright_corner)</code>	Get a rectangle shaped data out
<code>register_input</code>	<code>partial(func, *args, **keywords)</code> - new function with partial application of the given arguments and keywords.
<code>register_io</code>	<code>partial(func, *args, **keywords)</code> - new function with partial application of the given arguments and keywords.
<code>register_presentation</code>	<code>partial(func, *args, **keywords)</code> - new function with partial application of the given arguments and keywords.
<code>reverse()</code>	Opposite to enumerate
<code>row_at(index)</code>	Gets the data at the specified row
<code>row_range()</code>	Utility function to get row range
<code>rows()</code>	Returns a top to bottom row iterator
<code>rrows()</code>	Returns a bottom to top row iterator
<code>rvertical()</code>	Default iterator to go through each cell one by one from rightmost column to leftmost row and from bottom to top example.
<code>save_as(filename, **keywords)</code>	Save the content to a named file
<code>save_to_database(session, table[, ...])</code>	Save data in sheet to database table
<code>save_to_django_model(model[, initializer, ...])</code>	Save to database table through django model
<code>save_to_memory(file_type[, stream])</code>	Save the content to memory
<code>set_array(content, **keywords)</code>	Set data in array format
<code>set_bookdict(content, **keywords)</code>	Set data in bookdict format
<code>set_column_at(column_index, data_array[, ...])</code>	Updates a column data range
<code>set_csv(content, **keywords)</code>	Set data in csv format
<code>set_csvz(content, **keywords)</code>	Set data in csvz format
<code>set_dict(content, **keywords)</code>	Set data in dict format
<code>set_fods(content, **keywords)</code>	Set data in fods format
<code>Sheet.set_grid</code>	

Continued on next page

Table 19 – continued from previous page

<code>set_handsontable(_y, *_z)</code>	handsontable setter is not defined.
<code>set_handsontable_html(_y, *_z)</code>	handsontable.html setter is not defined.
<code>Sheet.set_html</code>	
<code>Sheet.set_json</code>	
<code>Sheet.set_latex</code>	
<code>Sheet.set_latex_booktabs</code>	
<code>Sheet.set_mediawiki</code>	
<code>set_named_column_at(name, column_array)</code>	Take the first row as column names
<code>set_named_row_at(name, row_array)</code>	Take the first column as row names
<code>Sheet.set_ndjson</code>	
<code>set_ods(content, **keywords)</code>	Set data in ods format
<code>Sheet.set Orgtbl</code>	
<code>Sheet.set_pipe</code>	
<code>Sheet.set_plain</code>	
<code>set_records(content, **keywords)</code>	Set data in records format
<code>set_row_at(row_index, data_array)</code>	Update a row data range
<code>Sheet.set_rst</code>	
<code>Sheet.set_simple</code>	
<code>set_svg(_y, *_z)</code>	svg setter is not defined.
<code>set_texttable(_y, *_z)</code>	texttable setter is not defined.
<code>set_tsv(content, **keywords)</code>	Set data in tsv format
<code>set_tsvz(content, **keywords)</code>	Set data in tsvz format
<code>set_url(content, **keywords)</code>	Set data in url format
<code>set_xls(content, **keywords)</code>	Set data in xls format
<code>set_xlsm(content, **keywords)</code>	Set data in xlsm format
<code>set_xlsx(content, **keywords)</code>	Set data in xlsx format
<code>to_array()</code>	Returns an array after filtering
<code>to_dict([row])</code>	Returns a dictionary
<code>to_records([custom_headers])</code>	Make an array of dictionaries
<code>top([lines])</code>	Preview top most 5 rows
<code>top_left([rows, columns])</code>	Preview top corner: 5x5
<code>transpose()</code>	Rotate the data table by 90 degrees
<code>vertical()</code>	Default iterator to go through each cell one by one from leftmost column to rightmost row and from top to bottom example.

### Attributes

<code>array</code>	Get/Set data in/from array format
<code>bookdict</code>	Get/Set data in/from bookdict format
<code>colnames</code>	Return column names if any
<code>content</code>	Plain representation without headers
<code>csv</code>	Get/Set data in/from csv format
<code>csvz</code>	Get/Set data in/from csvz format
<code>dict</code>	Get/Set data in/from dict format
<code>fods</code>	Set data in fods format
<code>Sheet.grid</code>	
<code>handsontable</code>	Get data in handsontable format
<code>handsontable_html</code>	Get data in handsontable.html format
<code>Sheet.html</code>	

Continued on next page

Table 20 – continued from previous page

<code>Sheet.json</code>	
<code>Sheet.latex</code>	
<code>Sheet.latex_booktabs</code>	
<code>Sheet.mediawiki</code>	
<code>Sheet.ndjson</code>	
<code>ods</code>	Get/Set data in/from ods format
<code>Sheet.orgtbl</code>	
<code>Sheet.pipe</code>	
<code>Sheet.plain</code>	
<code>records</code>	Get/Set data in/from records format
<code>rownames</code>	Return row names if any
<code>Sheet.rst</code>	
<code>Sheet.simple</code>	
<code>stream</code>	Return a stream in which the content is properly encoded
<code>svg</code>	Get data in svg format
<code>texttable</code>	Get data in texttable format
<code>tsv</code>	Get/Set data in/from tsv format
<code>tsvz</code>	Get/Set data in/from tsvz format
<code>url</code>	Set data in url format
<code>xls</code>	Get/Set data in/from xls format
<code>xlsm</code>	Get/Set data in/from xlsm format
<code>xlsx</code>	Get/Set data in/from xlsx format

## Attributes

<code>Sheet.content</code>	Plain representation without headers
<code>Sheet.number_of_rows()</code>	The number of rows
<code>Sheet.number_of_columns()</code>	The number of columns
<code>Sheet.row_range()</code>	Utility function to get row range
<code>Sheet.column_range()</code>	Utility function to get column range

## pyexcel.Sheet.content

### Sheet.content

Plain representation without headers

## pyexcel.Sheet.number\_of\_rows

### Sheet.number\_of\_rows()

The number of rows

## pyexcel.Sheet.number\_of\_columns

### Sheet.number\_of\_columns()

The number of columns

### pyexcel.Sheet.row\_range

Sheet.**row\_range**()  
Utility function to get row range

### pyexcel.Sheet.column\_range

Sheet.**column\_range**()  
Utility function to get column range

### Iteration

<i>Sheet.rows()</i>	Returns a top to bottom row iterator
<i>Sheet.rrows()</i>	Returns a bottom to top row iterator
<i>Sheet.columns()</i>	Returns a left to right column iterator
<i>Sheet.rcolumns()</i>	Returns a right to left column iterator
<i>Sheet.enumerate()</i>	Iterate cell by cell from top to bottom and from left to right
<i>Sheet.reverse()</i>	Opposite to enumerate
<i>Sheet.vertical()</i>	Default iterator to go through each cell one by one from leftmost column to rightmost row and from top to bottom example.
<i>Sheet.rvertical()</i>	Default iterator to go through each cell one by one from rightmost column to leftmost row and from bottom to top example.

### pyexcel.Sheet.rows

Sheet.**rows**()  
Returns a top to bottom row iterator

example:

```
import pyexcel as pe
data = [
    [1, 2, 3, 4],
    [5, 6, 7, 8],
    [9, 10, 11, 12]
]
m = pe.internal.sheets.Matrix(data)
print(pe.utils.to_array(m.rows()))
```

output:

```
[[1, 2, 3, 4], [5, 6, 7, 8], [9, 10, 11, 12]]
```

More details see [RowIterator](#)

## pyexcel.Sheet.rrows

Sheet.**rrows**()

Returns a bottom to top row iterator

```
import pyexcel as pe
data = [
    [1, 2, 3, 4],
    [5, 6, 7, 8],
    [9, 10, 11, 12]
]
m = pe.internal.sheets.Matrix(data)
print(pe.utils.to_array(m.rrows()))
```

```
[[9, 10, 11, 12], [5, 6, 7, 8], [1, 2, 3, 4]]
```

More details see RowReverseIterator

## pyexcel.Sheet.columns

Sheet.**columns**()

Returns a left to right column iterator

```
import pyexcel as pe
data = [
    [1, 2, 3, 4],
    [5, 6, 7, 8],
    [9, 10, 11, 12]
]
m = pe.internal.sheets.Matrix(data)
print(list(m.columns()))
```

```
[[1, 5, 9], [2, 6, 10], [3, 7, 11], [4, 8, 12]]
```

More details see ColumnIterator

## pyexcel.Sheet.rcolumns

Sheet.**rcolumns**()

Returns a right to left column iterator

example:

```
import pyexcel as pe
data = [
    [1, 2, 3, 4],
    [5, 6, 7, 8],
    [9, 10, 11, 12]
]
m = pe.internal.sheets.Matrix(data)
print(pe.utils.to_array(m.rcolumns()))
```

output:

```
[4, 8, 12], [3, 7, 11], [2, 6, 10], [1, 5, 9]]
```

More details see `ColumnReverseIterator`

### pyexcel.Sheet.enumerate

`Sheet.enumerate()`

Iterate cell by cell from top to bottom and from left to right

```
>>> import pyexcel as pe
>>> data = [
...     [1, 2, 3, 4],
...     [5, 6, 7, 8],
...     [9, 10, 11, 12]
... ]
>>> m = pe.internal.sheets.Matrix(data)
>>> print(list(m.enumerate()))
[1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12]
```

More details see `HTLBRIterator`

### pyexcel.Sheet.reverse

`Sheet.reverse()`

Opposite to `enumerate`

each cell one by one from bottom row to top row and from right to left example:

```
>>> import pyexcel as pe
>>> data = [
...     [1, 2, 3, 4],
...     [5, 6, 7, 8],
...     [9, 10, 11, 12]
... ]
>>> m = pe.internal.sheets.Matrix(data)
>>> print(list(m.reverse()))
[12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1]
```

