Experiment: 3.3

Student Name: SANJIV GUPTA **UID:** 21BCS-*3478*
Branch: CSE **Section/Group:** 21BCS-IOT-602B
Semester: 5th **Date:** 02/11/23
Subject Name: AIML Lab **Subject Code:** 21CSH-316

1. AIM: *Implement Exploratory Data Analysis on any data set.*

2. Objective:

To Learn about Meta-data.

3. Tools/Resource Used:

1. *Python programming language.*
2. *Jupyter Notebook.*

4. Algorithm:

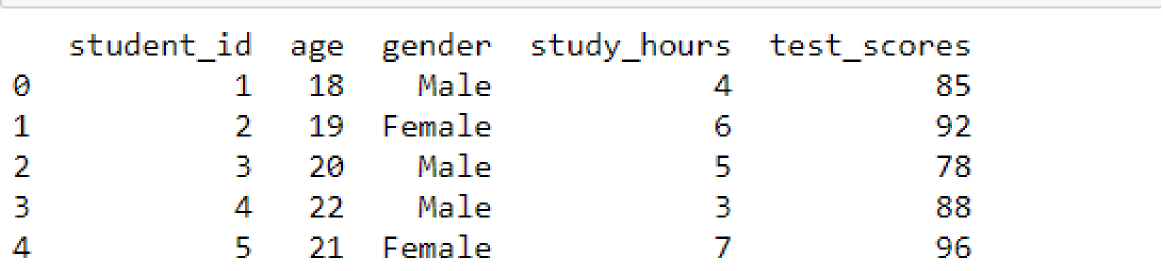
- *Import libraries: Use pandas, numpy, and data visualization tools.*
- *Load dataset.*
- *Display initial data overview.*
- *Check and handle missing values and duplicates.*
- *Explore data through univariate and bivariate analysis.*
- *Visualize correlations between numeric variables.*
- *Detect and address outliers if needed.*
- *Summarize findings and plan next steps.*

5. Program Code:

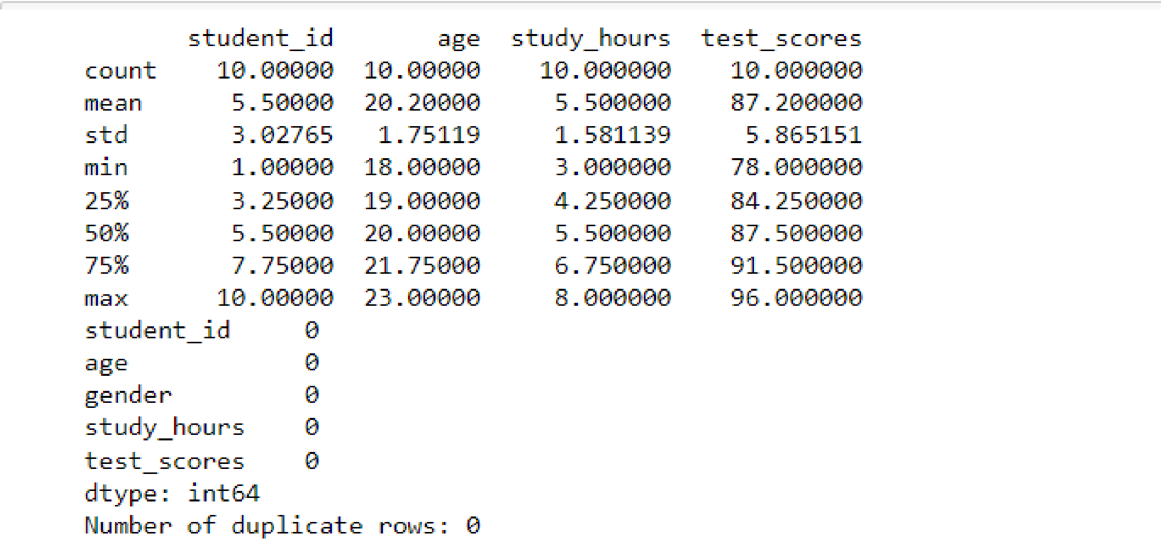
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns

data = {
    'student_id': range(1, 11),
    'age': [18, 19, 20, 22, 21, 20, 19, 18, 23, 22],
    'gender': ['Male', 'Female', 'Male', 'Male', 'Female', 'Male', 'Female', 'Male', 'Female', 'Male'],
    'study_hours': [4, 6, 5, 3, 7, 6, 5, 4, 8, 7],
    'test_scores': [85, 92, 78, 88, 96, 79, 90, 84, 93, 87]
}

df = pd.DataFrame(data)

print(df.head())

summary = df.describe()
print(summary)

missing_values = df.isnull().sum()
print(missing_values)

duplicates = df.duplicated().sum()
print("Number of duplicate rows:", duplicates)

# Remove duplicates if present
df = df.drop_duplicates()

# Example histogram for age
plt.figure(figsize=(8, 6))
sns.histplot(df['age'], kde=True)
plt.title('Age Distribution')
plt.xlabel('Age')
plt.show()

# Example scatter plot for study hours vs. test scores
plt.figure(figsize=(8, 6))
sns.scatterplot(data=df, x='study_hours', y='test_scores')
plt.title('Study Hours vs. Test Scores')
plt.xlabel('Study Hours')
plt.ylabel('Test Scores')
plt.show()

