Name – Ashish Kothari
Section – D1
Roll No – 17
Course – BCA
Subject – PBC 602 Machine Learning Lab

Problem Statement 1 - Create a Data Frame using dictionary containing students' marks details with columns Student_ID, Student_Name, Gender, Sub1, Sub2, Sub3 with the marks of 20 students.

Or you can create an excel file for the same and import it.

(i)   Find the mean and median marks in each subject.

(ii)   Find the mode of 'Gender' column.

(iii)   Find the variance and standard deviation of marks in each subject

CODE - import

pandas as pd import

numpy as np

```
data = {
    "Student_ID": range(1, 21),
    "Student_Name": [f"Student_{i}" for i in range(1, 21)],
    "Gender": np.random.choice(["Male", "Female"], size=20),
    "Sub1": np.random.randint(50, 100, size=20),
    "Sub2": np.random.randint(50, 100, size=20),
    "Sub3": np.random.randint(50, 100, size=20),
}

df = pd.DataFrame(data)

mean_marks = df[["Sub1", "Sub2", "Sub3"]].mean() median_marks
= df[["Sub1", "Sub2", "Sub3"]].median()

mode_gender = df["Gender"].mode()[0]

variance_marks = df[["Sub1", "Sub2", "Sub3"]].var() std_dev_marks
= df[["Sub1", "Sub2", "Sub3"]].std()
```

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```
print("Mean Marks:\n", mean_marks) print("\nMedian
Marks:\n", median_marks) print("\nMode of Gender
column:", mode_gender) print("\nVariance of
Marks:\n", variance_marks) print("\nStandard
Deviation of Marks:\n", std_dev_marks)
print("Program created by Nisha Belwal..")
```

OUTPUT –

```
Mean Marks:
 Sub1    69.00
Sub2    77.80
Sub3    82.95
dtype: float64

Median Marks:
 Sub1    65.5
Sub2    78.0
Sub3    85.0
dtype: float64

Mode of Gender column: Female

Variance of Marks:
 Sub1    193.368421
Sub2    186.273684
Sub3    133.313158
dtype: float64

Standard Deviation of Marks:
 Sub1    13.905697
Sub2    13.648212
Sub3    11.546132
dtype: float64
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```

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Problem Statement 2 - Define two matrices. Find their sum, difference, transpose and product of two matrices.

CODE – import

numpy as np

```python
A = np.array([[1, 2, 3], [4, 5, 6], [7, 8, 9]])
B = np.array([[9, 8, 7], [6, 5, 4], [3, 2, 1]])

sum_matrix = A + B

diff_matrix = A - B

transpose_A = A.T
transpose_B = B.T

product_matrix = np.dot(A, B)  # Matrix multiplication

print("Matrix A:\n", A) print("\nMatrix B:\n", B)
print("\nSum of Matrices:\n", sum_matrix)
print("\nDifference of Matrices:\n", diff_matrix)
print("\nTranspose of Matrix A:\n", transpose_A)
print("\nTranspose of Matrix B:\n", transpose_B)
print("\nProduct of Matrices:\n", product_matrix)
print("Program created by Nisha Belwal..")
```
OUTPUT –

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```
Matrix A:
 [[1 2 3]
 [4 5 6]
 [7 8 9]]

Matrix B:
 [[9 8 7]
 [6 5 4]
 [3 2 1]]

Sum of Matrices:
 [[10 10 10]
 [10 10 10]
 [10 10 10]]

Difference of Matrices:
 [[-8 -6 -4]
 [-2  0  2]
 [ 4  6  8]]

Transpose of Matrix A:
 [[1 4 7]
 [2 5 8]
 [3 6 9]]

Transpose of Matrix B:
 [[9 6 3]
 [8 5 2]
 [7 4 1]]

Product of Matrices:
 [[ 30  24  18]
 [ 84  69  54]
 [138 114  90]]
Program created by Nisha Belwal..
```

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Problem Statement 3 - Write a Python Program to perform following operations.

a) Read file with the help of function
b) Rename file
c) Delete file

CODE –

```python
import os

def read_file(filename):    try:        with
open(filename, 'r') as file:         content
= file.read()                 print("File
Content:\n",   content)               except
FileNotFoundError:
    print("Error: File not found!")

filename = "sample.txt"

read_file(filename)

new_filename = "renamed_sample.txt" try:
   os.rename(filename,        new_filename)
print(f"File  renamed  to  {new_filename}")
except FileNotFoundError:
   print("Error: File not found for renaming!")