More details see `HBRTLIterator`

### pyexcel.Sheet.vertical

`Sheet.vertical()`

Default iterator to go through each cell one by one from leftmost column to rightmost row and from top to bottom example:

```
import pyexcel as pe
data = [
    [1, 2, 3, 4],
    [5, 6, 7, 8],
    [9, 10, 11, 12]
]
```

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```
m = pe.internal.sheets.Matrix(data)
print(list(m.vertical()))
```

output:

```
[1, 5, 9, 2, 6, 10, 3, 7, 11, 4, 8, 12]
```

More details see VTLBRIterator

## pyexcel.Sheet.rvertical

Sheet.**rvertical**()

Default iterator to go through each cell one by one from rightmost column to leftmost row and from bottom to top example:

```
import pyexcel as pe
data = [
    [1, 2, 3, 4],
    [5, 6, 7, 8],
    [9, 10, 11, 12]
]
m = pe.internal.sheets.Matrix(data)
print(pe.utils.to_array(m.rvertical()))
```

output:

```
[12, 8, 4, 11, 7, 3, 10, 6, 2, 9, 5, 1]
```

More details see VBRTLIterator

## Cell access

<code>Sheet.cell_value(row, column[, new_value])</code>	Random access to table cells
<code>Sheet.__getitem__(aset)</code>	By default, this class recognize from top to bottom from left to right

## pyexcel.Sheet.cell\_value

Sheet.**cell\_value**(row, column, new\_value=None)

Random access to table cells

### Parameters

- **row** (*int*) – row index which starts from 0
- **column** (*int*) – column index which starts from 0
- **new\_value** (*any*) – new value if this is to set the value

## pyexcel.Sheet.\_\_getitem\_\_

Sheet.**\_\_getitem\_\_** (*aset*)

By default, this class recognize from top to bottom from left to right

## Row access

<i>Sheet.row_at</i> (index)	Gets the data at the specified row
<i>Sheet.set_row_at</i> (row_index, data_array)	Update a row data range
<i>Sheet.delete_rows</i> (row_indices)	Delete one or more rows
<i>Sheet.extend_rows</i> (rows)	Take ordereddict to extend named rows

## pyexcel.Sheet.row\_at

Sheet.**row\_at** (*index*)

Gets the data at the specified row

## pyexcel.Sheet.set\_row\_at

Sheet.**set\_row\_at** (*row\_index, data\_array*)

Update a row data range

## pyexcel.Sheet.delete\_rows

Sheet.**delete\_rows** (*row\_indices*)

Delete one or more rows

**Parameters** **row\_indices** (*list*) – a list of row indices

## pyexcel.Sheet.extend\_rows

Sheet.**extend\_rows** (*rows*)

Take ordereddict to extend named rows

**Parameters** **rows** (*ordereddict/list*) – a list of rows.

## Column access

<i>Sheet.column_at</i> (index)	Gets the data at the specified column
<i>Sheet.set_column_at</i> (column_index, data_array)	Updates a column data range
<i>Sheet.delete_columns</i> (column_indices)	Delete one or more columns
<i>Sheet.extend_columns</i> (columns)	Take ordereddict to extend named columns

### pyexcel.Sheet.column\_at

Sheet.**column\_at** (*index*)

Gets the data at the specified column

### pyexcel.Sheet.set\_column\_at

Sheet.**set\_column\_at** (*column\_index*, *data\_array*, *starting=0*)

Updates a column data range

It works like this if the call is: set\_column\_at(2, ['N','N', 'N'], 1):

```

    +--> column_index = 2
    |
A B C
1 3 N <- starting = 1
2 4 N

```

This function will not set element outside the current table range

#### Parameters

- **column\_index** (*int*) – which column to be modified
- **data\_array** (*list*) – one dimensional array
- **staring** (*int*) – from which index, the update happens

**Raises** **IndexError** – if column\_index exceeds column range or starting exceeds row range

### pyexcel.Sheet.delete\_columns

Sheet.**delete\_columns** (*column\_indices*)

Delete one or more columns

**Parameters** **column\_indices** (*list*) – a list of column indices

### pyexcel.Sheet.extend\_columns

Sheet.**extend\_columns** (*columns*)

Take ordereddict to extend named columns

**Parameters** **columns** (*ordereddict/list*) – a list of columns

## Data series

### Any column as row name

<i>Sheet.name_columns_by_row</i> (row_index)	Use the elements of a specified row to represent individual columns
<i>Sheet.rownames</i>	Return row names if any
<i>Sheet.named_column_at</i> (name)	Get a column by its name

Continued on next page

Table 26 – continued from previous page

<code>Sheet.set_named_column_at(name, column_array)</code>	col-	Take the first row as column names
<code>Sheet.delete_named_column_at(name)</code>		Works only after you named columns by a row

### pyexcel.Sheet.name\_columns\_by\_row

`Sheet.name_columns_by_row(row_index)`

Use the elements of a specified row to represent individual columns

The specified row will be deleted from the data :param row\_index: the index of the row that has the column names

### pyexcel.Sheet.rownames

`Sheet.rownames`

Return row names if any

### pyexcel.Sheet.named\_column\_at

`Sheet.named_column_at(name)`

Get a column by its name

### pyexcel.Sheet.set\_named\_column\_at

`Sheet.set_named_column_at(name, column_array)`

Take the first row as column names

Given name to identify the column index, set the column to the given array except the column name.

### pyexcel.Sheet.delete\_named\_column\_at

`Sheet.delete_named_column_at(name)`

Works only after you named columns by a row

Given name to identify the column index, set the column to the given array except the column name. :param str name: a column name

### Any row as column name

<code>Sheet.name_rows_by_column(column_index)</code>	Use the elements of a specified column to represent individual rows
<code>Sheet.colnames</code>	Return column names if any
<code>Sheet.named_row_at(name)</code>	Get a row by its name
<code>Sheet.set_named_row_at(name, row_array)</code>	Take the first column as row names
<code>Sheet.delete_named_row_at(name)</code>	Take the first column as row names

**pyexcel.Sheet.name\_rows\_by\_column**

Sheet.**name\_rows\_by\_column** (*column\_index*)

Use the elements of a specified column to represent individual rows

The specified column will be deleted from the data :param *column\_index*: the index of the column that has the row names

**pyexcel.Sheet.colnames**

Sheet.**colnames**

Return column names if any

**pyexcel.Sheet.named\_row\_at**

Sheet.**named\_row\_at** (*name*)

Get a row by its name

**pyexcel.Sheet.set\_named\_row\_at**

Sheet.**set\_named\_row\_at** (*name, row\_array*)

Take the first column as row names

Given name to identify the row index, set the row to the given array except the row name.

**pyexcel.Sheet.delete\_named\_row\_at**

Sheet.**delete\_named\_row\_at** (*name*)

Take the first column as row names

Given name to identify the row index, set the row to the given array except the row name.

**Conversion**

<i>Sheet.array</i>	Get/Set data in/from array format
<i>Sheet.records</i>	Get/Set data in/from records format
<i>Sheet.dict</i>	Get/Set data in/from dict format
<i>Sheet.url</i>	Set data in url format
<i>Sheet.csv</i>	Get/Set data in/from csv format
<i>Sheet.tsv</i>	Get/Set data in/from tsv format
<i>Sheet.csvz</i>	Get/Set data in/from csvz format
<i>Sheet.tsvz</i>	Get/Set data in/from tsvz format
<i>Sheet.xls</i>	Get/Set data in/from xls format
<i>Sheet.xlsm</i>	Get/Set data in/from xlsm format
<i>Sheet.xlsx</i>	Get/Set data in/from xlsx format
<i>Sheet.ods</i>	Get/Set data in/from ods format
<i>Sheet.stream</i>	Return a stream in which the content is properly encoded

## pyexcel.Sheet.array

### Sheet.array

Get/Set data in/from array format

You could obtain content in array format by dot notation:

```
Sheet.array
```

And you could as well set content by dot notation:

```
Sheet.array = the_io_stream_in_array_format
```

if you need to pass on more parameters, you could use:

```
Sheet.get_array(**keywords)  
Sheet.set_array(the_io_stream_in_array_format, **keywords)
```

## pyexcel.Sheet.records

### Sheet.records

Get/Set data in/from records format

You could obtain content in records format by dot notation:

```
Sheet.records
```

And you could as well set content by dot notation:

```
Sheet.records = the_io_stream_in_records_format
```

if you need to pass on more parameters, you could use:

```
Sheet.get_records(**keywords)  
Sheet.set_records(the_io_stream_in_records_format, **keywords)
```

## pyexcel.Sheet.dict

### Sheet.dict

Get/Set data in/from dict format

You could obtain content in dict format by dot notation:

```
Sheet.dict
```

And you could as well set content by dot notation:

```
Sheet.dict = the_io_stream_in_dict_format
```

if you need to pass on more parameters, you could use:

```
Sheet.get_dict(**keywords)  
Sheet.set_dict(the_io_stream_in_dict_format, **keywords)
```

## pyexcel.Sheet.url

### Sheet.url

Set data in url format

You could set content in url format by dot notation:

```
Sheet.url
```

if you need to pass on more parameters, you could use:

```
Sheet.set_url(the_io_stream_in_url_format, **keywords)
```

## pyexcel.Sheet.csv

### Sheet.csv

Get/Set data in/from csv format

You could obtain content in csv format by dot notation:

```
Sheet.csv
```

And you could as well set content by dot notation:

```
Sheet.csv = the_io_stream_in_csv_format
```

if you need to pass on more parameters, you could use:

```
Sheet.get_csv(**keywords)  
Sheet.set_csv(the_io_stream_in_csv_format, **keywords)
```

## pyexcel.Sheet.tsv

### Sheet.tsv

Get/Set data in/from tsv format

You could obtain content in tsv format by dot notation:

```
Sheet.tsv
```

And you could as well set content by dot notation:

```
Sheet.tsv = the_io_stream_in_tsv_format
```

if you need to pass on more parameters, you could use:

