LAB MANUAL

Development and Data Visualization using Streamlit

Loading and Displaying Datasets in Streamlit Apps

1. **Objective**

   To learn how to load external datasets (CSV files) into Streamlit applications and visualize the data using different chart types including line chart, bar chart, scatterplot, and customized charts using matplotlib.pyplot with st.pyplot().

2. **Equipment Required**

   - Computer system with Windows/Linux/macOS operating system
   - Python (version 3.9 or above) installed
   - Streamlit library installed in the Python environment
   - A sample CSV file (e.g., Data_Visualization.csv)
   - Code editor (e.g., Visual Studio Code, Jupyter Notebook, or Notepad++)
   - Internet connection (for installing dependencies or optional GitHub hosting)

3. **Prerequisites**

   - Understanding of Python data types and basic syntax
   - Familiarity with CSV file format and pandas dataframes
   - Basic knowledge of Streamlit layout and widgets
   - Awareness of different types of charts and their use cases

4. **Problem Statement**

   Build a Streamlit application that allows the user to upload a CSV file containing student performance data. After loading the dataset, the app should display the raw data and generate different types of visualizations:
   - Line chart of marks over months
   - Bar chart comparing students' total marks
   - Scatterplot showing correlation between two subjects
   - Custom chart using matplotlib and rendered using st.pyplot()

5. **Procedure**

   Build a Streamlit application that allows the user to upload a CSV file containing student performance data. After loading the dataset, the app should display the raw data and generate different types of visualizations:

   - Line chart of marks over months
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6. Setting up the Environment

- Open terminal or command prompt.
- Install required libraries: ***pip install streamlit pandas matplotlib***
- Create a file named ***data_visualization.py*** in your code editor.
- Place your sample CSV (e.g., ***Data_Visualizaiton.csv***) in the same folder. The sample CSV may contain:
- Name, Math, Science, English, Month
    - Asha, 67, 78, 80, Jan
    - Ravi, 75, 72, 85, Feb
    - Seema, 80, 85, 78, Mar
    - Imran, 70, 68, 88, Apr
    - Tara, 90, 95, 92, May
- Run the app: ***python -m streamlit run data_visualization.py***

7. Steps:

```python
import streamlit as st
import pandas as pd
import matplotlib.pyplot as plt

st.title("Student Performance Visualizer")
st.write("Upload a CSV file containing student performance data.")

# Upload CSV file
uploaded_file = st.file_uploader("Choose a CSV file", type="csv")

if uploaded_file is not None:
    df = pd.read_csv(uploaded_file)
    st.subheader("Raw Data")
    st.dataframe(df)

    st.subheader("Line Chart - Subject Marks Over Time")
    st.line_chart(df.set_index("Month")[["Math", "Science", "English"]])

    st.subheader("Bar Chart - Total Marks per Student")
    df["Total"] = df[["Math", "Science", "English"]].sum(axis=1)
    st.bar_chart(df.set_index("Name")["Total"])

    st.subheader("Scatterplot - Math vs Science")
    st.scatter_chart(df[["Math", "Science"]])

    st.subheader("Custom Chart using matplotlib and st.pyplot")
    fig, ax = plt.subplots()
```

```
    ax.plot(df["Month"], df["English"], marker='o', color='green', label="English
Marks")
    ax.set_title("English Performance Over Months")
    ax.set_xlabel("Month")
    ax.set_ylabel("Marks")
    ax.legend()
    st.pyplot(fig)
```

Run the Application

Navigate to the project folder in the terminal and run the following command:

python –m streamlit run data_visualization.py

Output

Student Performance Visualizer

Upload a CSV file containing student performance data.

