DACE

Cultivating Technology

DHAANISH AHMED COLLEGE OF ENGINEERING

Dhaanish Nagar, Padappai, Chennai – 601301
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DHAANISH AHMED COLLEGE OF ENGINEERING

Dhaanish Nagar, Padappai, Chennai – 601301

BONAFIDE CERTIFICATE

This is to certify that, this a Bonafide Record Work done by

Mr./Ms...

Year.....................Semester..................Register No................................

Department of...in the

....during the

academic year 2023 - 2024

Signature

Lab-In-Charge

Signature

Head of the Department

Submitted for the Anna University practical Examination held on................................

Signature of
Internal Examiner
with Date

Signature of
External Examiner
with Date

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Ex. No.:1

Date:

Working with Numpy Arrays

Aim:

To write a python program to create an array using numpy package.

Algorithm:

```
Step1: Start
Step2: Import numpy package.
Step3: Create a list and assign values to it.
Step4: Create array using numpy.
Step5: Display array values.
Step6: Stop
```

Program:

```
import numpy as np

list = [1,2,3,4]

sample = np.array(list)

print("created list %s"% list)

print("Numpy array in python %s"% sample)

print("Creating new list of array\n")

new = np.array([(1,2,3),(4,5,6)])

print('Squre Root of {}'.format(new))

print(np.sqrt(new))
```

Output:

```
created list [1, 2, 3, 4]

Numpy array in python [1 2 3 4]

Creating new list of array

Squre Root of [[1 2 3]

[4 5 6]]

[[1. 1.41421356 1.73205081]

[2. 2.23606798 2.44948974]]
```

Result:

Thus, the Program has been successfully executed and the output is verified.

Ex. No. 2

Date:

Basic plots using Matplotlib

Aim:

To write a python program to make a basic plots by using matplotlib.

Algorithm:

Step1: Start

Step2: Import matplotlib package.

Step3: Create a basic variables x and y.

Step4: Assign x and y with a common values.

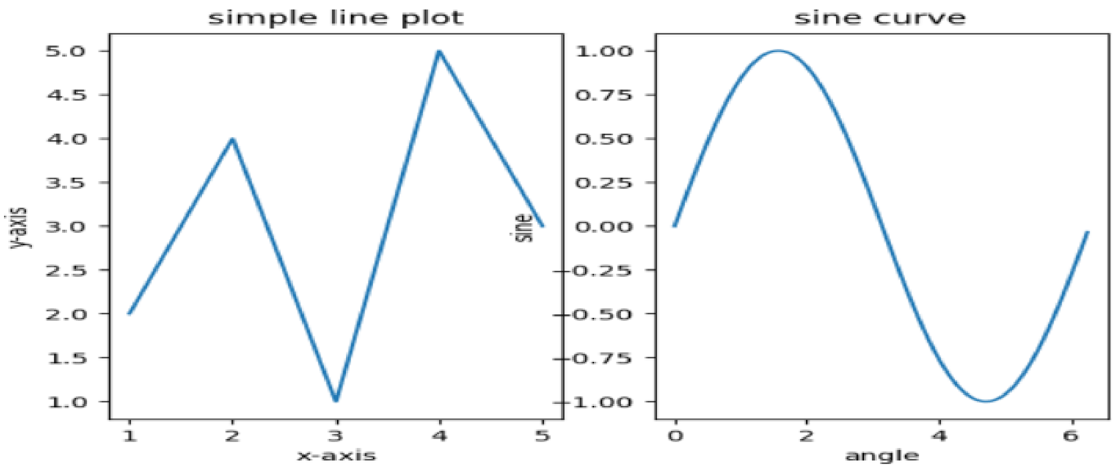
Step5: Plot the points and display.