```
Sheet.get_tsv(**keywords)  
Sheet.set_tsv(the_io_stream_in_tsv_format, **keywords)
```

## pyexcel.Sheet.csvz

### Sheet.csvz

Get/Set data in/from csvz format

You could obtain content in csvz format by dot notation:

```
Sheet.csvz
```

And you could as well set content by dot notation:

```
Sheet.csvz = the_io_stream_in_csvz_format
```

if you need to pass on more parameters, you could use:

```
Sheet.get_csvz(**keywords)  
Sheet.set_csvz(the_io_stream_in_csvz_format, **keywords)
```

## pyexcel.Sheet.tsvz

### Sheet.tsvz

Get/Set data in/from tsvz format

You could obtain content in tsvz format by dot notation:

```
Sheet.tsvz
```

And you could as well set content by dot notation:

```
Sheet.tsvz = the_io_stream_in_tsvz_format
```

if you need to pass on more parameters, you could use:

```
Sheet.get_tsvz(**keywords)  
Sheet.set_tsvz(the_io_stream_in_tsvz_format, **keywords)
```

## pyexcel.Sheet.xls

### Sheet.xls

Get/Set data in/from xls format

You could obtain content in xls format by dot notation:

```
Sheet.xls
```

And you could as well set content by dot notation:

```
Sheet.xls = the_io_stream_in_xls_format
```

if you need to pass on more parameters, you could use:

```
Sheet.get_xls(**keywords)  
Sheet.set_xls(the_io_stream_in_xls_format, **keywords)
```

## pyexcel.Sheet.xlsxm

### Sheet.xlsxm

Get/Set data in/from xlsxm format



You could obtain content in xlsx format by dot notation:

```
Sheet.xlsx
```

And you could as well set content by dot notation:

```
Sheet.xlsx = the_io_stream_in_xlsx_format
```

if you need to pass on more parameters, you could use:

```
Sheet.get_xlsx(**keywords)
Sheet.set_xlsx(the_io_stream_in_xlsx_format, **keywords)
```

## pyexcel.Sheet.xlsx

### Sheet.xlsx

Get/Set data in/from xlsx format

You could obtain content in xlsx format by dot notation:

```
Sheet.xlsx
```

And you could as well set content by dot notation:

```
Sheet.xlsx = the_io_stream_in_xlsx_format
```

if you need to pass on more parameters, you could use:

```
Sheet.get_xlsx(**keywords)
Sheet.set_xlsx(the_io_stream_in_xlsx_format, **keywords)
```

## pyexcel.Sheet.ods

### Sheet.ods

Get/Set data in/from ods format

You could obtain content in ods format by dot notation:

```
Sheet.ods
```

And you could as well set content by dot notation:

```
Sheet.ods = the_io_stream_in_ods_format
```

if you need to pass on more parameters, you could use:

```
Sheet.get_ods(**keywords)
Sheet.set_ods(the_io_stream_in_ods_format, **keywords)
```

## pyexcel.Sheet.stream

### Sheet.stream

Return a stream in which the content is properly encoded

Example:

```
>>> import pyexcel as p
>>> b = p.get_book(bookdict={"A": [[1]]})
>>> csv_stream = b.stream.texttable
>>> print(csv_stream.getvalue())
A:
+----+
| 1 |
+----+
```

Where `b.stream.xls.getvalue()` is equivalent to `b.xls`. In some situation `b.stream.xls` is preferred than `b.xls`.

Sheet examples:

```
>>> import pyexcel as p
>>> s = p.Sheet([[1]], 'A')
>>> csv_stream = s.stream.texttable
>>> print(csv_stream.getvalue())
A:
+----+
| 1 |
+----+
```

Where `s.stream.xls.getvalue()` is equivalent to `s.xls`. In some situation `s.stream.xls` is preferred than `s.xls`.

It is similar to `save_to_memory()`.

## Formatting

---

`Sheet.format(formatter)`

Apply a formatting action for the whole sheet

---

### pyexcel.Sheet.format

`Sheet.format(formatter)`

Apply a formatting action for the whole sheet

Example:

```
>>> import pyexcel as pe
>>> # Given a dictionary as the following
>>> data = {
...     "1": [1, 2, 3, 4, 5, 6, 7, 8],
...     "3": [1.25, 2.2, 3.3, 4.4, 5.5, 6.6, 7.7, 8.8],
...     "5": [2, 3, 4, 5, 6, 7, 8, 9],
...     "7": [1, '', ]
...     }
>>> sheet = pe.get_sheet(adict=data)
>>> sheet.row[1]
[1, 1.25, 2, 1]
>>> sheet.format(str)
>>> sheet.row[1]
['1', '1.25', '2', '1']
>>> sheet.format(int)
>>> sheet.row[1]
[1, 1, 2, 1]
```

## Filtering

---

<code>Sheet.filter([column_indices, row_indices])</code>	Apply the filter with immediate effect
----------------------------------------------------------	----------------------------------------

---

### pyexcel.Sheet.filter

`Sheet.filter` (*column\_indices=None, row\_indices=None*)

Apply the filter with immediate effect

## Transformation

---

<code>Sheet.transpose()</code>	Rotate the data table by 90 degrees
<code>Sheet.map(custom_function)</code>	Execute a function across all cells of the sheet
<code>Sheet.region(topleft_corner, bottomright_corner)</code>	Get a rectangle shaped data out
<code>Sheet.cut(topleft_corner, bottomright_corner)</code>	Get a rectangle shaped data out and clear them in position
<code>Sheet.paste(topleft_corner[, rows, columns])</code>	Paste a rectangle shaped data after a position

---

### pyexcel.Sheet.transpose

`Sheet.transpose()`

Rotate the data table by 90 degrees

Reference `transpose()`

### pyexcel.Sheet.map

`Sheet.map` (*custom\_function*)

Execute a function across all cells of the sheet

Example:

```
>>> import pyexcel as pe
>>> # Given a dictionary as the following
>>> data = {
...     "1": [1, 2, 3, 4, 5, 6, 7, 8],
...     "3": [1.25, 2.2, 3.3, 4.4, 5.5, 6.6, 7.7, 8.8],
...     "5": [2, 3, 4, 5, 6, 7, 8, 9],
...     "7": [1, '', ]
...     }
>>> sheet = pe.get_sheet(adict=data)
>>> sheet.row[1]
[1, 1.25, 2, 1]
>>> inc = lambda value: (float(value) if value != '' else 0)+1
>>> sheet.map(inc)
>>> sheet.row[1]
[2.0, 2.25, 3.0, 2.0]
```

## pyexcel.Sheet.region

Sheet.**region** (*topleft\_corner, bottomright\_corner*)

Get a rectangle shaped data out

### Parameters

- **topleft\_corner** (*slice*) – the top left corner of the rectangle
- **bottomright\_corner** (*slice*) – the bottom right corner of the rectangle

## pyexcel.Sheet.cut

Sheet.**cut** (*topleft\_corner, bottomright\_corner*)

Get a rectangle shaped data out and clear them in position

### Parameters

- **topleft\_corner** (*slice*) – the top left corner of the rectangle
- **bottomright\_corner** (*slice*) – the bottom right corner of the rectangle

## pyexcel.Sheet.paste

Sheet.**paste** (*topleft\_corner, rows=None, columns=None*)

Paste a rectangle shaped data after a position

**Parameters** **topleft\_corner** (*slice*) – the top left corner of the rectangle

example:

```
>>> import pyexcel as pe
>>> data = [
...     # 0 1 2 3 4 5 6
...     [1, 2, 3, 4, 5, 6, 7], # 0
...     [21, 22, 23, 24, 25, 26, 27],
...     [31, 32, 33, 34, 35, 36, 37],
...     [41, 42, 43, 44, 45, 46, 47],
...     [51, 52, 53, 54, 55, 56, 57] # 4
... ]
>>> s = pe.Sheet(data)
>>> # cut 1<= row < 4, 1<= column < 5
>>> data = s.cut([1, 1], [4, 5])
>>> s.paste([4, 6], rows=data)
>>> s
pyexcel sheet:
+---+---+---+---+---+---+---+---+---+
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |   |   |   |
+---+---+---+---+---+---+---+---+---+
| 21 |   |   |   |   | 26 | 27 |   |   |   |
+---+---+---+---+---+---+---+---+---+
| 31 |   |   |   |   | 36 | 37 |   |   |   |
+---+---+---+---+---+---+---+---+---+
| 41 |   |   |   |   | 46 | 47 |   |   |   |
+---+---+---+---+---+---+---+---+---+
| 51 | 52 | 53 | 54 | 55 | 56 | 22 | 23 | 24 | 25 |
+---+---+---+---+---+---+---+---+---+
```

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```

|   |   |   |   |   |   | 32 | 33 | 34 | 35 |
+---+---+---+---+---+---+---+---+---+---+
|   |   |   |   |   |   | 42 | 43 | 44 | 45 |
+---+---+---+---+---+---+---+---+---+---+
>>> s.paste([6,9], columns=data)
>>> s
pyexcel sheet:
+---+---+---+---+---+---+---+---+---+---+
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |   |   |   |   |   |
+---+---+---+---+---+---+---+---+---+---+
| 21 |   |   |   |   | 26 | 27 |   |   |   |   |   |
+---+---+---+---+---+---+---+---+---+---+
| 31 |   |   |   |   | 36 | 37 |   |   |   |   |   |
+---+---+---+---+---+---+---+---+---+---+
| 41 |   |   |   |   | 46 | 47 |   |   |   |   |   |
+---+---+---+---+---+---+---+---+---+---+
| 51 | 52 | 53 | 54 | 55 | 56 | 22 | 23 | 24 | 25 |   |   |
+---+---+---+---+---+---+---+---+---+---+
|   |   |   |   |   |   | 32 | 33 | 34 | 35 |   |   |
+---+---+---+---+---+---+---+---+---+---+
|   |   |   |   |   |   | 42 | 43 | 44 | 22 | 32 | 42 |
+---+---+---+---+---+---+---+---+---+---+
|   |   |   |   |   |   |   |   |   | 23 | 33 | 43 |
+---+---+---+---+---+---+---+---+---+---+
|   |   |   |   |   |   |   |   |   | 24 | 34 | 44 |
+---+---+---+---+---+---+---+---+---+---+
|   |   |   |   |   |   |   |   |   | 25 | 35 | 45 |
+---+---+---+---+---+---+---+---+---+---+

```

## Save changes

<code>Sheet.save_as(filename, **keywords)</code>	Save the content to a named file
<code>Sheet.save_to_memory(file_type[, stream])</code>	Save the content to memory
<code>Sheet.save_to_database(session, table[, ...])</code>	Save data in sheet to database table
<code>Sheet.save_to_django_model(model[, ...])</code>	Save to database table through django model

## pyexcel.Sheet.save\_as

`Sheet.save_as(filename, **keywords)`

Save the content to a named file

Keywords may vary depending on your file type, because the associated file type employs different library.