try:
   os.remove(new_filename)                print(f"File
{new_filename}   deleted   successfully")   except
FileNotFoundError:
   print("Error: File not found for deletion!")
print("Program created by Nisha Belwal..")
```

OUTPUT –

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```
Error: File not found!
Error: File not found for renaming!
Error: File not found for deletion!
Program created by Nisha Belwal..
```

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Problem Statement 4 - Write a Python program to count the number of lines in a text file using enumerate.
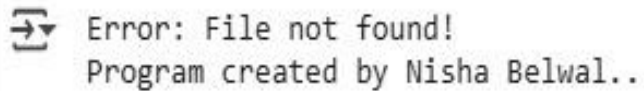
CODE –

```
def count_lines(filename):    try:       with open(filename, 'r') as
file:            line_count = sum(1 for _, _ in enumerate(file,
start=1))        print(f"Total number of lines in '{filename}':",
line_count)     except FileNotFoundError:
    print("Error: File not found!")

filename = "sample.txt"

count_lines(filename)
print("Program created by Nisha Belwal..")
```

OUTPUT –

```
Error: File not found!
Program created by Nisha Belwal..
```

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Problem Statement 5 - Write a Python program to create a module named as calculator.py. which defines four functions addition, subtraction, multiplication and division, and import this module to another module to use its functions.

CODE 1 –

```python
# calculator.py - A simple calculator module

def addition(a, b):
    return a + b

def subtraction(a, b):
    return a - b

def multiplication(a, b):
    return a * b

def division(a, b):
if b != 0:
        return a / b
else:
        return "Error! Division by zero."
```

CODE 2 –

```python
# main.py - Importing and using the calculator module

import calculator

num1 = 10
num2 = 5

# Using functions from calculator.py
print("Addition:", calculator.addition(num1, num2)) print("Subtraction:",
calculator.subtraction(num1, num2)) print("Multiplication:",
calculator.multiplication(num1, num2)) print("Division:",
calculator.division(num1, num2))
```

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OUTPUT –

```
makefile

Addition: 15
Subtraction: 5
Multiplication: 50
Division: 2.0
```

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Problem Statement 6 - Construct clusters by using KMeans algorithm on a sample data set. Take the value of k=3, visualize all three clusters using scatter plot also print the Silhouette score of the clustering.

