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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

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..")

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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]]
```

```
[[1 2 3]
 [4 5 6]
 [7 8 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]]
```

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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 –

```
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!
```

```
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```

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

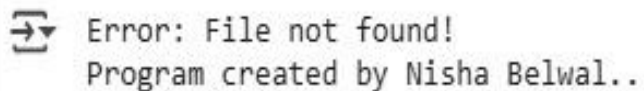
CODE –

```
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 –

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 –

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 –

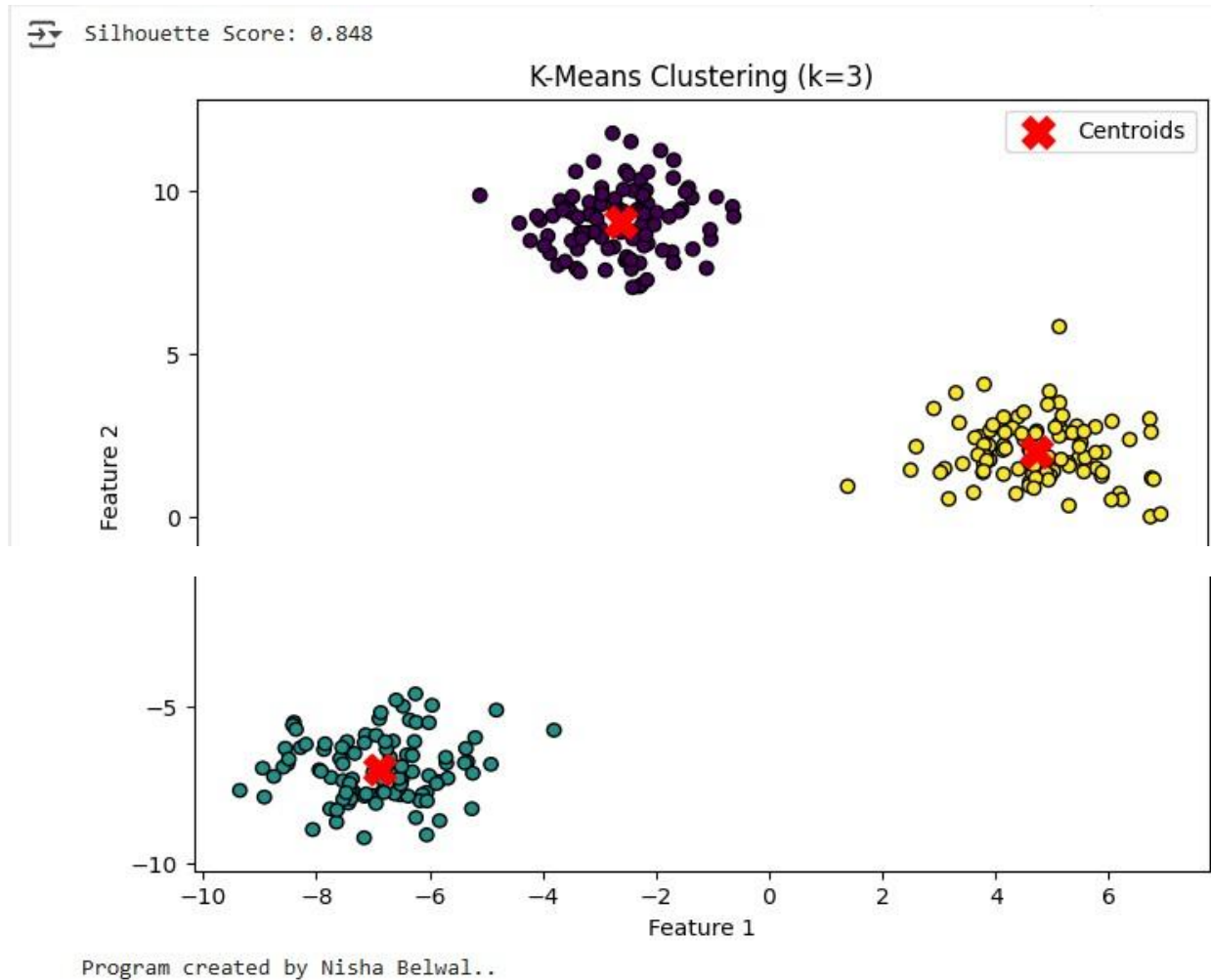
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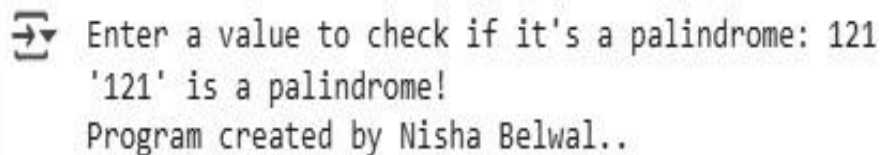
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Problem Statement 7 - WAP to check if a value entered by a user is palindrome or not.

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..
```