### PARAMETERS

**filename:** a file path

**library:** choose a specific pyexcel-io plugin for writing

**renderer\_library:** choose a pyexcel parser plugin for writing

### Parameters related to csv file format

for csv, `fmtparams` are accepted

**delimiter :** field separator

**lineterminator** : line terminator

**encoding**: csv specific. Specify the file encoding the csv file. For example: `encoding='latin1'`. Especially, `encoding='utf-8-sig'` would add utf 8 bom header if used in renderer, or would parse a csv with utf bom header used in parser.

**escapechar** : A one-character string used by the writer to escape the delimiter if quoting is set to `QUOTE_NONE` and the `quotechar` if `doublequote` is `False`.

**quotechar** : A one-character string used to quote fields containing special characters, such as the delimiter or `quotechar`, or which contain new-line characters. It defaults to `'"`

**quoting** : Controls when quotes should be generated by the writer and recognised by the reader. It can take on any of the `QUOTE_*` constants (see section Module Contents) and defaults to `QUOTE_MINIMAL`.

**skipinitialspace** : When `True`, whitespace immediately following the delimiter is ignored. The default is `False`.

**pep\_0515\_off** : When `True` in python version 3.6, PEP-0515 is turned on. The default is `False`

### pyexcel.Sheet.save\_to\_memory

`Sheet.save_to_memory` (*file\_type*, *stream=None*, *\*\*keywords*)

Save the content to memory

#### Parameters

- **file\_type** – any value of `'csv'`, `'tsv'`, `'csvz'`, `'tsvz'`, `'xls'`, `'xlsm'`, `'xlsm'`, `'ods'`
- **stream** – the memory stream to be written to. Note in Python 3, for `csv` and `tsv` format, please pass an instance of `StringIO`. For `xls`, `xlsx`, and `ods`, an instance of `BytesIO`.

### pyexcel.Sheet.save\_to\_database

`Sheet.save_to_database` (*session*, *table*, *initializer=None*, *mapdict=None*, *auto\_commit=True*)

Save data in sheet to database table

#### Parameters

- **session** – database session
- **table** – a database table
- **initializer** – a initialization functions for your table
- **mapdict** – custom map dictionary for your data columns
- **auto\_commit** – by default, data is auto committed.

### pyexcel.Sheet.save\_to\_django\_model

`Sheet.save_to_django_model` (*model*, *initializer=None*, *mapdict=None*, *batch\_size=None*)

Save to database table through django model

#### Parameters

- **model** – a database model
- **initializer** – a initialization functions for your model
- **mapdict** – custom map dictionary for your data columns

- **batch\_size** – a parameter to Django concerning the size for bulk insertion

## 2.8.2 Internal API reference

This is intended for developers and hackers of pyexcel.

### Data sheet representation

In inheritance order from parent to child

---

<i>Matrix</i> (array)	The internal representation of a sheet data.
-----------------------	----------------------------------------------

---

### pyexcel.internal.sheets.Matrix

**class** pyexcel.internal.sheets.**Matrix** (array)

The internal representation of a sheet data. Each element can be of any python types

**\_\_init\_\_** (array)

Constructor

The reason a deep copy was not made here is because the data sheet could be huge. It could be costly to copy every cell to a new memory area :param list array: a list of arrays

### Methods

<b>__init__</b> (array)	Constructor
<b>cell_value</b> (row, column[, new_value])	Random access to table cells
<b>column_at</b> (index)	Gets the data at the specified column
<b>column_range</b> ()	Utility function to get column range
<b>columns</b> ()	Returns a left to right column iterator
<b>contains</b> (predicate)	Has something in the table
<b>cut</b> (topleft_corner, bottomright_corner)	Get a rectangle shaped data out and clear them in position
<b>delete_columns</b> (column_indices)	Delete columns by specified list of indices
<b>delete_rows</b> (row_indices)	Deletes specified row indices
<b>enumerate</b> ()	Iterate cell by cell from top to bottom and from left to right
<b>extend_columns</b> (columns)	Inserts two dimensional data after the rightmost column
<b>extend_columns_with_rows</b> (rows)	Rows were appended to the rightmost side
<b>extend_rows</b> (rows)	Inserts two dimensional data after the bottom row
<b>filter</b> ([column_indices, row_indices])	Apply the filter with immediate effect
<b>format</b> (formatter)	Apply a formatting action for the whole sheet
<b>get_array</b> (**keywords)	Get data in array format
<b>get_bookdict</b> (**keywords)	Get data in bookdict format
<b>get_csv</b> (**keywords)	Get data in csv format
<b>get_csvz</b> (**keywords)	Get data in csvz format
<b>get_dict</b> (**keywords)	Get data in dict format
<b>get_fods</b> (**_)	fods getter is not defined.

Continued on next page

Table 34 – continued from previous page

<code>Matrix.get_grid</code>	
<code>get_handsontable(**keywords)</code>	Get data in handsontable format
<code>get_handsontable_html(**keywords)</code>	Get data in handsontable.html format
<code>Matrix.get_html</code>	
<code>get_internal_array()</code>	present internal array
<code>Matrix.get_json</code>	
<code>Matrix.get_latex</code>	
<code>Matrix.get_latex_booktabs</code>	
<code>Matrix.get_mediawiki</code>	
<code>Matrix.get_ndjson</code>	
<code>get_ods(**keywords)</code>	Get data in ods format
<code>Matrix.get_orgtbl</code>	
<code>Matrix.get_pipe</code>	
<code>Matrix.get_plain</code>	
<code>get_records(**keywords)</code>	Get data in records format
<code>Matrix.get_rst</code>	
<code>Matrix.get_simple</code>	
<code>get_svg(**keywords)</code>	Get data in svg format
<code>get_texttable(**keywords)</code>	Get data in texttable format
<code>get_tsv(**keywords)</code>	Get data in tsv format
<code>get_tsvz(**keywords)</code>	Get data in tsvz format
<code>get_url(**_)</code>	url getter is not defined.
<code>get_xls(**keywords)</code>	Get data in xls format
<code>get_xlsm(**keywords)</code>	Get data in xlsm format
<code>get_xlsx(**keywords)</code>	Get data in xlsx format
<code>map(custom_function)</code>	Execute a function across all cells of the sheet
<code>number_of_columns()</code>	The number of columns
<code>number_of_rows()</code>	The number of rows
<code>paste(topleft_corner[, rows, columns])</code>	Paste a rectangle shaped data after a position
<code>plot([file_type])</code>	Visualize the data
<code>rcolumns()</code>	Returns a right to left column iterator
<code>region(topleft_corner, bottomright_corner)</code>	Get a rectangle shaped data out
<code>register_input</code>	<code>partial(func, *args, **keywords)</code> - new function with partial application of the given arguments and keywords.
<code>register_io</code>	<code>partial(func, *args, **keywords)</code> - new function with partial application of the given arguments and keywords.
<code>register_presentation</code>	<code>partial(func, *args, **keywords)</code> - new function with partial application of the given arguments and keywords.
<code>reverse()</code>	Opposite to enumerate
<code>row_at(index)</code>	Gets the data at the specified row
<code>row_range()</code>	Utility function to get row range
<code>rows()</code>	Returns a top to bottom row iterator
<code>rrows()</code>	Returns a bottom to top row iterator
<code>rvertical()</code>	Default iterator to go through each cell one by one from rightmost column to leftmost row and from bottom to top example.
<code>save_as(filename, **keywords)</code>	Save the content to a named file
<code>save_to_database(session, table[, ...])</code>	Save data in sheet to database table

Continued on next page



Table 34 – continued from previous page

save_to_django_model(model[, initializer, ...])	Save to database table through django model
save_to_memory(file_type[, stream])	Save the content to memory
set_array(content, **keywords)	Set data in array format
set_bookdict(content, **keywords)	Set data in bookdict format
set_column_at(column_index, data_array[, ...])	Updates a column data range
set_csv(content, **keywords)	Set data in csv format
set_csvz(content, **keywords)	Set data in csvz format
set_dict(content, **keywords)	Set data in dict format
set_fods(content, **keywords)	Set data in fods format
Matrix.set_grid	
set_handsontable(_y, **_z)	handsontable setter is not defined.
set_handsontable_html(_y, **_z)	handsontable.html setter is not defined.
Matrix.set_html	
Matrix.set_json	
Matrix.set_latex	
Matrix.set_latex_booktabs	
Matrix.set_mediawiki	
Matrix.set_ndjson	
set_ods(content, **keywords)	Set data in ods format
Matrix.set Orgtbl	
Matrix.set_pipe	
Matrix.set_plain	
set_records(content, **keywords)	Set data in records format
set_row_at(row_index, data_array)	Update a row data range
Matrix.set_rst	
Matrix.set_simple	
set_svg(_y, **_z)	svg setter is not defined.
set_texttable(_y, **_z)	texttable setter is not defined.
set_tsv(content, **keywords)	Set data in tsv format
set_tsvz(content, **keywords)	Set data in tsvz format
set_url(content, **keywords)	Set data in url format
set_xls(content, **keywords)	Set data in xls format
set_xlsm(content, **keywords)	Set data in xlsm format
set_xlsx(content, **keywords)	Set data in xlsx format
to_array()	Get an array out
transpose()	Rotate the data table by 90 degrees
vertical()	Default iterator to go through each cell one by one from leftmost column to rightmost row and from top to bottom example.