CODE –

```
import numpy as np import matplotlib.pyplot
as plt from sklearn.cluster import KMeans
from sklearn.metrics import silhouette_score
from sklearn.datasets import make_blobs

X, _ = make_blobs(n_samples=300, centers=3, cluster_std=1.0, random_state=42)

kmeans = KMeans(n_clusters=3, random_state=42, n_init=10) clusters
= kmeans.fit_predict(X)

sil_score = silhouette_score(X, clusters)
print(f"Silhouette Score: {sil_score:.3f}")

plt.figure(figsize=(8, 6))
plt.scatter(X[:, 0], X[:, 1], c=clusters, cmap='viridis', marker='o', edgecolors='k')
plt.scatter(kmeans.cluster_centers_[:, 0], kmeans.cluster_centers_[:, 1], c='red',
marker='X', s=200, label='Centroids') plt.title("K-Means Clustering (k=3)")
plt.xlabel("Feature 1") plt.ylabel("Feature 2") plt.legend() plt.show()
print("Program created by Nisha Belwal..")
```
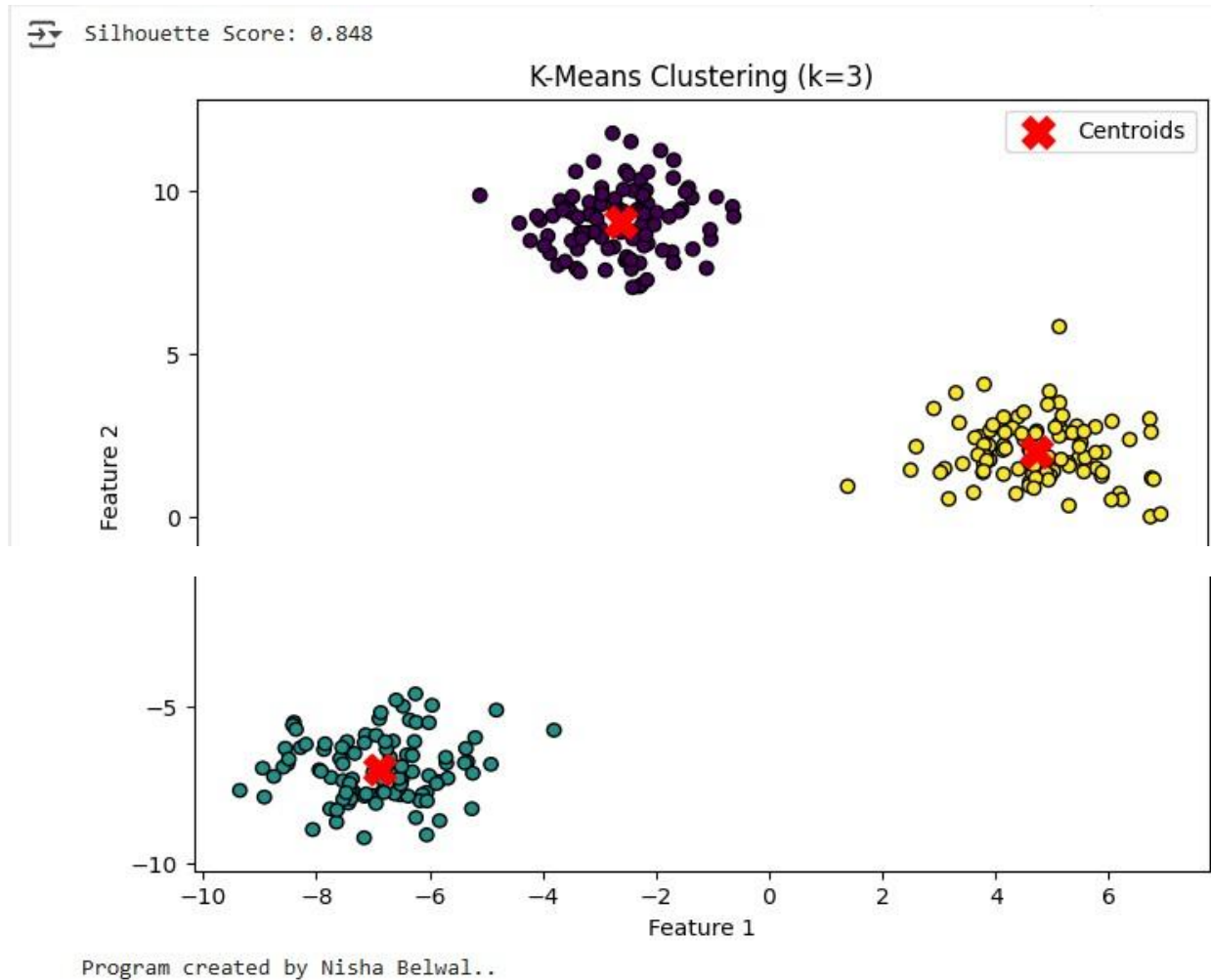
OUTPUT –

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Silhouette Score: 0.848

K-Means Clustering (k=3)
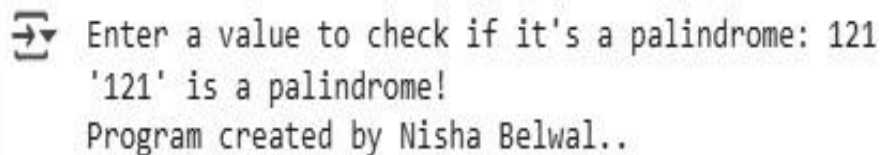
Program created by Nisha Belwal..

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Problem Statement 7 - WAP to check if a value entered by a user is palindrome or not.

CODE –

```
def is_palindrome(value):
    value = str(value)
    return value == value[::-1]

user_input = input("Enter a value to check if it's a palindrome: ")

if                  is_palindrome(user_input):
print(f"'{user_input}' is a palindrome!") else:
print(f"'{user_input}' is not a palindrome.")
print("Program created by Nisha Belwal..")
```

OUTPUT –

```
Enter a value to check if it's a palindrome: 121
'121' is a palindrome!
Program created by Nisha Belwal..
```

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Problem Statement 8 - WAP to print a factorial of a number.

CODE –

```
def factorial(n):
if n < 0:
     return "Factorial is not defined for negative numbers!"
elif n == 0 or n == 1:
     return 1
else:
     fact = 1        for i in
range(2, n + 1):
        fact *= i
     return fact

num = int(input("Enter a number to find its factorial: "))

print(f"Factorial of {num} is: {factorial(num)}")
print("Program created by Nisha Belwal..")
```

OUTPUT –

```
Enter a number to find its factorial: 5
Factorial of 5 is: 120
Program created by Nisha Belwal..
```