Step6: Stop

Program:

```
import matplotlib.pyplot as plt
import numpy as np
import math
# Sample data
x = [1, 2, 3, 4, 5]
y = [2, 4, 1, 5, 3]
# Create a figure1 and axis
plt.subplot(1,2,1)
plt.xlabel('x-axis')
plt.ylabel('y-axis')
plt.title('simple line plot')
plt.plot(x,y)

# Create a figure2 and axis

plt.subplot(1,2,2)

x=np.arange(0,(math.pi)*2,0.05)

y=np.sin(x)

plt.plot(x,y)

plt.xlabel('angle')

plt.ylabel('sine')

plt.title('sine curve')

# Show the plot

plt.show()
```

Output:



Result:

Thus, the Program has been successfully executed and the output is verified.

Ex. No. 3

Date:

Working with Pandas data frames

Aim:

To write a python program to create a data frames by using Pandas package.

Algorithm:

```
Step1: Start
Step2: Import pandas package.
Step3: Create a variable and assign some dictionary data values to it.
Step4: By using DataFrame() function create a data frame.
Step5: Display the data set values.
Step6: Stop
```

Program:

(i) Pandas data frames

```
import pandas as pd
data = {'Word':['happy','apple','blue','gloomy'],
'Meaning':['happy','fruit','color','sad']}
df = pd.DataFrame(data)
print(df)
```

(ii) Reading CSV files with pandas

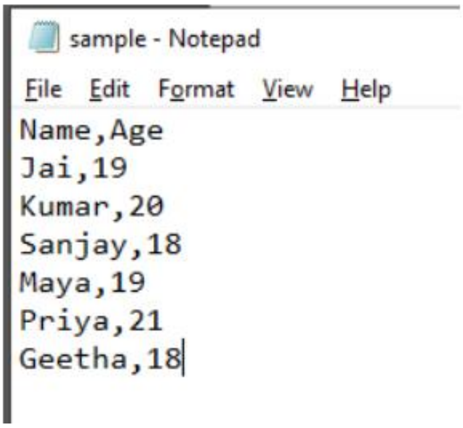
Creating a csv file by using notepad or any other text editor.

Save the file as any-name.csv.

```
import pandas as pd
df = pd.read_csv(' any-name.csv ')
```

```
print(df.head())

print(df.tail())

print(df.info())
```

Output:



```
Name,Age
Jai,19
Kumar,20
Sanjay,18
Maya,19
Priya,21
Geetha,18
```

```
(i)

Word Meaning

0 happy happy

1 apple fruit

2 blue color

3 gloomy sad

(ii)

Name Age

0 Jai 19

1 Kumar 20

2 Sanjay 18

3 Maya 19
```

```
4 Priya 21
Name Age
1 Kumar 20
2 Sanjay 18
3 Maya 19
4 Priya 21
5 Geetha 18
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 6 entries, 0 to 5
Data columns (total 2 columns):
# Column Non-Null Count Dtype
```

Result:

Thus, the Program has been successfully executed and the output is verified.

Ex. No.: 4

Date:

Frequency distributions, averages and variability

Aim:

To write a python program to find frequency distributions, averages and variability.

Algorithm:

```
Step1: Start
Step2: Import numpy package.
Step3: Import pandas package.
Step4: Assign data to created variables.
Step5: Solve the values and display.
Step6: Stop
```

Program:

```
import numpy as np
import pandas as pd
list = [2,4,4,4,5,5,7,9]
data={'Grade':['A','A','A','B','B','B','B','C','D','D'],
'Age':[18,18,18,19,19,20,18,18,19,19],
'Gender':['M','M','F','F','F','M','M','F','M','F']}
df = pd.DataFrame(data)
print(df)
print(list)
print('Average :',np.average(list))
print('Variance :',np.var(list))

print('Standard Deviation :',np.std(list))
```

Output:

```
Grade Age Gender

0 A 18 M

1 A 18 M

2 A 18 F

3 B 19 F

4 B 19 F

5 B 20 M

6 B 18 M

7 C 18 F

8 D 19 M

9 D 19 F

Find freqency of each letter grade

col_0 count

Grade

A 3

B 4

C 1

D 2

Fiding average, variance, standard deviation for

[2, 4, 4, 4, 5, 5, 7, 9]

Average : 5.0
```

```
Variance : 4.0

Standard Deviation : 2.0
```

Result:

Thus, the Program has been successfully executed and the output is verified.