**Attributes**

array	Get/Set data in/from array format
bookdict	Get/Set data in/from bookdict format
csv	Get/Set data in/from csv format
csvz	Get/Set data in/from csvz format
dict	Get/Set data in/from dict format
fods	Set data in fods format

Continued on next page

Table 35 – continued from previous page

Matrix.grid	
handsontable	Get data in handsontable format
handsontable_html	Get data in handsontable.html format
Matrix.html	
Matrix.json	
Matrix.latex	
Matrix.latex_booktabs	
Matrix.mediawiki	
Matrix.ndjson	
ods	Get/Set data in/from ods format
Matrix.orgtbl	
Matrix.pipe	
Matrix.plain	
records	Get/Set data in/from records format
Matrix.rst	
Matrix.simple	
stream	Return a stream in which the content is properly encoded
svg	Get data in svg format
texttable	Get data in texttable format
tsv	Get/Set data in/from tsv format
tsvz	Get/Set data in/from tsvz format
url	Set data in url format
xls	Get/Set data in/from xls format
xlsm	Get/Set data in/from xlsm format
xlsx	Get/Set data in/from xlsx format

<i>SheetStream</i> (name, payload)	Memory efficient sheet representation
<i>BookStream</i> ([sheets, filename, path])	Memory efficient book representation

### pyexcel.internal.generators.SheetStream

**class** pyexcel.internal.generators.SheetStream (name, payload)

Memory efficient sheet representation

This class wraps around the data read from pyexcel-io. Comparing with *pyexcel.Sheet*, the instance of this class does not load all data into memory. Hence it performs better when dealing with big data.

If you would like to do custom rendering for each row of the two dimensional data, you would need to pass a row formatting/rendering function to the parameter “renderer” of pyexcel’s signature functions.

**\_\_init\_\_** (name, payload)

x.\_\_init\_\_(...) initializes x; see help(type(x)) for signature

#### Methods

<i>__init__</i> (name, payload)	x.__init__(...) initializes x; see help(type(x)) for signature
<i>get_internal_array</i> ()	
<i>to_array</i> ()	Simply return the generator

## Attributes

array	array attribute
-------	-----------------

## pyexcel.internal.generators.BookStream

**class** pyexcel.internal.generators.**BookStream** (*sheets=None*, *filename='memory'*, *path=None*)

Memory efficient book representation

Comparing with `pyexcel.Book`, the instance of this class uses `pyexcel.generators.SheetStream` as its internal representation of sheet objects. Because `SheetStream` does not read data into memory, it is memory efficient.

**\_\_init\_\_** (*sheets=None*, *filename='memory'*, *path=None*)

Book constructor

Selecting a specific book according to filename extension :param OrderedDict/dict sheets: a dictionary of data :param str filename: the physical file :param str path: the relative path or absolute path :param set keywords: additional parameters to be passed on

## Methods

<b>__init__</b> ([sheets, filename, path])	Book constructor
<b>load_from_sheets</b> (sheets)	Load content from existing sheets
<b>number_of_sheets</b> ()	Return the number of sheets
<b>sheet_names</b> ()	
<b>to_dict</b> ()	Get book data structure as a dictionary

## Row representation

<i>Row</i> (matrix)	Represent row of a matrix
---------------------	---------------------------

## pyexcel.internal.sheets.Row

**class** pyexcel.internal.sheets.**Row** (*matrix*)

Represent row of a matrix

Table 41: “example.csv”

1	2	3
4	5	6
7	8	9

Above column manipulation can be performed on rows similarly. This section will not repeat the same example but show some advance usages.

```
>>> import pyexcel as pe
>>> data = [[1,2,3], [4,5,6], [7,8,9]]
>>> m = pe.internal.sheets.Matrix(data)
>>> m.row[0:2]
```

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```
[[1, 2, 3], [4, 5, 6]]
>>> m.row[0:3] = [0, 0, 0]
>>> m.row[2]
[0, 0, 0]
>>> del m.row[0:2]
>>> m.row[0]
[0, 0, 0]
```

`__init__(matrix)`  
`x.__init__(...)` initializes x; see `help(type(x))` for signature

### Methods

<code>__init__(matrix)</code>	<code>x.__init__(...)</code> initializes x; see <code>help(type(x))</code> for signature
<code>format([row_index, formatter, format_specs])</code>	Format a row
<code>get_converter(theformatter)</code>	return the actual converter or a built-in converter
<code>select(indices)</code>	Delete row indices other than specified

### Column representation

<code>Column(matrix)</code>	Represent columns of a matrix
-----------------------------	-------------------------------

### pyexcel.internal.sheets.Column

**class** `pyexcel.internal.sheets.Column` (*matrix*)  
 Represent columns of a matrix

Table 44: “example.csv”

1	2	3
4	5	6
7	8	9

Let us manipulate the data columns on the above data matrix:

```
>>> import pyexcel as pe
>>> data = [[1,2,3], [4,5,6], [7,8,9]]
>>> m = pe.internal.sheets.Matrix(data)
>>> m.column[0]
[1, 4, 7]
>>> m.column[2] = [0, 0, 0]
>>> m.column[2]
[0, 0, 0]
>>> del m.column[1]
>>> m.column[1]
[0, 0, 0]
>>> m.column[2]
Traceback (most recent call last):
...
IndexError
```

`__init__` (*matrix*)  
`x.__init__(...)` initializes x; see `help(type(x))` for signature

## Methods

<code>__init__</code> ( <i>matrix</i> )	<code>x.__init__(...)</code> initializes x; see <code>help(type(x))</code> for signature
<code>format</code> ([ <i>column_index</i> , <i>formatter</i> , <i>format_specs</i> ])	Format a column
<code>get_converter</code> ( <i>theformatter</i> )	return the actual converter or a built-in converter
<code>select</code> ( <i>indices</i> )	Examples:

## 2.9 Developer's guide

### 2.9.1 Developer's guide

Development steps for code changes

1. `git clone https://github.com/pyexcel/pyexcel.git`
2. `cd pyexcel`

Upgrade your setup tools and pip. They are needed for development and testing only:

1. `pip install --upgrade setuptools pip`

Then install relevant development requirements:

1. `pip install -r rnd_requirements.txt` # if such a file exists
2. `pip install -r requirements.txt`
3. `pip install -r tests/requirements.txt`

Once you have finished your changes, please provide test case(s), relevant documentation and update CHANGELOG.rst.

---

**Note:** As to `rnd_requirements.txt`, usually, it is created when a dependent library is not released. Once the dependency is installed (will be released), the future version of the dependency in the `requirements.txt` will be valid.

---

### How to test your contribution

Although *nose* and *doctest* are both used in code testing, it is advisable that unit tests are put in tests. *doctest* is incorporated only to make sure the code examples in documentation remain valid across different development releases.

On Linux/Unix systems, please launch your tests like this:

```
$ make
```

On Windows systems, please issue this command:

```
> test.bat
```

## How to update test environment and update documentation

Additional steps are required:

1. pip install moban
2. make your changes in *.moban.d* directory, then issue command *moban*

## What is pyexcel-commons

Many information that are shared across pyexcel projects, such as: this developer guide, license info, etc. are stored in *pyexcel-commons* project.

## What is .moban.d

*.moban.d* stores the specific meta data for the library.

## 2.9.2 How to log pyexcel

When developing source plugins, it becomes necessary to have log trace available. It helps find out what goes wrong quickly.

The basic step would be to set up logging before pyexcel import statement.

```
import logging
import logging.config
logging.basicConfig(format='%(asctime)s - %(name)s - %(levelname)s - %(message)s',
                    level=logging.DEBUG)

import pyexcel
```

And if you would use a complex configuration, you can use the following code.

```
import logging
import logging.config
logging.config.fileConfig('log.conf')

import pyexcel
```

And then save the following content as *log.conf* in your directory:

```
[loggers]
keys=root, sources, renderers

[handlers]
keys=consoleHandler

[formatters]
keys=custom

[logger_root]
level=INFO
handlers=consoleHandler

[logger_sources]
```

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```

level=DEBUG
handlers=consoleHandler
qualname=pyexcel.sources.factory
propagate=0

[logger_renderers]
level=DEBUG
handlers=consoleHandler
qualname=pyexcel.renderers.factory
propagate=0

[handler_consoleHandler]
class=StreamHandler
level=DEBUG
formatter=custom
args=(sys.stdout,)

[formatter_custom]
format=%(asctime)s - %(name)s - %(levelname)s - %(message)s
datefmt=

```

Disable logging

-----

In unit testing and django framework, you will find the `lml` logging even you have `↳not` explicitly wanted them.

You can suppress them:

```

import logging
logging.getLogger('lml.plugin').propagate = False

```

Here **is** a list of possible modules: `lml.plugin` and `lml.loader`.

## 2.9.3 Packaging with PyInstaller

With pyexcel v0.5.0, the way to package it has been changed because it uses lml for all plugins.

And you need to do the same for pyexcel-io plugins too.

