Exp 5: Exploratory Data Analysis (EDA)

1. Importing Libraries:

• import matplotlib.pyplot as plt: Imports Matplotlib for plotting graphs.

• import seaborn as sns: Imports Seaborn for more advanced and attractive data visualization.

```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from google.colab import files
```

2. Reading the Dataset:

• Loads the dataset, same as Experiment 4.

```
upload = files.upload()
df = pd.read_csv('titanic.csv')
```

```
Choose Files No file chosen    Upload widget is only available when the cell has been executed in the current browser session. Please rerun this cell to enable.
Saving titanic.csv to titanic.csv
```

3. Summary Statistics:

• Summarize the dataset in terms of average, sum, etc.

```
print("Summarized Dataset:")
print(df.describe())
```

```
Summarized Dataset:
       PassengerId    Survived      Pclass         Age       SibSp  \
count   891.000000  891.000000  891.000000  714.000000  891.000000
mean    446.000000    0.383838    2.308642   29.699118    0.523008
std     257.353842    0.486592    0.836071   14.526497    1.102743
min       1.000000    0.000000    1.000000    0.420000    0.000000
25%     223.500000    0.000000    2.000000   20.125000    0.000000
50%     446.000000    0.000000    3.000000   28.000000    0.000000
75%     668.500000    1.000000    3.000000   38.000000    1.000000
max     891.000000    1.000000    3.000000   80.000000    8.000000

            Parch        Fare
count  891.000000  891.000000
mean     0.381594   32.204208
std      0.806057   49.693429
min      0.000000    0.000000
```

```
25%      0.000000    7.910400
50%      0.000000   14.454200
75%      0.000000   31.000000
max      6.000000  512.329200
```

4. Checking Missing Values:

• Counts the number of missing (null) values for each column, to identify incomplete data and displays it.

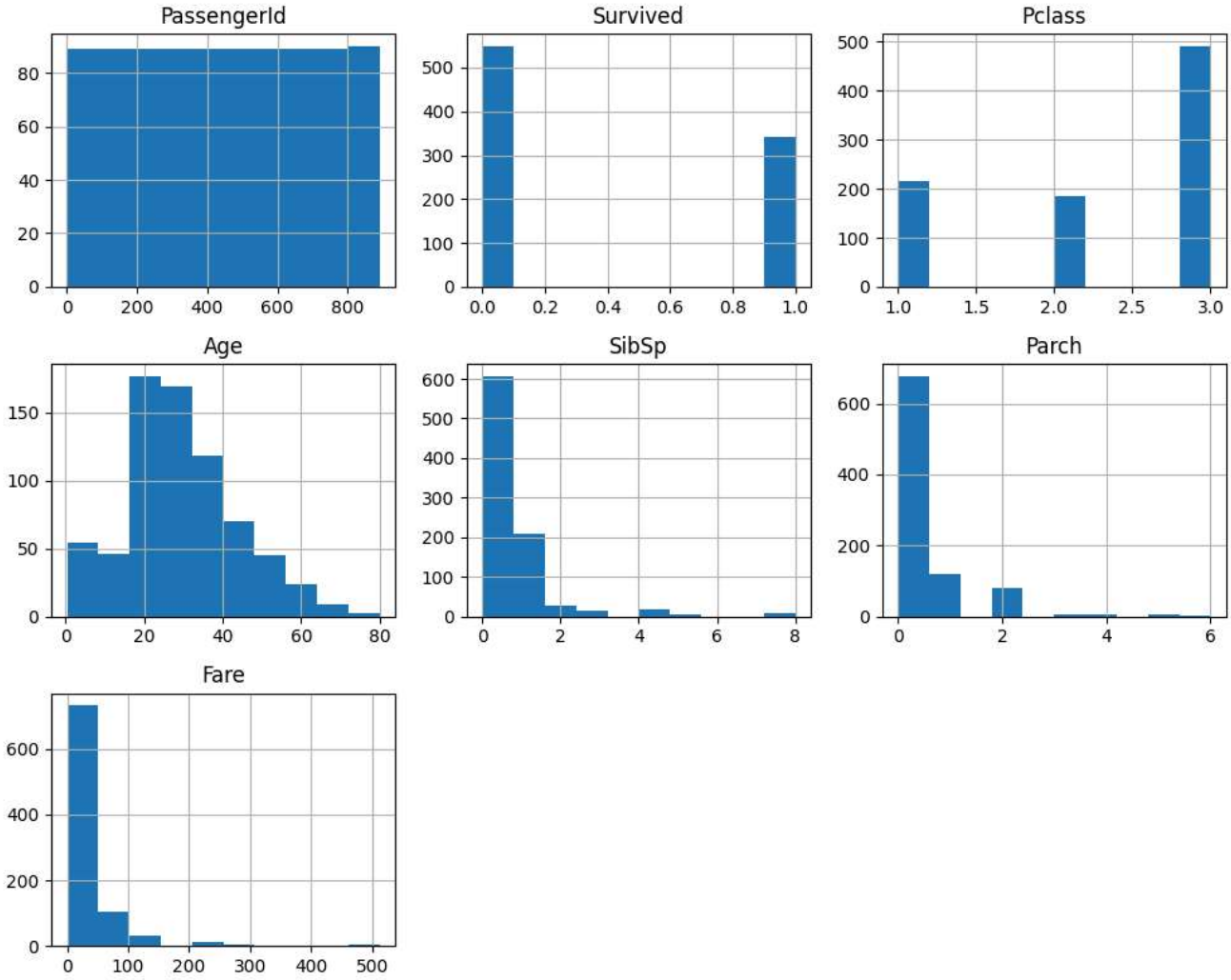
```
print("\nMissing Values:")
print(df.isnull().sum())
```

```
Missing Values:
PassengerId      0
Survived         0
Pclass           0
Name             0
Sex              0
Age            177
SibSp            0
Parch            0
Ticket           0
Fare             0
Cabin          687
Embarked         2
dtype: int64
```