Choose a CSV file

| Drag and drop file here	
Limit 200MB per file • CSV	Browse files

Data_Visualization.csv 5.0KB   ✕

Raw Data

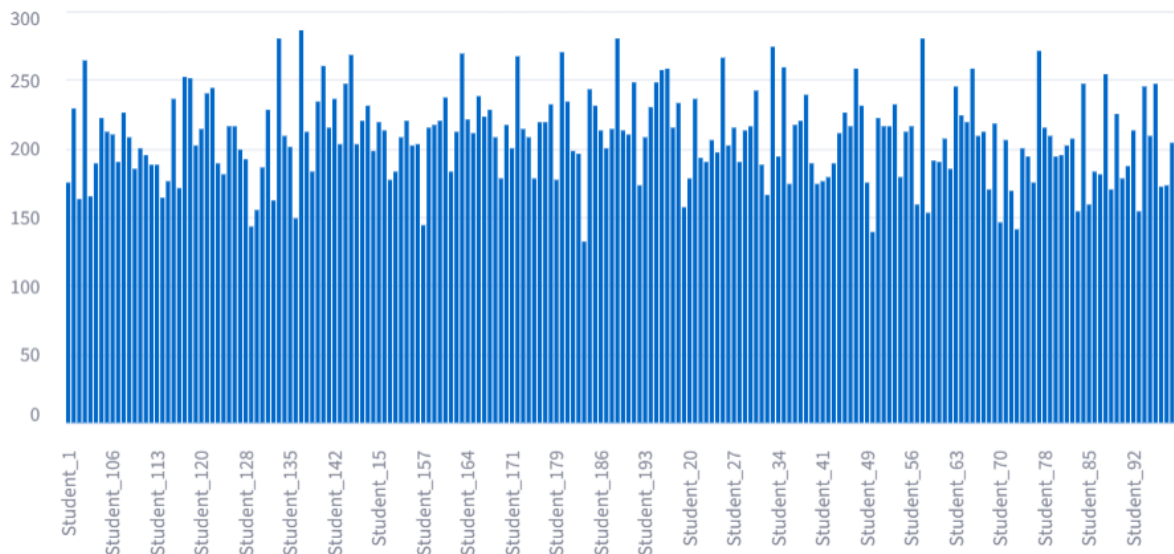|	Name	Math	Science	English	Month
0	Student_1	47	41	87	Nov
1	Student_2	55	54	48	May
2	Student_3	46	83	87	Dec
3	Student_4	45	77	67	Sep
4	Student_5	41	45	53	Jan
5	Student_6	72	78	41	Apr
6	Student_7	52	85	81	Sep
7	Student_8	74	66	54	Dec
8	Student_9	77	57	91	Aug

Line Chart

Line Chart - Subject Marks Over Time
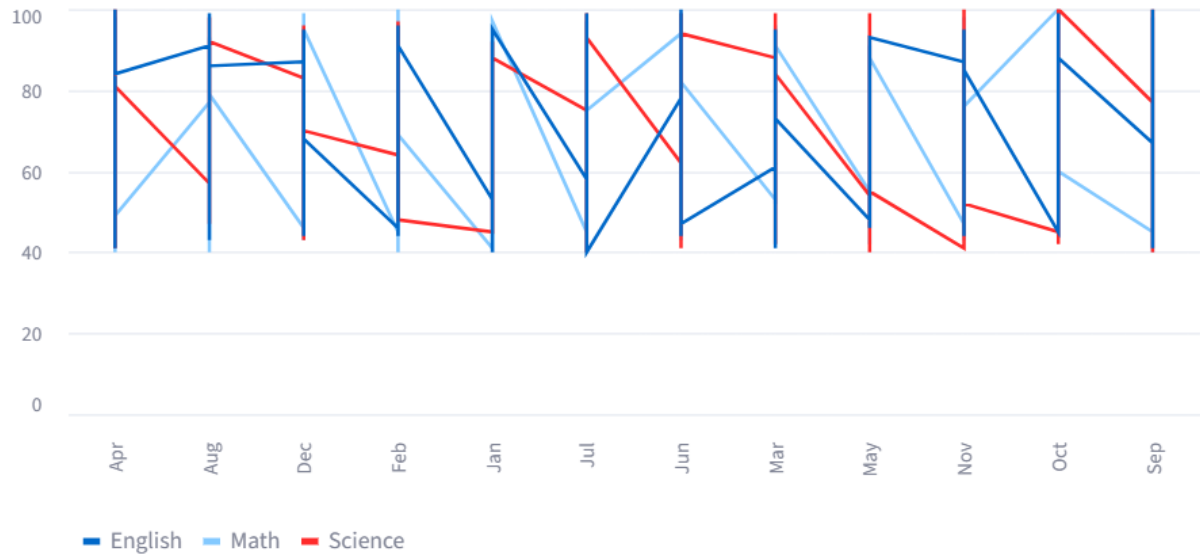
Bar Chart

Bar Chart - Total Marks per Student 🔗

Scatterplot Chart

Scatterplot - Math vs Science

● Math ● Science