### Built-in plugins of pyexcel

In order to package every built-in plugins of pyexcel-io, you need to specify:

```

--hidden-import pyexcel.plugins.renderers.sqlalchemy
--hidden-import pyexcel.plugins.renderers.django
--hidden-import pyexcel.plugins.renderers.excel
--hidden-import pyexcel.plugins.renderers._texttable
--hidden-import pyexcel.plugins.parsers.excel
--hidden-import pyexcel.plugins.parsers.sqlalchemy
--hidden-import pyexcel.plugins.sources.http

```

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```
--hidden-import pyexcel.plugins.sources.file_input
--hidden-import pyexcel.plugins.sources.memory_input
--hidden-import pyexcel.plugins.sources.file_output
--hidden-import pyexcel.plugins.sources.output_to_memory
--hidden-import pyexcel.plugins.sources.pydata.bookdict
--hidden-import pyexcel.plugins.sources.pydata.dictsource
--hidden-import pyexcel.plugins.sources.pydata.arraysource
--hidden-import pyexcel.plugins.sources.pydata.records
--hidden-import pyexcel.plugins.sources.django
--hidden-import pyexcel.plugins.sources.sqlalchemy
--hidden-import pyexcel.plugins.sources.querysets
```

## 2.9.4 How to write a plugin for pyexcel

**Note:** Under writing. Stay tuned.

There are three types of plugins for pyexcel: data parser, data renderer and data source.

### Tutorial

Let me walk you through the process of creating pyexcel-pdf package.

Prerequisites:

1. pip install moban yehua
2. git clone <https://github.com/moremoban/setupmobans.git> # generic setup
3. git clone <https://github.com/pyexcel/pyexcel-commons.git>

Let me assume that you have the work directory as:

```
setupmobans pyexcel-commons
```

and *YOUR\_WORK\_DIRECTORY* points to the base directory for both.

And then please export an environment variable:

```
export YEHUA_FILE=$YOUR_WORK_DIRECTORY/pyexcel-commons/yehua/yehua.yml
```

Now let's get started.

### Step 1

Call *yehua* to get the basic scaffolding:

```
$ yehua
Yehua will walk you through creating a pyexcel package.
Press ^C to quit at any time.

What is your project name? pyexcel-pdf
What is the description? parses tables in pdf file as tabular data
What is project type?
```

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```

1. pyexcel plugins
2. command line interface
3. python's C extensnion
(1,2,3): 1
What is the nick name? pdf
$

```

## Step 2

Call *moban* to inflate all project files:

```

$ cd pyexcel-pdf/
$ ln -s ../pyexcel-commons/ commons
$ ln -s ../setupmobans/ setupmobans
$ moban
Templating README.rst to README.rst
Templating setup.py to setup.py
Templating requirements.txt to requirements.txt
Templating NEW_BSD_LICENSE.jj2 to LICENSE
Templating MANIFEST.in.jj2 to MANIFEST.in
Templating tests/requirements.txt to tests/requirements.txt
Templating test.script.jj2 to test.sh
Templating test.script.jj2 to test.bat
Templating travis.yml.jj2 to .travis.yml
Templating gitignore.jj2 to .gitignore
Templating docs/source/conf.py.jj2 to docs/source/conf.py

```

## Step 3 - Coding

Please put your code in `pyexcel_pdf`

## 2.10 Change log

### 2.10.1 What's breaking in 0.5.9

`pyexcel.Sheet.to_records()` returns a generator instead of a list of dictionaries.

### 2.10.2 Migrate away from 0.4.3

`get_{file_type}_stream` functions from `pyexcel.Sheet` and `pyexcel.Book` were introduced since 0.4.3 but were removed since 0.4.4. Please be advised to use `save_to_memory` functions, `Sheet.io_{file_type}` or `Book.io_{file_type}`.

### 2.10.3 Migrate from 0.2.x to 0.3.0+

Filtering and formatting behavior of `pyexcel.Sheet` are simplified. Soft filter and soft formatter are removed. Extra classes such as `iterator`, `formatter`, `filter` are removed.

Most of formatting tasks could be achieved using `format()` and `map()`. and Filtering with `filter()`. Formatting and filtering on row and/or column can be found with `row()` and `column()`

## 1. Updated filter function

There is no alternative to replace the following code:

```
sheet.filter(pe.OddRowFilter())
```

You will need to remove odd rows by yourself:

```
>>> import pyexcel as pe
>>> data = [
...     ['1'],
...     ['2'],
...     ['3'],
... ]
>>> sheet = pe.Sheet(data)
>>> to_remove = []
>>> for index in sheet.row_range():
...     if index % 2 == 0:
...         to_remove.append(index)
>>> sheet.filter(row_indices=to_remove)
>>> sheet
pyexcel sheet:
+---+
| 2 |
+---+
```

Or, you could do this:

```
>>> data = [
...     ['1'],
...     ['2'],
...     ['3'],
... ]
>>> sheet = pe.Sheet(data)
>>> def odd_filter(row_index, _):
...     return row_index % 2 == 0
>>> del sheet.row[odd_filter]
>>> sheet
pyexcel sheet:
+---+
| 2 |
+---+
```

And the same applies to `EvenRowFilter`, `OddColumnFilter`, `EvenColumnFilter`.

## 2. Updated format function

### 2.1 Replacement of sheetformatter

The following formatting code:

```
sheet.apply_formatter(pe.sheets.formatters.SheetFormatter(int))
```

can be replaced by:

```
sheet.format(int)
```

## 2.2 Replacement of row formatters

The following code:

```
row_formatter = pe.sheets.formatters.RowFormatter([1, 2], str)
sheet.add_formatter(row_formatter)
```

can be replaced by:

```
sheet.row.format([1, 2], str)
```

## 2.3 Replacement of column formatters

The following code:

```
f = NamedColumnFormatter(["Column 1", "Column 3"], str)
sheet.apply_formatter(f)
```

can be replaced by:

```
sheet.column.format(["Column 1", "Column 3"], str)
```

### 2.10.4 Migrate from 0.2.1 to 0.2.2+

#### 1. Explicit imports, no longer needed

Please forget about these statements:

```
import pyexcel.ext.xls
import pyexcel.ext.ods
import pyexcel.ext.xlsx
```

They are no longer needed. As long as you have pip-installed them, they will be auto-loaded. However, if you do not want some of the plugins, please use *pip* to uninstall them.

What if you have your code as it is? No harm but a few warnings shown:

```
Deprecated usage since v0.2.2! Explicit import is no longer required. pyexcel.ext.ods_
->is auto imported.
```

#### 2. Invalid environment marker: platform\_python\_implementation=="PyPy"

Yes, it is a surprise. Please upgrade setuptools in your environment:

```
pip install --upgrade setuptools
```

At the time of writing, setuptools (18.0.1) or setuptools-21.0.0-py2.py3-none-any.whl is installed on author's computer and worked.

### 3. How to keep both pyexcel-xls and pyexcel-xlsx

As in [Issue 20](#), pyexcel-xls was used for xls and pyexcel-xlsx had to be used for xlsx. Both must co-exist due to requirements. The workaround would failed when auto-import are enabled in v0.2.2. Hence, user of pyexcel in this situation shall use 'library' parameter to all signature functions, to instruct pyexcel to use a named library for each function call.

### 4. pyexcel.get\_io is no longer exposed

pyexcel.get\_io was passed on from pyexcel-io. However, it is no longer exposed. Please use pyexcel\_io.manager.RWManager.get\_io if you have to.

You are likely to use pyexcel.get\_io when you do `pyexcel.Sheet.save_to_memory()` or `pyexcel.Book.save_to_memory()` where you need to put in a io stream. But actually, with latest code, you could put in a `None`.

## 2.10.5 Migrate from 0.1.x to 0.2.x

### 1. "Writer" is gone, Please use save\_as.

Here is a piece of legacy code:

```
w = pyexcel.Writer("afile.csv")
data=[['a', 'b', 'c', 'd', 'e', 'f', 'g', 'h', 'i', 'j', 1.1, 1]]
w.write_array(table)
w.close()
```

The new code is:

```
>>> data=[['a', 'b', 'c', 'd', 'e', 'f', 'g', 'h', 'i', 'j', 1.1, 1]]
>>> pyexcel.save_as(array=data, dest_file_name="afile.csv")
```

Here is another piece of legacy code:

```
content = {
    "X": [1,2,3,4,5],
    "Y": [6,7,8,9,10],
    "Z": [11,12,13,14,15],
}
w = pyexcel.Writer("afile.csv")
w.write_dict(self.content)
w.close()
```

The new code is:

```
>>> content = {
...     "X": [1,2,3,4,5],
...     "Y": [6,7,8,9,10],
...     "Z": [11,12,13,14,15],
... }
>>> pyexcel.save_as(adict=content, dest_file_name="afile.csv")
```

Here is yet another piece of legacy code:

```

data = [
    [1, 2, 3],
    [4, 5, 6]
]
io = StringIO()
w = pyexcel.Writer(("csv", io))
w.write_rows(data)
w.close()

```

The new code is:

```

>>> data = [
...     [1, 2, 3],
...     [4, 5, 6]
... ]
>>> io = pyexcel.save_as(dest_file_type='csv', array=data)
>>> for line in io.readlines():
...     print(line.rstrip())
1,2,3
4,5,6

```

## 2. “BookWriter” is gone. Please use save\_book\_as.

Here is a piece of legacy code:

```

import pyexcel
content = {
    "Sheet1": [[1, 1, 1, 1], [2, 2, 2, 2], [3, 3, 3, 3]],
    "Sheet2": [[4, 4, 4, 4], [5, 5, 5, 5], [6, 6, 6, 6]],
    "Sheet3": [[u'X', u'Y', u'Z'], [1, 4, 7], [2, 5, 8], [3, 6, 9]]
}
w = pyexcel.BookWriter("afile.csv")
w.write_book_from_dict(content)
w.close()

```

The replacement code is:

```

>>> import pyexcel
>>> content = {
...     "Sheet1": [[1, 1, 1, 1], [2, 2, 2, 2], [3, 3, 3, 3]],
...     "Sheet2": [[4, 4, 4, 4], [5, 5, 5, 5], [6, 6, 6, 6]],
...     "Sheet3": [[u'X', u'Y', u'Z'], [1, 4, 7], [2, 5, 8], [3, 6, 9]]
... }
>>> pyexcel.save_book_as(bookdict=content, dest_file_name="afile.csv")

```

## 2.10.6 Change log

0.5.15 - 07.07.2019

### updated

- #185: fix a bug with http data source. The real fix lies in pyexcel-io v0.5.19. this release just put the version requirement in.