5. Histograms:

Visualizes the distribution of numerical columns using histograms.

```
df.hist(figsize=(10, 8))
plt.tight_layout()
plt.show()
```

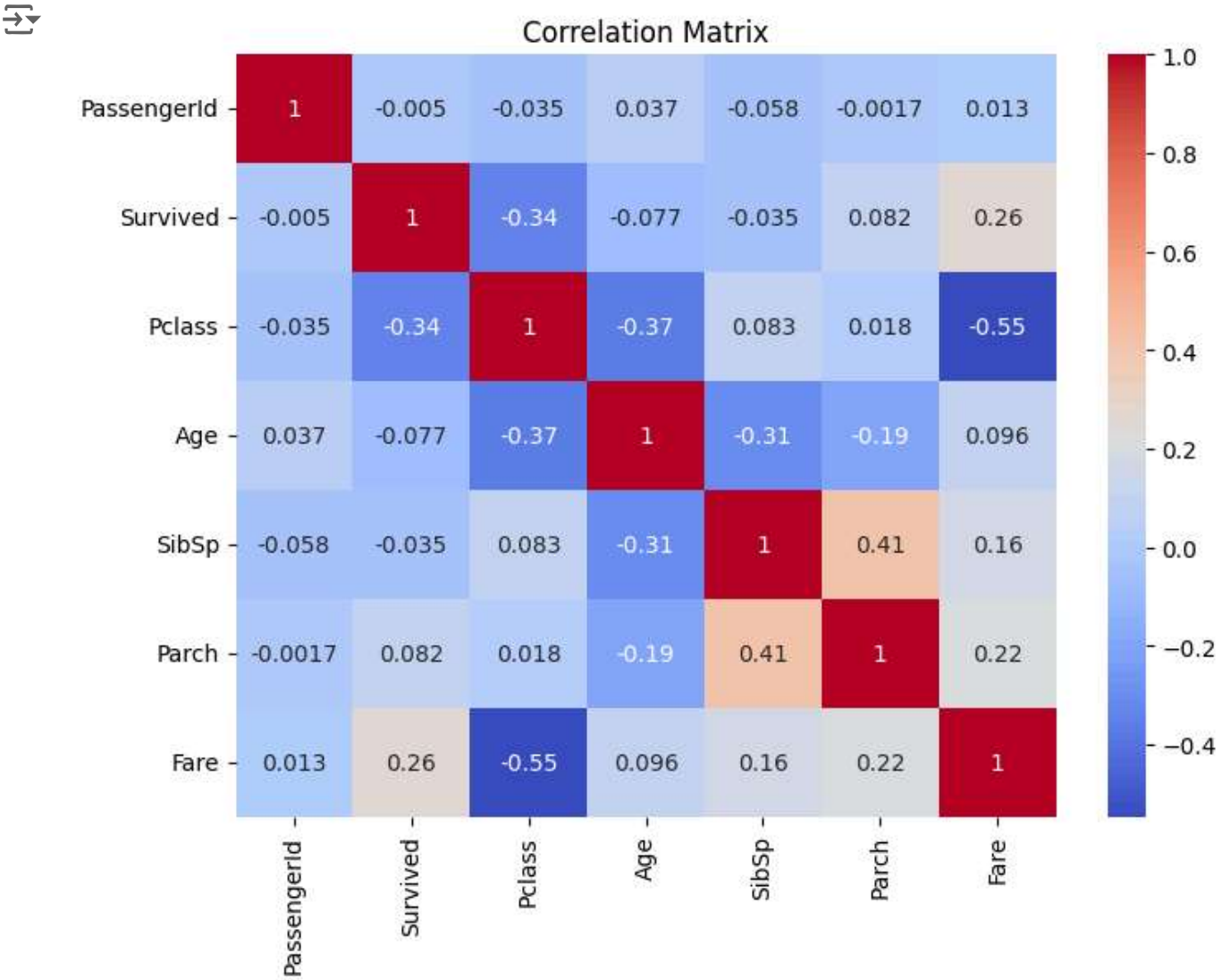


6. Correlation Heatmap:

`sns.heatmap(df.corr(), annot=True, cmap='coolwarm')`: This plots a heatmap showing correlations between numerical columns. Strong positive or negative correlations are highlighted.

```
numerical_df = df.select_dtypes(include='number')
```

```
# Check if there are any numerical columns before plotting
if not numerical_df.empty:
    plt.figure(figsize=(8, 6))
    sns.heatmap(numerical_df.corr(), annot=True, cmap='coolwarm')
    plt.title('Correlation Matrix')
    plt.show()
else:
    print("No numerical columns available for correlation matrix.")
```



7. Boxplots for Outliers:

`sns.boxplot(df[col])` : This generates boxplots for each numerical column, which helps identify outliers. Outliers are data points that lie outside the typical range of the dataset.

```
numerical_cols = df.select_dtypes(include='number').columns

# Determine the number of subplots needed based on the number of numerical columns
n_cols = len(numerical_cols)
n_rows = (n_cols // 3) + 1  # Adjusting rows based on how many columns we have
```

