**Lab 1: Data Loading, Summary, and Visualisation**

Type ‘jupyter notebook’ in terminal

A new browser window will be opened listing the directories and files of anaconda.

Choose a new Python 3 file.

1. Data Frame

A data frame is a 2-d data structure similar to matrix. However columns of the matrix can be of different types, Size is mutable, Rows and columns can be labelled. And Arithmetic operations can be performed on rows and columns.

Create a pandas data frame as follows.

*import numpy*

*import pandas*

*myarray = numpy.array([[1,2,3],[4,5,6]])*

*rownames = ['a','b']*

*colnames=['f1','f2','f3']*

*mydataframe = pandas.DataFrame(myarray, index = rownames, columns=colnames)*

*print(mydataframe)*

Change the type of data

*import numpy*

*import pandas*

*myarray = numpy.array([['a','sandhya',9.6],[4,'shreya',6.5]])*

*rownames = ['r1','r2']*

*colnames=['f1','f2','f3']*

*mydataframe = pandas.DataFrame(myarray, index = rownames, columns=colnames)*

*print(mydataframe)*

2. Load csv file using pandas from a specific path or url

Copy dataset given in <https://brahma/sandhyaharikumar/OpenLab/Test/1_diabetes.csv> to your local folder. Then execute the following.

*from pandas import read\_csv*

*path='1\_diabetes.csv'*

*data=read\_csv(path)*

*print (data.shape) #to know size of the data*

The file can be given column names as follows

*from pandas import read\_csv*

*url='1\_diabetes.csv'*

*data=read\_csv(url)*

*colnames=['Pregnancies','Glucose','BloodPressure','SkinThickness','Insulin','BMI','DiabetesPedigreeFunction','Age','Outcome']*

*print (data.shape)*

3. To get statistical summary of the data

(a)

*description = data.describe()*

*print(description)*

This will give statistics of each column in the dataset.

Example

Pregnancies Glucose BloodPressure SkinThickness Insulin \

count 768.000000 768.000000 768.000000 768.000000 768.000000

mean 3.845052 120.894531 69.105469 20.536458 79.799479

std 3.369578 31.972618 19.355807 15.952218 115.244002

min 0.000000 0.000000 0.000000 0.000000 0.000000

25% 1.000000 99.000000 62.000000 0.000000 0.000000

50% 3.000000 117.000000 72.000000 23.000000 30.500000

75% 6.000000 140.250000 80.000000 32.000000 127.250000

max 17.000000 199.000000 122.000000 99.000000 846.000000

Here 25%, 50%, gives % of data that falls below a given corresponding value in each column.

(b) Size of matrix

*print(data.shape)*

(c) Peek at data

*print(data.head(4))*

(d) Group on the basis of a particular attribute

*print(data.groupby(‘Outcome’).size())*

4. Data visualization

For plotting pairs of attributes as scattered plot, specify the attributes to be plotted explicitly

*import matplotlib.pyplot as plt*

*import pandas*

*from pandas.plotting import scatter\_matrix*

*scatter\_matrix(data[['Pregnancies','Glucose']])*

*plt.show()*

For plotting all pairs of attributes in data

*import matplotlib.pyplot as plt*

*import pandas*

*from pandas.plotting import scatter\_matrix*

*scatter\_matrix(data) #scatter plot*

*plt.show()*

*data.hist() #histogram*

*plt.show()*

*5. Standardization of dataset*

*from sklearn.preprocessing import StandardScaler*

*import pandas*

*import numpy*

*arr=data.values #convert data frame to array*

*X=arr[:,0:8] #split columns*

*Y=arr[:,8]*

*scaler=StandardScaler().fit(X) #fit data for standardization*

*rescaledX=scaler.transform(X) #convert the data as per (x-µ)/σ*

*numpy.set\_printoptions(precision=3)*

*print(rescaledX[0:2,:])*

*print(X[0:2,:])*

6. Normalizing a column in pandas

Create a dataframe for a set of values in an array

*myarray=numpy.array([1,3,-10,4,5,7,-4,-2,10])*

*mydataframe = pandas.DataFrame(myarray)*

*print(mydataframe)*

plot the data

*mydataframe.plot(kind='bar')*

*plt.show()*

Plot normalized data

*from sklearn import preprocessing*

*fl\_x=mydataframe.values.astype(float)*

*#fl\_x=mydataframe[['f1']].values.astype(float) #If specific feature name is to be converted*

*min\_max\_scaler=preprocessing.MinMaxScaler()*

*X\_scaled=min\_max\_scaler.fit\_transform(fl\_x)*

*df\_normalized=pandas.DataFrame(X\_scaled)*

*print(df\_normalized)*

*df\_normalized.plot(kind='bar')*

*plt.show()*

***Question : Identify the difference in the standardization and normalization of data.***

Introductory Python

Download “Think Python: How to Think like a Computer Scientist” from AUMS

A. **Basics of Python**

1. Read preface and chapter 1 of Think Python

2. Practice sections from 2.1 to 2.8

3. Implement exercise 2.2, 2.3

4. Practice sections from 2.1 to 3.15

5. Implement exercise 3.1 to 3.5

6. Practice sections from 7.1 to 7.7

7. Implement exercise 7.1 to 7.5

**B. Practice on various Data Structures**

Lists, Dictionaries, and Tuples.

1. Practice sections from 10.1 to 10.8

Implement exercise 9.1, 10.1, 10.4, 10.6, 10.8, 10.9

2. Practice sections from 11.1 to 11.4

Implement exercise 11.1, 11.2, 11.3, 11.10

3. Practice sections 12.1 to 12.3, 12.5, and 12.6

*Implement 12.1, 12.2, to 12.4*