### 0.5.14 - 12.06.2019

#### updated

1. #182: support dest\_force\_file\_type on save\_as and save\_book\_as

### 0.5.13 - 12.03.2019

#### updated

1. #176: get\_sheet {IndexError}list index out of range // XLSX can't be opened

### 0.5.12 - 25.02.2019

#### updated

1. #174: include examples in tarbar

### 0.5.11 - 22.02.2019

#### updated

1. #169: remove pyexcel-handsontable in test
2. add tests, and docs folder in distribution

### 0.5.10 - 3.12.2018

#### updated

1. #157: Please use scan\_plugins\_regex, which lml 0.7 complains about
2. updated dependency on pyexcel-io to 0.5.11

### 0.5.9.1 - 30.08.2018

#### updated

1. to require pyexcel-io 0.5.9.1 and use lml at least version 0.0.2

### 0.5.9 - 30.08.2018

#### added

1. support \_\_len\_\_. len(book) returns the number of sheets and len(sheet) returns the number of rows
2. #144: memory-efficient way to read sheet names.
3. #148: force\_file\_type is introduced. When reading a file on a disk, this parameter allows you to choose a reader. i.e. csv reader for a text file. xlsx reader for a xlsx file but with .blob file suffix.
4. finally, pyexcel got import pyexcel.\_\_version\_\_

#### updated

1. Sheet.to\_records() returns a generator now, saving memory

2. #115, Fix set membership test to run faster in python2
3. #140, Direct writes to cells yield weird results

### 0.5.8 - unreleased

#### added

1. #125, sort book sheets

#### updated

1. #126, dest\_sheet\_name in save\_as will set the sheet name in the output
2. #115, Fix set membership test to run faster in python2

### 0.5.7 - 11.01.2018

#### added

1. pyexcel-io#46, expose *bulk\_save* to developer.

### 0.5.6 - 23.10.2017

#### removed

1. #105, remove gease from setup\_requires, introduced by 0.5.5.
2. removed testing against python 2.6
3. #103, include LICENSE file in MANIFEST.in, meaning LICENSE file will appear in the released tar ball.

### 0.5.5 - 20.10.2017

#### removed

1. #105, remove gease from setup\_requires, introduced by 0.5.5.
2. removed testing against python 2.6
3. #103, include LICENSE file in MANIFEST.in, meaning LICENSE file will appear in the released tar ball.

### 0.5.4 - 27.09.2017

#### fixed

1. #100, Sheet.to\_dict() gets out of range error because there is only one row.

#### updated

1. Updated the baseline of pyexcel-io to 0.5.1.

### 0.5.3 - 01-08-2017

#### added

1. #95, respect the order of records in `iget_records`, `isave_as` and `save_as`.
2. #97, new feature to allow intuitive initialization of `pyexcel.Book`.

### 0.5.2 - 26-07-2017

#### Updated

1. embeded the enabler for `pyexcel-htmlr`. `http` source does not support `text/html` as mime type.

### 0.5.1 - 12.06.2017

#### Updated

1. support saving `SheetStream` and `BookStream` to database targets. This is needed for `pyexcel-webio` and its downstream projects.

### 0.5.0 - 19.06.2017

#### Added

1. `Sheet.top()` and `Sheet.top_left()` for data browsing
2. add `html` as default rich display in Jupyter notebook when `pyexcel-text` and `pyexcel-chart` is installed
3. add `svg` as default rich display in Jupyter notebook when `pyexcel-chart` and one of its implementation plugin(`pyexcel-pygal`, etc.) are is installed
4. new dictionary source supported: a dictionary of key value pair could be read into a sheet.
5. added dynamic external plugin loading. meaning if a `pyexcel` plugin is installed, it will be loaded implicitly. And this change would remove unnecessary info log for those who do not use `pyexcel-text` and `pyexcel-gal`
6. `save_book_as` before 0.5.0 becomes `isave_book_as` and `save_book_as` in 0.5.0 convert `BookStream` to `Book` before saving.
7. #83, file closing mechanism is enforced. `free_resource` is added and it should be called when `iget_array`, `iget_records`, `isave_as` and/or `isave_book_as` are used.

#### Updated

1. array is passed to `pyexcel.Sheet` as reference. it means your array data will be modified.

#### Removed

1. `pyexcel.Writer` and `pyexcel.BookWriter` were removed
2. `pyexcel.load_book_from_sql` and `pyexcel.load_from_sql` were removed
3. `pyexcel.deprecated.load_from_query_sets`, `pyexcel.deprecated.load_book_from_django_models` and `pyexcel.deprecated.load_from_django_model` were removed
4. Removed plugin loading code and `lml` is used instead



---

### 0.4.5 - 17.03.2017

#### Updated

1. #80: remove pyexcel-chart import from v0.4.x

### 0.4.4 - 06.02.2017

#### Updated

1. #68: regression `save_to_memory()` should have returned a stream instance which has been reset to zero if possible. The exception is `sys.stdout`, which cannot be reset.
2. #74: Not able to handle `decimal.Decimal`

#### Removed

1. remove `get_{file_type}_stream` functions from `pyexcel.Sheet` and `pyexcel.Book` introduced since 0.4.3.

### 0.4.3 - 26.01.2017

#### Added

1. `stream` attribute are attached to `~pyexcel.Sheet` and `~pyexcel.Book` to get direct access the underneath stream in responding to file type attributes, such as `sheet.xls`. it helps provide a custom stream to external world, for example, `Sheet.stream.csv` gives a text stream that contains csv formatted data. `Book.stream.xls` returns a xls format data in a byte stream.

#### Updated

1. Better error reporting when an unknown parameters or unsupported file types were given to the signature functions.

### 0.4.2 - 17.01.2017

#### Updated

1. Raise exception if the incoming sheet does not have column names. In other words, only sheet with column names could be saved to database. sheet with row names cannot be saved. The alternative is to transpose the sheet, then `name_columns_by_row` and then save.
2. fix `iget_records` where a non-uniform content should be given, e.g. `[["x", "y"], [1, 2], [3]]`, some record would become non-uniform, e.g. key 'y' would be missing from the second record.
3. `skip_empty_rows` is applicable when saving a python data structure to another data source. For example, if your array contains a row which is consisted of empty string, such as `['', '', ' ... ']`, please specify `skip_empty_rows=False` in order to preserve it. This becomes subtle when you try save a python dictionary where empty rows is not easy to be spotted.
4. #69: better documentation for `save_book_as`.

### 0.4.1 - 23.12.2016

#### Updated

1. #68: regression `save_to_memory()` should have returned a stream instance.

#### 0.4.0 - 22.12.2016

##### Added

1. Flask-Excel#19 allow sheet\_name parameter
2. pyexcel-xls#11 case-insensitive for file\_type. xls and XLS are treated in the same way

##### Updated

1. #66: export\_columns is ignored
2. Update dependency on pyexcel-io v0.3.0

#### 0.3.3 - 07.11.2016

##### Updated

1. #63: cannot display empty sheet(hence book with empty sheet) as texttable

#### 0.3.2 - 02.11.2016

##### Updated

1. #62: optional module import error become visible.

#### 0.3.0 - 28.10.2016

##### Added:

1. file type setters for Sheet and Book, and its documentation
2. *iget\_records* returns a generator for a list of records and should have better memory performance, especially dealing with large csv files.
3. *iget\_array* returns a generator for a list of two dimensional array and should have better memory performance, especially dealing with large csv files.
4. Enable pagination support, and custom row renderer via pyexcel-io v0.2.3

##### Updated

1. Take *isave\_as* out from *save\_as*. Hence two functions are there for save a sheet as
2. #60: encode 'utf-8' if the console is of ascii encoding.
3. #59: custom row renderer
4. #56: set cell value does not work
5. pyexcel.transpose becomes *pyexcel.sheets.transpose*
6. iterator functions of *pyexcel.Sheet* were converted to generator functions
  - *pyexcel.Sheet.enumerate()*
  - *pyexcel.Sheet.reverse()*
  - *pyexcel.Sheet.vertical()*
  - *pyexcel.Sheet.rvertical()*
  - *pyexcel.Sheet.rows()*

- *pyexcel.Sheet.rows()*
- *pyexcel.Sheet.columns()*
- *pyexcel.Sheet.rcolumns()*
- *pyexcel.Sheet.named\_rows()*
- *pyexcel.Sheet.named\_columns()*

7. *~pyexcel.Sheet.save\_to\_memory* and *~pyexcel.Book.save\_to\_memory* return the actual content. No longer they will return a io object hence you cannot call *getvalue()* on them.

#### Removed:

1. *content* and *out\_file* as function parameters to the signature functions are no longer supported.

2. *SourceFactory* and *RendererFactory* are removed

3. The following methods are removed

- *pyexcel.to\_array*
- *pyexcel.to\_dict*
- *pyexcel.utils.to\_one\_dimensional\_array*
- *pyexcel.dict\_to\_array*
- *pyexcel.from\_records*
- *pyexcel.to\_records*

4. *pyexcel.Sheet.filter* has been re-implemented and all filters were removed:

- *pyexcel.filters.ColumnIndexFilter*
- *pyexcel.filters.ColumnFilter*
- *pyexcel.filters.RowFilter*
- *pyexcel.filters.EvenColumnFilter*
- *pyexcel.filters.OddColumnFilter*
- *pyexcel.filters.EvenRowFilter*
- *pyexcel.filters.OddRowFilter*
- *pyexcel.filters.RowIndexFilter*
- *pyexcel.filters.SingleColumnFilter*
- *pyexcel.filters.RowValueFilter*
- *pyexcel.filters.NamedRowValueFilter*
- *pyexcel.filters.ColumnValueFilter*
- *pyexcel.filters.NamedColumnValueFilter*
- *pyexcel.filters.SingleRowFilter*

5. the following functions have been removed

- *add\_formatter*
- *remove\_formatter*
- *clear\_formatters*

- *freeze\_formatters*
- *add\_filter*
- *remove\_filter*
- *clear\_filters*
- *freeze\_formatters*

6. *pyexcel.Sheet.filter* has been re-implemented and all filters were removed:

- `pyexcel.formatters.SheetFormatter`

## 0.2.5 - 31.08.2016

### Updated:

1. #58: `texttable` should have been made as compulsory requirement

## 0.2.4 - 14.07.2016

### Updated:

1. For python 2, writing to `sys.stdout` by `pyexcel-cli` raise `IOError`.

## 0.2.3 - 11.07.2016

### Updated:

1. For python 3, do not seek 0 when saving to memory if `sys.stdout` is passed on. Hence, adding support for `sys.stdin` and `sys.stdout`.