Ex. No.: 5

Date:

Normal Curves, Correlation and scatter plots, correlation coefficient

Aim:

To write a python program to calculate correlation, correlation coefficient and normal curves.

Algorithm:

```
Step1: Start
Step2: Import required librery
Step3: Make normal curves and calculate correlation.
Step4: Collect sample data to calculate correlation coefficient.
Step5: Assign the datas to x and y variable.
Step6: Plot the points.
Step7: Display the graphs (i),(ii)and(iii).
Step8: Stop
```

Program:

(i) Plotting normal distribution

```
import numpy as np
import matplotlib.pyplot as plt
from scipy.stats import norm
x=np.arange(-3,3,0.001)
plt.plot(x,norm.pdf(x,0,1))
plt.show()
```

(ii) Plot multiple normal distributions

```
import numpy as np
import matplotlib.pyplot as plt
from scipy.stats import norm
x=np.arange(-5,5,0.001)
plt.plot(x,norm.pdf(x,0,1),'--',label='μ:0, σ:1')
plt.plot(x,norm.pdf(x,0,1.5),'-.',label='μ:0, σ:1.5')
plt.plot(x,norm.pdf(x,0,2),'-',label='μ:0, σ:2')
plt.legend()
plt.show()
```

(iii) Plotting a scatter plot

```
import numpy as np
import matplotlib.pyplot as plt
x,y,scale = np.random.randn(3,50)
fig,ax = plt.subplots()
ax.scatter(x=x,y=y,c=scale,s=np.abs(scale)*500)
ax.set(title='Scatter plot')
plt.show()
```

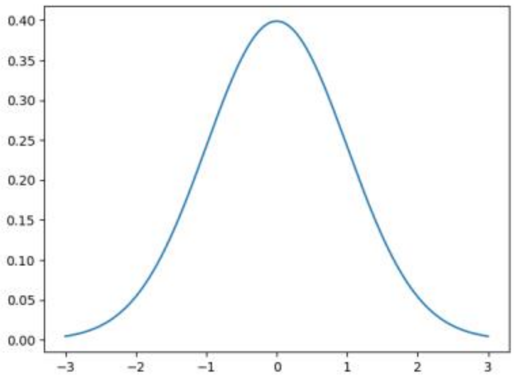
(vi) Calculation of the Pearson's correlation between two variables

```
from numpy.random import randn
from numpy.random import seed
from scipy.stats import pearsonr
#seed random number generator
seed(1)
#data
```

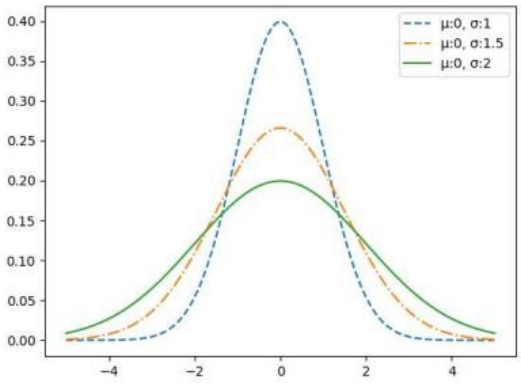
```
data1 = 20*randn(1000) +100

data2 = data1 + (10 * randn(1000)+50)

#calculate pearson's correlation

corr,_=pearsonr(data1,data2)

print('Pearson correlation: %.3f' % corr)
```

Output:

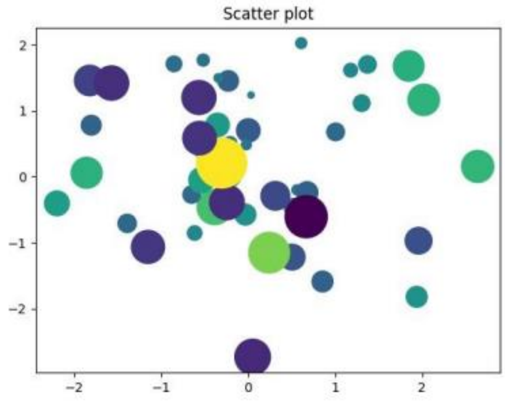
(i)



(ii)



(iii)



Result:

Thus, the Program has been successfully executed and the output is verified.