# Example count plot for gender
plt.figure(figsize=(8, 6))
```

```
sns.countplot(data=df, x='gender')
plt.title('Gender Distribution')
plt.xlabel('Gender')
plt.ylabel('Count')
plt.show()

correlation_matrix = df.corr()
plt.figure(figsize=(8, 6))
sns.heatmap(correlation_matrix, annot=True, cmap='coolwarm')
plt.title('Correlation Matrix')
plt.show()
```

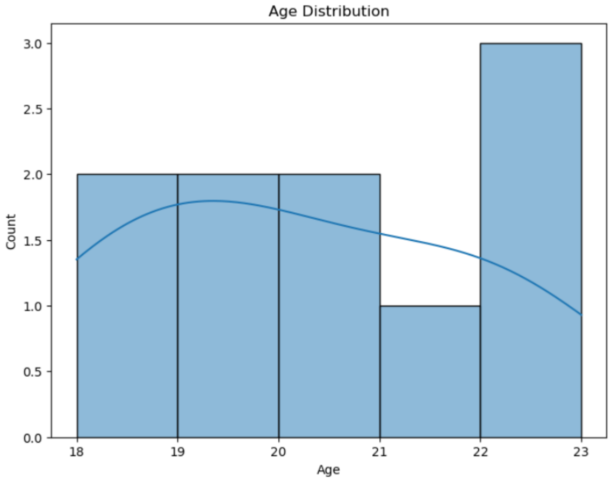
6. Output/Result:

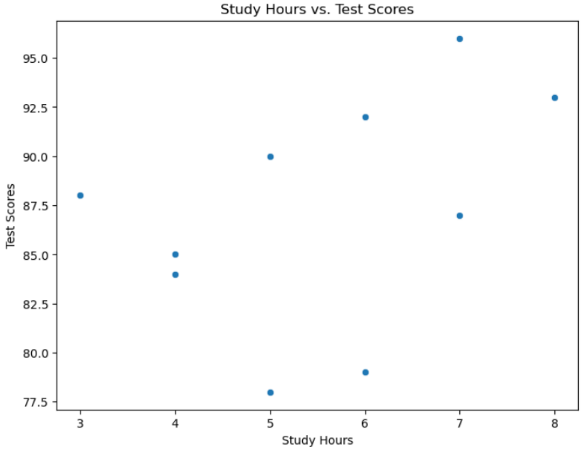


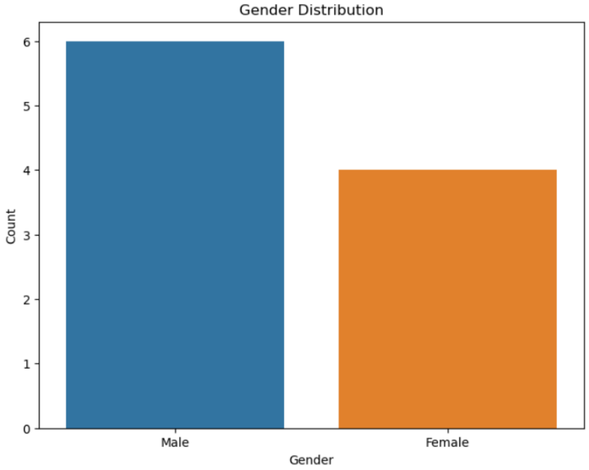
```
   student_id  age  gender  study_hours  test_scores
0           1   18    Male            4           85
1           2   19  Female            6           92
2           3   20    Male            5           78
3           4   22    Male            3           88
4           5   21  Female            7           96
```

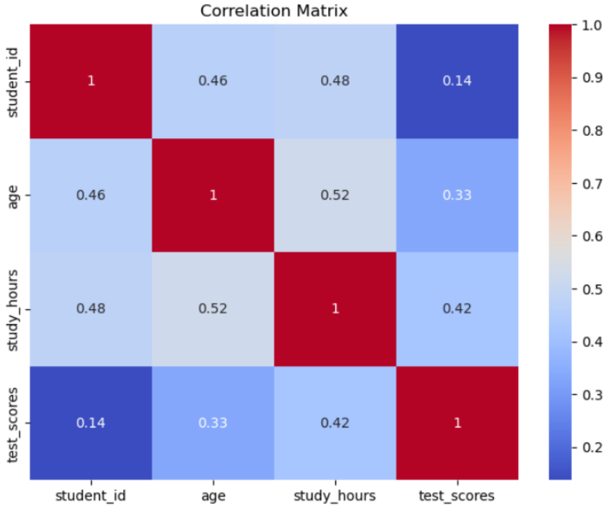


```
       student_id       age  study_hours  test_scores
count    10.00000  10.00000    10.000000    10.000000
mean      5.50000  20.20000     5.500000    87.200000
std       3.02765   1.75119     1.581139     5.865151
min       1.00000  18.00000     3.000000    78.000000
25%       3.25000  19.00000     4.250000    84.250000
50%       5.50000  20.00000     5.500000    87.500000
75%       7.75000  21.75000     6.750000    91.500000
max      10.00000  23.00000     8.000000    96.000000
student_id     0
age            0
gender         0
study_hours    0
test_scores    0
dtype: int64
Number of duplicate rows: 0
```









7. Learning Outcomes:

1. *Implement to implement different python library.*
2. *Understand the concept of EDA process.*