Data Structures

Pandas has two data structures: Series (1 dimension) and DataFrame (multidimensional)

Series

DataFrame

```
s = pd.Series(['a', 'b', 'c'], index=[0 , 1, 2])
```

Create new Series

```
df = pd.DataFrame(
{'col_1': [11, 12, 13],
'col_2': [21, 22, 23],
'col_3': [31, 32, 33]},
index=[0, 1, 2])
```

Create new DataFrame

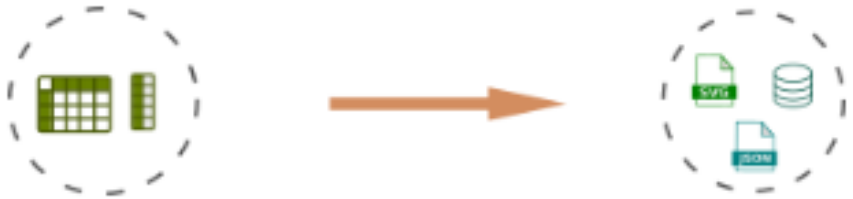
Read

Import data from CSV, Excel, JSON, SQL, HTML, web

`pd.read_csv(filename)`	From a CSV file
`pd.read_csv(filename, header=None, nrows=5)`	From a CSV file with parameters
`pd.read_excel(filename)`	From an Excel file
`pd.read_sql(query, connection_object)`	Reads from a SQL table/database
`pd.read_json(json_string)`	Reads from a JSON formatted string, URL or file.

Write

Write data to CSV, Excel, JSON, HTML



`df.to_csv(filename)`	Writes to a CSV file
`df.to_excel(filename)`	Writes to an Excel file
`df.to_json(filename)`	Writes to a file in JSON format
`df.to_html(filename)`	Saves as an HTML table

Inspect Data

View stats, samples and summary of the data

`df.head(n)`	First n rows
`df.tail(n)`	Last n rows
`df.shape`	Number of rows and columns
`df.info()`	Index, Datatype and Memory information
`df.describe()`	Summary statistics for numerical columns
`s.value_counts(dropna=False)`	(Series) Views unique values and counts
`df.sample(n)`	Randomly select n rows.
`df.nlargest(n, 'col_1')`	Select and order top n entries for column
`df.nsmallest(n, 'col_1')`	Select and order bottom n entries.
`df.quantile([0.25,0.75])`	Quantiles of each object

Select

Select data by index, by label, get subset

`s.loc[0]`	(Series) Select by index
`s.iloc[0]`	(Series) Select by position
`df['col_1']`	Get single column as Series
`df[['col_1', 'col_2']]`	Get multiple columns as a DataFrame
`df.iloc[0,:]`	Select first row from DataFrame
`df.iloc[0,0]`	First element of first column
`df.loc[df['col_1'] > 10, ['col_1', 'col_2']]`	Select rows meeting logical condition, and only the specific columns
`df.iat[1, 2]`	Access single value by index
`df.at[3, 'col_2']`	Access single value by label

Add rows/columns

Add new values to existing DataFrame

`df['new col'] = df['col'] * 100`	Add new column based on other column
`df['new col'] = False`	Add new column single value
`df.loc[-1] = [1, 2, 3]`	Add new row at the end of DataFrame
`df.append(df2, ignore_index = True)`	add rows from DataFrame to existing DataFrame

Drop rows/columns/nan

Drop data from DataFrame

`s.drop([0, 1])`	(Series) Drop values from Series by index (row axis)
`df.drop('col_1' , axis=1)`	Drop column by name col_1 (column axis)
`df.dropna()`	Drops all rows that contain null values
`df.dropna(axis=1)`	Drops all columns that contain null values
`df.dropna(axis=1,thresh=n)`	Drops all rows have have less than n non null values