Ex. No.: 6

Date:

Regression

Aim:

To write a python program calculate regression.

Algorithm:

Step1: Start

Step2: Import numpy and matplotlib.

Step3: Create a function coef(x,y) and calculate cross-deviation and deviation about x

Step4: And calculate regression coefficients.

Step5: Derive predicted response vector to

Step6: Create plot_regression_line(x,y,b) to plot values.

Step7: Plot the values and display.

Step8: Stop

Program:

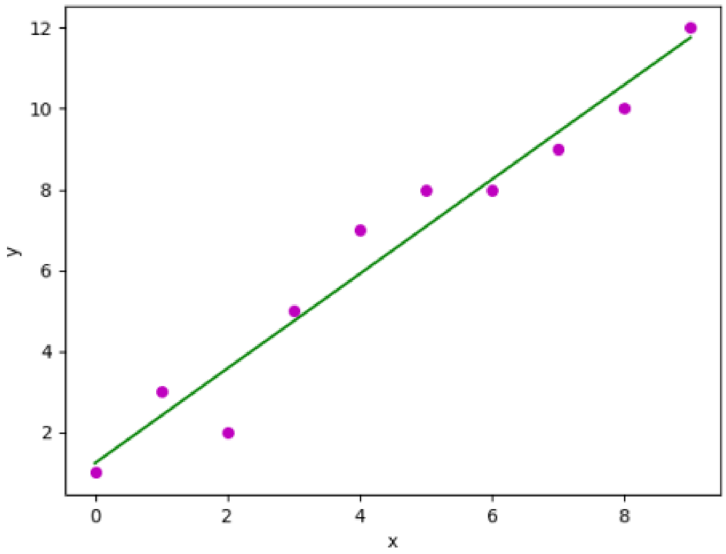
```
import numpy as np

import matplotlib.pyplot as plt

def estimate_coef(x,y):

#No.of points

n=np.size(x)

#mean of x and y vector

m_x=np.mean(x)

m_y=np.mean(y)

#calculating cross-deviation and deviation about x
```

```
SS_xy=np.sum(y*x) - n*m_y*m_x
SS_xx=np.sum(x*x) - n*m_x*m_x
#calculation regression coefficients
b_1=SS_xy / SS_xx
b_0=m_y - b_1 * m_x
return (b_0, b_1)
def plot_regression_line(x,y,b):
#plotting actual points as scatter plots
plt.scatter(x,y,color='m', marker='o',s=30)
#predicted response vector
y_pred=b[0] + b[1]*x
#plotting the regression line
plt.plot(x,y_pred,color='g')
plt.xlabel('x')
plt.ylabel('y')
plt.show()
def main():
#data
x=np.array([0,1,2,3,4,5,6,7,8,9])
y=np.array([1,3,2,5,7,8,8,9,10,12])
#estimation coefficients
b=estimate_coef(x,y)
print("Estimated coefficients:\nb_0 = {} \nb_1 = {}".format(b[0],b[1]))
#plotting regression line
```

```
plot_regression_line(x,y,b)

if name == ' main ':

main()
```

Output:

```
Estimated coefficients:

b_0 = 1.2363636363636363

b_1 = 1.1696969696969697
```



Result:

Thus, the Program has been successfully executed and the output is verified.

Ex. No. 7

Date:

Z-Test

Aim:

To write a python program to make a Z-test.

