

# Python For Data Science Cheat Sheet

## Pandas

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## Reshaping Data

### Pivot

```
>>> df3= df2.pivot(index='Date',
                    columns='Type',
                    values='Value')
```

Spread rows into columns

	Date	Type	Value
0	2016-03-01	a	11.432
1	2016-03-02	b	13.031
2	2016-03-01	c	20.784
3	2016-03-03	a	99.906
4	2016-03-02	a	1.303
5	2016-03-03	c	20.784

	Type	a	b	c
Date				
2016-03-01		11.432	NaN	20.784
2016-03-02		1.303	13.031	NaN
2016-03-03		99.906	NaN	20.784

### Pivot Table

```
>>> df4 = pd.pivot_table(df2,
                        values='Value',
                        index='Date',
                        columns='Type')
```

Spread rows into columns

### Stack / Unstack

```
>>> stacked = df5.stack()
>>> stacked.unstack()
```

Pivot a level of column labels  
Pivot a level of index labels

		0	1
1	5	0.233482	0.390959
2	4	0.184713	0.237102
3	3	0.433522	0.429401

Unstacked

			0	1	2
1	5	0	0.233482		
1	5	1	0.390959		
2	4	0	0.184713		
2	4	1	0.237102		
3	3	0	0.433522		
3	3	1	0.429401		

Stacked

### Melt

```
>>> pd.melt(df2,
            id_vars=["Date"],
            value_vars=["Type", "Value"],
            value_name="Observations")
```

Gather columns into rows

	Date	Type	Value
0	2016-03-01	a	11.432
1	2016-03-02	b	13.031
2	2016-03-01	c	20.784
3	2016-03-03	a	99.906
4	2016-03-02	a	1.303
5	2016-03-03	c	20.784

	Date	Variable	Observations
0	2016-03-01	Type	a
1	2016-03-02	Type	b
2	2016-03-01	Type	c
3	2016-03-03	Type	a
4	2016-03-02	Type	a
5	2016-03-03	Type	c
6	2016-03-01	Value	11.432
7	2016-03-02	Value	13.031
8	2016-03-01	Value	20.784
9	2016-03-03	Value	99.906
10	2016-03-02	Value	1.303
11	2016-03-03	Value	20.784

## Iteration

```
>>> df.iteritems()
>>> df.iterrows()
```

(Column-index, Series) pairs  
(Row-index, Series) pairs

## Advanced Indexing

Also see NumPy Arrays

### Selecting

```
>>> df3.loc[:, (df3>1).any()]
>>> df3.loc[:, (df3>1).all()]
>>> df3.loc[:, df3.isnull().any()]
>>> df3.loc[:, df3.notnull().all()]
```

Select cols with any vals >1  
Select cols with vals > 1  
Select cols with NaN  
Select cols without NaN

### Indexing With isin

```
>>> df[(df.Country.isin(df2.Type))]
>>> df3.filter(items=["a", "b"])
>>> df.select(lambda x: not x%5)
```

Find same elements  
Filter on values  
Select specific elements

### Where

```
>>> s.where(s > 0)
```

Subset the data

### Query

```
>>> df6.query('second > first')
```

Query DataFrame

## Setting/Resetting Index

```
>>> df.set_index('Country')
>>> df4 = df.reset_index()
>>> df = df.rename(index=str,
                  columns={"Country": "entry",
                           "Capital": "cptl",
                           "Population": "ppltn"})
```

Set the index  
Reset the index  
Rename DataFrame

## Reindexing

```
>>> s2 = s.reindex(['a', 'c', 'd', 'e', 'b'])
```

### Forward Filling

```
>>> df.reindex(range(4),
               method='ffill')
Country Capital Population
0 Belgium Brussels 11190846
1 India New Delhi 1303171035
2 Brazil Brasilia 207847528
3 Brazil Brasilia 207847528
```

### Backward Filling

```
>>> s3 = s.reindex(range(5),
                   method='bfill')
0 3
1 3
2 3
3 3
4 3
```

## MultiIndexing

```
>>> arrays = [np.array([1,2,3]),
              np.array([5,4,3])]
>>> df5 = pd.DataFrame(np.random.rand(3, 2), index=arrays)
>>> tuples = list(zip(*arrays))
>>> index = pd.MultiIndex.from_tuples(tuples,
                                    names=['first', 'second'])
>>> df6 = pd.DataFrame(np.random.rand(3, 2), index=index)
>>> df2.set_index(["Date", "Type"])
```

## Duplicate Data

```
>>> s3.unique()
>>> df2.duplicated('Type')
>>> df2.drop_duplicates('Type', keep='last')
>>> df.index.duplicated()
```

Return unique values  
Check duplicates  
Drop duplicates  
Check index duplicates

## Grouping Data

### Aggregation

```
>>> df2.groupby(by=['Date', 'Type']).mean()
>>> df4.groupby(level=0).sum()
>>> df4.groupby(level=0).agg({'a': lambda x: sum(x) / len(x),
                           'b': np.sum})
```

### Transformation

```
>>> customSum = lambda x: (x+x%2)
>>> df4.groupby(level=0).transform(customSum)
```

## Missing Data

```
>>> df.dropna()
>>> df3.fillna(df3.mean())
>>> df2.replace("a", "f")
```

Drop NaN values  
Fill NaN values with a predetermined value  
Replace values with others

## Combining Data

data1		data2	
X1	X2	X1	X3
a	11.432	a	20.784
b	1.303	b	NaN
c	99.906	d	20.784

### Merge

```
>>> pd.merge(data1,
             data2,
             how='left',
             on='X1')
```

X1	X2	X3
a	11.432	20.784
b	1.303	NaN
c	99.906	NaN

```
>>> pd.merge(data1,
             data2,
             how='right',
             on='X1')
```

X1	X2	X3
a	11.432	20.784
b	1.303	NaN
d	NaN	20.784

```
>>> pd.merge(data1,
             data2,
             how='inner',
             on='X1')
```

X1	X2	X3
a	11.432	20.784
b	1.303	NaN

```
>>> pd.merge(data1,
             data2,
             how='outer',
             on='X1')
```

X1	X2	X3
a	11.432	20.784
b	1.303	NaN
c	99.906	NaN
d	NaN	20.784

### Join

```
>>> data1.join(data2, how='right')
```

## Concatenate

### Vertical

```
>>> s.append(s2)
Horizontal/Vertical
>>> pd.concat([s,s2],axis=1, keys=['One', 'Two'])
>>> pd.concat([data1, data2], axis=1, join='inner')
```

## Dates

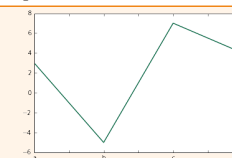
```
>>> df2['Date'] = pd.to_datetime(df2['Date'])
>>> df2['Date'] = pd.date_range('2000-1-1',
                              periods=6,
                              freq='M')
>>> dates = [datetime(2012,5,1), datetime(2012,5,2)]
>>> index = pd.DatetimeIndex(dates)
>>> index = pd.date_range(datetime(2012,2,1), end, freq='BM')
```

## Visualization

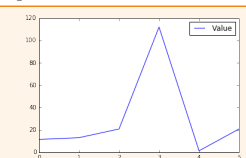
Also see Matplotlib

```
>>> import matplotlib.pyplot as plt
```

```
>>> s.plot()
>>> plt.show()
```



```
>>> df2.plot()
>>> plt.show()
```



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