## 0.2.2 - 01.06.2016

### Updated:

1. Explicit imports, no longer needed
2. Depends on latest `setuptools` 18.0.1
3. `NotImplementedError` will be raised if parameters to core functions are not supported, e.g. `get_sheet(cannot_find_me_option=")` will be thrown out as `NotImplementedError`)

## 0.2.1 - 23.04.2016

### Added:

1. add `pyexcel-text` file types as attributes of `pyexcel.Sheet` and `pyexcel.Book`, related to #31
2. auto import `pyexcel-text` if it is pip installed

### Updated:

1. code refactoring done for easy addition of sources.
2. bug fix #29, Even if the format is a string it is displayed as a float
3. `pyexcel-text` is no longer a plugin to `pyexcel-io` but to `pyexcel.sources`, see [pyexcel-text#22](#)

**Removed:**

1. pyexcel.presentation is removed. No longer the internal decorate @outsource is used. related to #31

**0.2.0 - 17.01.2016**

**Updated**

1. adopt pyexcel-io yield key word to return generator as content
2. pyexcel.save\_as and pyexcel.save\_book\_as get performance improvements

**0.1.7 - 03.07.2015**

**Added**

1. Support pyramid-excel which does the database commit on its own.

**0.1.6 - 13.06.2015**

**Added**

1. get excel data from a http url

**0.0.13 - 07.02.2015**

**Added**

1. Support django
2. texttable as default renderer

**0.0.12 - 25.01.2015**

**Added**

1. Added sqlalchemy support

**0.0.10 - 15.12.2015**

**Added**

1. added csvz and tsvz format

**0.0.4 - 12.10.2014**

**Updated**

1. Support python 3

## 0.0.1 - 14.09.2014

### Features:

1. read and write csv, ods, xls,xlsx and xlsxm files(which are referred later as excel files)
2. various iterators for the reader
3. row and column filters for the reader
4. utilities to get array and dictionary out from excel files.
5. cookbok receipes for some common and simple usage of this library.

## 2.10.7 Note on pypy and lxml

When executing the unit tests on pypy3, it's found that lxml 4.0.0 works well on pypy3. lxml 3.6.4 works well on pypy2.

## CHAPTER 3

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### Indices and tables

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- `genindex`
- `modindex`
- `search`





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## Bibliography

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[f1] quoted from [whatis.com](http://whatis.com). Technical details can be found at [MSDN XLS](#)

[f2] `xlsx` is used by MS-Excel 2007, more information can be found at [MSDN XLSX](#)



## Symbols

`__getitem__()` (*pyexcel.Sheet method*), 150

`__init__()` (*pyexcel.Book method*), 131

`__init__()` (*pyexcel.Sheet method*), 141

`__init__()` (*pyexcel.internal.generators.BookStream method*), 167

`__init__()` (*pyexcel.internal.generators.SheetStream method*), 166

`__init__()` (*pyexcel.internal.sheets.Column method*), 168

`__init__()` (*pyexcel.internal.sheets.Matrix method*), 163

`__init__()` (*pyexcel.internal.sheets.Row method*), 168

## A

`array` (*pyexcel.Sheet attribute*), 154

## B

`Book` (*class in pyexcel*), 131

`bookdict` (*pyexcel.Book attribute*), 135

`BookStream` (*class in pyexcel.internal.generators*), 167

## C

`cell_value()` (*pyexcel.Sheet method*), 149

`colnames` (*pyexcel.Sheet attribute*), 153

`Column` (*class in pyexcel.internal.sheets*), 168

`column_at()` (*pyexcel.Sheet method*), 151

`column_range()` (*pyexcel.Sheet method*), 146

`columns()` (*pyexcel.Sheet method*), 147

`content` (*pyexcel.Sheet attribute*), 145

`csv` (*pyexcel.Book attribute*), 135

`csv` (*pyexcel.Sheet attribute*), 155

`csvz` (*pyexcel.Book attribute*), 136

`csvz` (*pyexcel.Sheet attribute*), 155

`cut()` (*pyexcel.Sheet method*), 160

## D

`delete_columns()` (*pyexcel.Sheet method*), 151

`delete_named_column_at()` (*pyexcel.Sheet method*), 152

`delete_named_row_at()` (*pyexcel.Sheet method*), 153

`delete_rows()` (*pyexcel.Sheet method*), 150

`dict` (*pyexcel.Sheet attribute*), 154

## E

`enumerate()` (*pyexcel.Sheet method*), 148

`extend_columns()` (*pyexcel.Sheet method*), 151

`extend_rows()` (*pyexcel.Sheet method*), 150

`extract_a_sheet_from_a_book()` (*in module pyexcel*), 130

## F

`filter()` (*pyexcel.Sheet method*), 159

`format()` (*pyexcel.Sheet method*), 158

`free_resources()` (*in module pyexcel*), 116

## G

`get_array()` (*in module pyexcel*), 87

`get_book()` (*in module pyexcel*), 101

`get_book_dict()` (*in module pyexcel*), 99

`get_dict()` (*in module pyexcel*), 91

`get_records()` (*in module pyexcel*), 95

`get_sheet()` (*in module pyexcel*), 102

## I

`iget_array()` (*in module pyexcel*), 107

`iget_book()` (*in module pyexcel*), 106

`iget_records()` (*in module pyexcel*), 111

`isave_as()` (*in module pyexcel*), 121

`isave_book_as()` (*in module pyexcel*), 127

## M

`map()` (*pyexcel.Sheet method*), 159

`Matrix` (*class in pyexcel.internal.sheets*), 163

`merge_all_to_a_book()` (*in module pyexcel*), 130

`merge_csv_to_a_book()` (*in module pyexcel*), 130

## N

name\_columns\_by\_row() (*pyexcel.Sheet method*), 152  
 name\_rows\_by\_column() (*pyexcel.Sheet method*), 153  
 named\_column\_at() (*pyexcel.Sheet method*), 152  
 named\_row\_at() (*pyexcel.Sheet method*), 153  
 number\_of\_columns() (*pyexcel.Sheet method*), 145  
 number\_of\_rows() (*pyexcel.Sheet method*), 145  
 number\_of\_sheets() (*pyexcel.Book method*), 134

## O

ods (*pyexcel.Book attribute*), 138  
 ods (*pyexcel.Sheet attribute*), 157

## P

paste() (*pyexcel.Sheet method*), 160

## R

rcolumns() (*pyexcel.Sheet method*), 147  
 records (*pyexcel.Sheet attribute*), 154  
 region() (*pyexcel.Sheet method*), 160  
 reverse() (*pyexcel.Sheet method*), 148  
 Row (*class in pyexcel.internal.sheets*), 167  
 row\_at() (*pyexcel.Sheet method*), 150  
 row\_range() (*pyexcel.Sheet method*), 146  
 rownames (*pyexcel.Sheet attribute*), 152  
 rows() (*pyexcel.Sheet method*), 146  
 rrows() (*pyexcel.Sheet method*), 147  
 rvertical() (*pyexcel.Sheet method*), 149

## S

save\_as() (*in module pyexcel*), 116  
 save\_as() (*pyexcel.Book method*), 139  
 save\_as() (*pyexcel.Sheet method*), 161  
 save\_book\_as() (*in module pyexcel*), 125  
 save\_to\_database() (*pyexcel.Book method*), 140  
 save\_to\_database() (*pyexcel.Sheet method*), 162  
 save\_to\_django\_model() (*pyexcel.Sheet method*), 162  
 save\_to\_django\_models() (*pyexcel.Book method*), 140  
 save\_to\_memory() (*pyexcel.Book method*), 139  
 save\_to\_memory() (*pyexcel.Sheet method*), 162  
 set\_column\_at() (*pyexcel.Sheet method*), 151  
 set\_named\_column\_at() (*pyexcel.Sheet method*), 152  
 set\_named\_row\_at() (*pyexcel.Sheet method*), 153  
 set\_row\_at() (*pyexcel.Sheet method*), 150  
 Sheet (*class in pyexcel*), 141  
 sheet\_names() (*pyexcel.Book method*), 134  
 SheetStream (*class in pyexcel.internal.generators*), 166

split\_a\_book() (*in module pyexcel*), 130  
 stream (*pyexcel.Book attribute*), 138  
 stream (*pyexcel.Sheet attribute*), 157

## T

transpose() (*pyexcel.Sheet method*), 159  
 tsv (*pyexcel.Book attribute*), 136  
 tsv (*pyexcel.Sheet attribute*), 155  
 tsvz (*pyexcel.Book attribute*), 136  
 tsvz (*pyexcel.Sheet attribute*), 156

## U

url (*pyexcel.Book attribute*), 135  
 url (*pyexcel.Sheet attribute*), 155

## V

vertical() (*pyexcel.Sheet method*), 148

## X

xls (*pyexcel.Book attribute*), 137  
 xls (*pyexcel.Sheet attribute*), 156  
 xlsm (*pyexcel.Book attribute*), 137  
 xlsm (*pyexcel.Sheet attribute*), 156  
 xlsx (*pyexcel.Book attribute*), 137  
 xlsx (*pyexcel.Sheet attribute*), 157