Algorithm:

```
Step1: Start
Step2: Import ztest from statsmodels.stats.weightstats.
Step3: Collecting IQ datas of 20 patients.
Step4: Assigning those values to data.
Step5: Display ztest(data,value=100).
Step6: Collects data from city A and B.
Step7: Display ztest(cityA,cityB,value=0)
Step8: Stop
```

Program:

```
from statsmodels.stats.weightstats import ztest as ztest

#enter IQ level for 20 patients

data=[88,92,94,94,96,97,97,97,99,99,105,109,109,110,112,112,113,114,115]

#perform one sample z-test

print('Z-Test I')

print(ztest(data, value=100))

cityA=[78,89,92,94,94,96,97,97,97,99,99,105,109,110,112,112,113,114,115]

cityB=[88,89,92,92,94,94,96,97,97,97,99,99,105,109,110,112,113,114,115]

print('\nZ-Test II')
print(ztest(cityA,cityB,value=0))
```

Output:

```
Z-Test I

(1.378696666763784, 0.1679882976520375)

Z-Test II

(0.16977083200593462, 0.8651903665846945)
```

Result:

Thus, the Program has been successfully executed and the output is verified.

Ex. No.: 8

Date:

T-Test

Aim:

To write a python program to make a T-test.

Algorithm:

```
Step1: Start
Step2: Import numpy and scipy.
Step3: Calculate standard deviation.
Step4: Assign standard deviation value to var_x.
Step5: Calculate variance to get std
Step6: Assign variance to var_y.
Step7: By using stats module calculated standard deviation, p and t.
Step8: Stop
```

Program:

```
import numpy as np
from scipy import stats
N = 10
#Gaussian distributed data with mean=2 and var=1
x=np.random.rand(N)+2
#Gaussian distributed data with mean=0 and var=1
y=np.random.randn(N)
#calculating standard deviation
#calculating variance to get std
```

```
var_x = x.var(ddof=1)

var_y = y.var(ddof=1)

#standard deviation

SD = np.sqrt((var_x + var_y) / 2)

print('Standard Deviation =',SD)

#Calculating the T-Statistics

tval = (x.mean() - y.mean()) / (SD * np.sqrt(2/N))

#compaing with critical T-Value

#Degrees of freedom

dof=2*N-2

#p-value after compaison with the T-Statistics

pval = 1-stats.t.cdf(tval,df=dof)

print('t = '+str(tval))

print('p = '+str(2*pval))

#Cross checking using the internal function from scipy package

tval2,pval2 = stats.ttest_ind(x,y)

print('t = '+str(tval2))

print('p = '+str(pval2))
```

Output:

```
Standard Deviation = 0.7194173256540722

t = 7.307006005934893

p = 8.6873364035788882e-07

t = 7.307006005934891

p = 8.68733640421676e-07
```

Result:

Thus, the Program has been successfully executed and the output is verified.

Ex. No. 9

Date:

ANOVA

Aim:

To write a python program to make a Anova analysis.

Algorithm:

```
Step1: Start
Step2: Import required library.
Step3: Import seaborn to customize style.
Step4: Import csv dataset named Diet_Dataset.csv
Step5: Display CSV file data.
Step6: Display header datas in CSV file.
Step7: Plot x and y which are mata-data age and pdf.
Step8: Stop
```

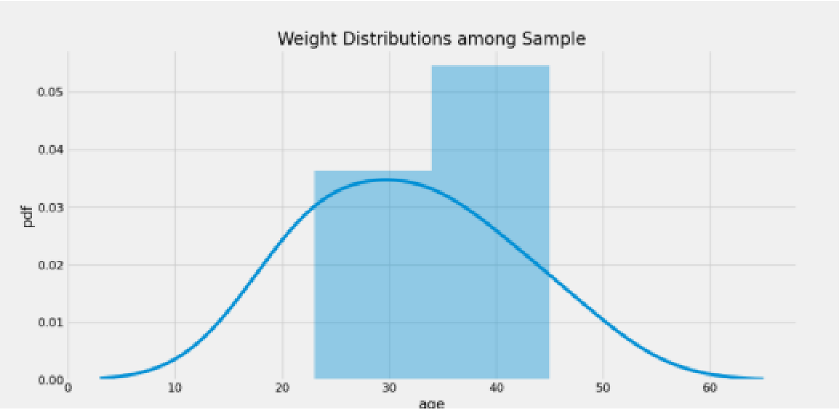
Program:

```
import pandas as pd
import matplotlib.pyplot as plt
import statsmodels.api as sm
from statsmodels.formula.api import ols
import seaborn as sns
import numpy as np
import pandas.tseries
plt.style.use('fivethirtyeight')
mydata=pd.read_csv('Diet_Dataset.csv')
```

```
print(mydata.head())

print('\nThe total number of rows in the dataset:',mydata.size)

print('\n',mydata.gender.unique())

print(mydata[mydata.gender==' '])

f,ax=plt.subplots(figsize=(11,9))

plt.title('Weight Distributions among Sample')

plt.ylabel('pdf')

sns.distplot(mydata.age)

plt.show()
```