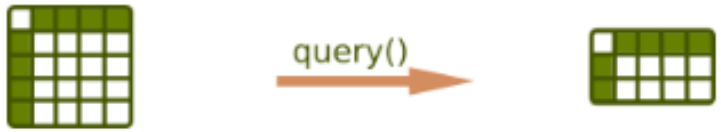
Sort values/index

Sort and rank values/index by one or multiple criteria

`df.sort_values(by='col_1', ascending=False)`	Sort values by column, ascending order
`df.sort_values(by=['col_1', 'col_2'])`	Sort values by columns
`df.sort_index(ascending=False)`	Sort object by labels (along an axis) in descending order
`df.sort_values(by=[('col_1', 'col_2')])`	Sort multindex by multiple levels
`df.reset_index()`	Reset the index of the DataFrame, moving index to columns

Filter

Filter data based on multiple criteria



`df[df['col_1'] > 100]`	Values greater than X
`df[(df['col_1']=='a')&(df['col_2']>=10)]`	Filter Multiple Conditions - & - and; | - or
`df[df['date'] > '2022-02-22']`	Date filtering
`df[df['date'].dt.month == 2]`	Filter with dt attributes
`df[df['col_1'].str.contains('pan*', regex=True)]`	Filter by regex
`df[df['col_1'].isin(['pan', 'das'])]`	Filter based on list of values
`df.query('col_1 > 100')`	Filter by queries
`df.query('col_1 > 100 and col_2 = 0')`	Filter by multiple queries

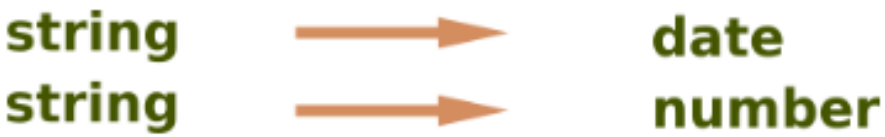
Group by

Group by and summarize data

`df.groupby('col_1')`	Group by single column - return pandas.core.groupby.DataFrameGroupBy
`df.groupby(['col_1', 'col_2'])`	Group by multiple columns
`df.groupby('col_1').groups`	View groups
`df.groupby('col_1').get_group(1)`	Get group
`df.groupby('col_1').count()`	Get count per groups
`df.groupby('col_1').agg([np.sum, np.mean])`	Apply multiple agg functions on group
`df.groupby('col_1').filter(lambda x: len(x) >= 5)`	Filter groups
`df.groupby('col_1').agg('count')`	Aggregate group using function.
`df.groupby('col_1').rank(method='dense')`	Compute numerical data ranks (1 through n) along axis.

Convert

Convert to date, string, numeric



`df['points'].astype(str)`	convert to string
`df['col_1'].astype('int64')`	convert to int64
`df['col_1'].astype(float)`	convert to float
`pd.to_numeric(df['col_1'], errors='coerce')`	convert to numeric
`pd.to_datetime(df['date'], format='%Y-%m-%d')`	convert string to date
`pd.DataFrame(df['Values'].tolist(), columns=['col_1', 'col_1'])`	Split column list to multiple columns
`df['col_1'].apply(pd.Series)`	Expand Series of dictionnaries

Merge & Concat

Merging, joniing and concatenating 2 and more DataFrames

`df1.append(df2)`	Adds the rows in df1 to the end of df2 (columns should be identical)
`pd.concat([df1, df2],axis=1)`	Adds the columns in df1 to the end of df2 (rows should be identical)
`df1.join(df2,on=col1,how='inner')`	SQL-style joins the columns in df1 with the columns on df2 where the rows for col have identical values. how can be one of 'left', 'right', 'outer', 'inner'

Apply

Applying functions to a column or DataFrame; lambda functions


```
def calc(x):
return x + 1
df.apply(calc, axis = 1)
```

Apply function to DataFrame

```
df[['col_1','col_2']].apply(calc)
```

Apply to multiple columns

```
df.apply(lambda x: x * -1 if x < 0 else x)
```

Apply lambda


That's all Folks!