# Data Exploration using Pandas

# CHEATSHEET

## 1. Reading and Writing Data

a. Reading a CSV file
```
>>>df=pd.read_csv('AnalyticsVidhya.csv')
```
b. Writing content of data frame to CSV file
```
>>>df.to_csv('AV.csv')
```
c. Reading an Excel file
```
>>>df=pd.read_excel('AV.xlsx','sheet1')
```
d. Writing content of data frame to Excel file
```
>>>df.to_excel('AV2.xlsx',sheet_name='sheet2')
```

## 2.Getting Preview of Dataframe

a. Looking at top n records
```
>>>df.head(5)
```
b. Looking at bottom n records
```
>>>df.tail(5)
```
c. View columns name
```
>>>df.columns
```

## 3. Rename Columns of Data Frame

a. Rename method helps to rename column of data frame.
```
>>>df2=df.rename(columns={'old_columnname':'new_columnname'})
```
This statement will create a new data frame with new column name.

b. To rename the column of existing data frame, set inplace=True.
```
>>>df.rename(columns={'old_columnname':'new_columnname'}, inplace=True)
```

## 4. Selecting Columns or Rows

a. Accessing sub data frames
```
>>>df[['column1','column2']]
```
b. Filtering Records
```
>>>df[ df['column1']>10]
>>>df[ (df['column1']>10) & df['column2']==30]
>>>df[ (df['column1']>10) | df['column2']==30]
```

## 5. Handling Missing Values

This is an inevitable part of dealing with data . To overcome this hurdle, use dropna or fillna function.

a. dropna: It is used to drop rows or columns having missing data
```
>>>df1.dropna()
```

b. fillna: It is used to fill missing values
```
>>>df2.fillna(value=5) #It replaces all missing values with 5
>>>mean=df2['column1'].mean()
>>>df2['column1'].fillna(mean)  #It replaces all missing values of column1 with mean of available values
```

## 6. Creating New Columns

New column is a function of existing columns
```
>>>df['NewColumn1']=df['column2']  #Create a copy of existing column2

>>>df['NewColumn2']=df['column2']+10  #Add 10 to existing column2 then create a new one

>>>df['NewColumn3']= df['column1'] + df['column2']  #Add elements of column1 and column2 then create new column
```

## 7. Aggregate

a. Groupby: Groupby helps to perform three operations
- i. Splitting the data into groups
- ii. Applying a function to each group individually
- iii. Combining the result into a data structure

```
>>>df.groupby('column1').sum()
>>>df.groupby(['column1','column2']).count()
```

b. Pivot Table: It helps to generate data structure. It has three components index, columns and values (similar to excel)
```
>>>pd.pivot_table(df, values='column1', index=['column2','column3'], columns=['column4'])
```
By default, it shows the sum of values column but you can change it using argument aggfunc
```
>>>pd.pivot_table(df, values='column1', index=['column2','column3'], columns=['column4'], aggfunc=len)
#it shows count
```

c. Cross Tab: Cross Tab computes the simple cross tabulation of two factors.
```
>>>pd.crosstab(df.column1, df.column2)
```

## 8. Merging/ Concatenating DataFrames

It performs similar operation like we do in SQL.

a. Concatenating: It concatenate two or more data frames based on their columns.
```
>>>pd.concat([df1,df2])
```
b. Merging: We can perform left, right and inner join also.
```
>>>pd.merge(df1, df2, on='column1', how='inner')
>>>pd.merge(df1, df2, on='column1', how='left')
>>>pd.merge(df1, df2, on='column1', how='right')
>>>pd.merge(df1, df2, on='column1', how='outer')
```

## 9. Applying function to element, column or dataframe

a. Map: It iterates over each element of a series.
```
>>>df['column1'].map(lambda x: 10+x) #this will add 10 to each element of column1

>>>df['column2'].map(lambda x: 'AV'+x)  #this will concatenate "AV" at the beginning of each element of column2 (column format is string)
```

b. Apply: As the name suggests, applies a function along any axis of the DataFrame.
```
>>>df[['column1','column2']].apply(sum)  #it will returns the sum of all the values of column1 and column2.
```

c. ApplyMap: This helps to apply a function to each element of dataframe.
```
>>>func = lambda x: x+2
>>>df.applymap(func)  #it will add 2 to each element of dataframe (all columns of dataframe must be numeric type)
```

## 10. Identify unique values

Function unique helps to return unique values of a column.
```
>>>df['Column1'].unique()
```

## 11. Basic Stats

Pandas helps to understand the data using basic statistical methods.

a. describe: This returns the quick stats (count, mean, std, min, first quartile, median, third quartile, max) on suitable columns
```
>>>df.describe()
```

b. covariance: It returns the co-variance between suitable columns.
```
>>>df.cov()
```

c. correlation: It returns the co-variance between suitable columns.
```
>>>df.corr()
```


To learn more, we recommend Wes Mckinney's **Python for Data Analysis** Book for Learning Pandas

For more resources on analytics / data science, visit

**www.analyticsvidhya.com**

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