Output:

```
person gender age height

0 23 34 344

1 32 45 233

2 2 0 23 234

3 3 0 34 345

4 22 0 23 344

The total number of rows in the dataset: 20

[' ' '0']

person gender age height

0 23 34 344

1 32 45 233
```



Result:

Thus, the Program has been successfully executed and the output is verified.

Ex. No.: 10

Date:

Building and Validating linear models

Aim:

To write a python program to building and validating linear models.

Algorithm:

Step1: Start

Step2: From pandas import read_csv, autocorrelation_plot and DataFrame.

Step3: Import statsmodels.tsa.arima_model.

Step4: Import a dataset from csv.csv file.

Step5: Create a function parser() to calculate date-time.

Step6: Read csv.csv file and assign the data to series variable.

Step7: Display series.

Step8: Plot series.

Step9:Display graph.

Step10: Stop

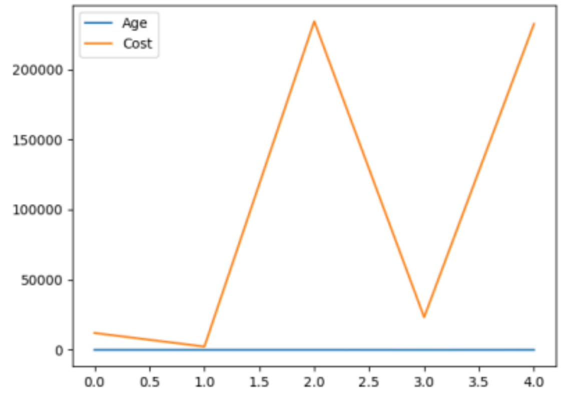
Program:

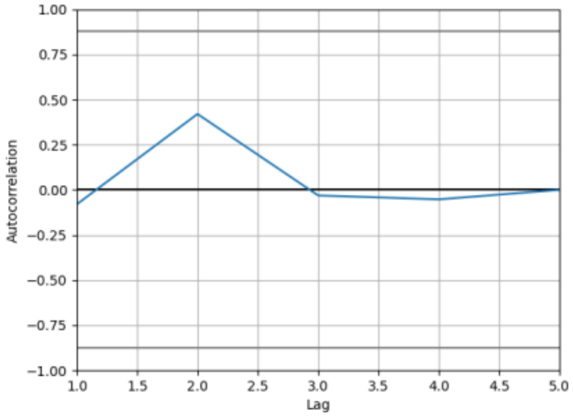
```
from pandas import read_csv

from matplotlib import pyplot

from pandas.plotting import autocorrelation_plot

from pandas import DataFrame

from statsmodels.tsa.arima_model import ARIMA

#Importing Data

def parser(x):
```

```
return datetime.strptine('198"+x, "W-%a')

series = read_csv("csv.csv")#, header=0, index_col=0, squeeze=True)

print(series.head())

#ploting in series

series.plot()

#autocorrelation

pyplot.figure()

autocorrelation_plot(series)

pyplot.show()
```

Output:

```
Age Cost

0 12 12121

1 12 2423

2 22 234234

3 3 23324

4 23 232422
```





Result:

Thus, the Program has been successfully executed and the output is verified.