

Python For Data Science Cheat Sheet

Pandas Basics

Learn Python for Data Science *Interactively* at www.DataCamp.com



Pandas

The Pandas library is built on NumPy and provides easy-to-use data structures and data analysis tools for the Python programming language.



Use the following import convention:

```
>>> import pandas as pd
```

Pandas Data Structures

Series

A one-dimensional labeled array capable of holding any data type

A	3
B	-5
C	7
D	4

Index

```
>>> s = pd.Series([3, -5, 7, 4], index=['a', 'b', 'c', 'd'])
```

DataFrame

Columns

	Country	Capital	Population
1	Belgium	Brussels	11190846
2	India	New Delhi	1303171035
3	Brazil	Brasilia	207847528

A two-dimensional labeled data structure with columns of potentially different types

```
>>> data = {'Country': ['Belgium', 'India', 'Brazil'],
           'Capital': ['Brussels', 'New Delhi', 'Brasilia'],
           'Population': [11190846, 1303171035, 207847528]}
```

```
>>> df = pd.DataFrame(data,
                      columns=['Country', 'Capital', 'Population'])
```

I/O

Read and Write to CSV

```
>>> pd.read_csv('file.csv', header=None, nrows=5)
>>> pd.to_csv('myDataFrame.csv')
```

Read and Write to Excel

```
>>> pd.read_excel('file.xlsx')
>>> pd.to_excel('dir/myDataFrame.xlsx', sheet_name='Sheet1')
Read multiple sheets from the same file
>>> xlsx = pd.ExcelFile('file.xls')
>>> df = pd.read_excel(xlsx, 'Sheet1')
```

Asking For Help

```
>>> help(pd.Series.loc)
```

Selection

Also see NumPy Arrays

Getting

```
>>> s['b']
-5
>>> df[['Country', 'Capital', 'Population']]
Country    Capital    Population
1  India    New Delhi    1303171035
2  Brazil    Brasilia    207847528
```

Get one element

Get subset of a DataFrame

Selecting, Boolean Indexing & Setting

By Position

```
>>> df.iloc([0], [0])
'Belgium'
>>> df.iat([0], [0])
'Belgium'
```

Select single value by row & column

By Label

```
>>> df.loc([0], ['Country'])
'Belgium'
>>> df.at([0], ['Country'])
'Belgium'
```

Select single value by row & column labels

By Label/Position

```
>>> df.ix[2]
Country    Brazil
Capital    Brasilia
Population 207847528
```

Select single row of subset of rows

```
>>> df.ix[:, 'Capital']
0    Brussels
1    New Delhi
2    Brasilia
```

Select a single column of subset of columns

```
>>> df.ix[[1], 'Capital']
'New Delhi'
```

Select rows and columns

Boolean Indexing

```
>>> s[s > 1]
1    New Delhi
2    Brasilia
>>> s[(s < -1) | (s > 2)]
>>> df[df['Population'] > 1200000000]
```

Series s where value is not >1
s where value is <-1 or >2

Use filter to adjust DataFrame

Setting

```
>>> s['a'] = 6
```

Set index a of Series s to 6

Read and Write to SQL Query or Database Table

```
>>> from sqlalchemy import create_engine
>>> engine = create_engine('sqlite:///memory:')
>>> pd.read_sql("SELECT * FROM my_table;", engine)
>>> pd.read_sql_table("my_table", engine)
>>> pd.read_sql_query("SELECT * FROM my_table;", engine)
read_sql() is a convenience wrapper around read_sql_table() and read_sql_query()
>>> pd.to_sql('myDf', engine)
```

Dropping

```
>>> s.drop(['a', 'c'])
Drop values from rows (axis=0)
>>> df.drop('Country', axis=1)
Drop values from columns (axis=1)
```

Sort & Rank

```
>>> df.sort_index(by='Country')
Sort by row or column index
>>> s.order()
Sort a series by its values
>>> df.rank()
Assign ranks to entries
```

Retrieving Series/DataFrame Information

Basic Information

```
>>> df.shape
(rows, columns)
>>> df.index
Describe index
>>> df.columns
Describe DataFrame columns
>>> df.info()
Info on DataFrame
>>> df.count()
Number of non-NA values
```

Summary

```
>>> df.sum()
Sum of values
>>> df.cumsum()
Cumulative sum of values
>>> df.min()/df.max()
Minimum/maximum values
>>> df.iidmin()/df.iidmax()
Minimum/Maximum index value
>>> df.describe()
Summary statistics
>>> df.mean()
Mean of values
>>> df.median()
Median of values
```

Applying Functions

```
>>> f = lambda x: x*2
>>> df.apply(f)
Apply function
>>> df.applymap(f)
Apply function element-wise
```

Data Alignment

Internal Data Alignment

NA values are introduced in the indices that don't overlap:

```
>>> s3 = pd.Series([7, -2, 3], index=['a', 'c', 'd'])
>>> s + s3
a    10.0
b    NaN
c    5.0
d    7.0
```

Arithmetic Operations with Fill Methods

You can also do the internal data alignment yourself with the help of the fill methods:

```
>>> s.add(s3, fill_value=0)
a    10.0
b    -5.0
c    5.0
d    7.0
>>> s.sub(s3, fill_value=2)
>>> s.div(s3, fill_value=4)
>>> s.mul(s3, fill_value=3)
```