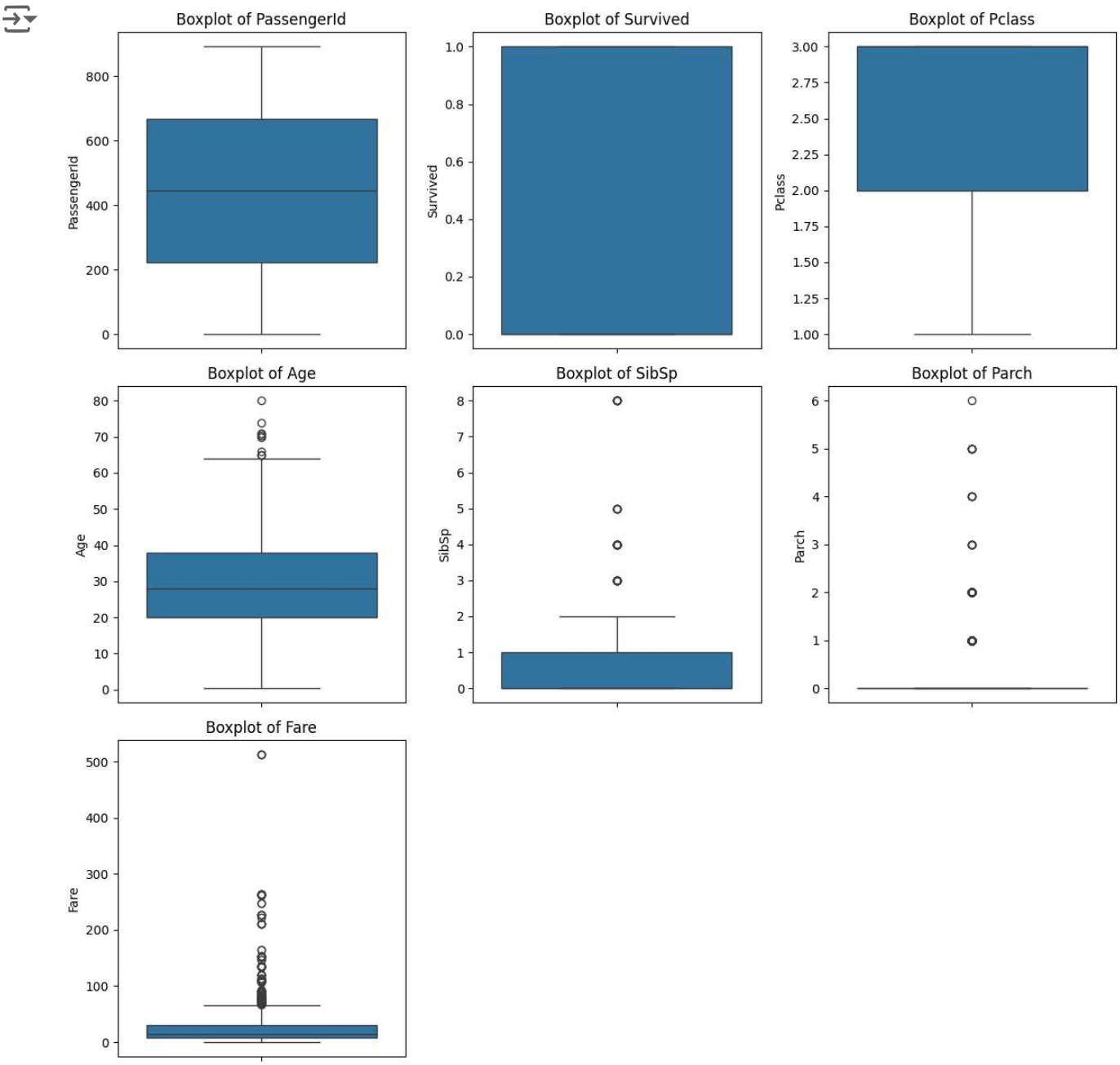
```
# Create a figure with dynamic subplot arrangement
plt.figure(figsize=(12, n_rows * 4))

# Looping through each numerical column
for i, col in enumerate(numerical_cols, 1):
    plt.subplot(n_rows, 3, i)  # Adjusting the subplot grid dynamically

    # Dropping missing and non-finite values (NaN, inf, -inf) from the column
    clean_col = df[col].dropna()  # Remove NaN values
    clean_col = clean_col[clean_col.apply(lambda x: x != float('inf') and x != float('-in

    # Plotting the cleaned data
    if not clean_col.empty:  # Ensure there is data to plot
        sns.boxplot(clean_col)
        plt.title(f'Boxplot of {col}')
    else:
        plt.title(f'{col} (No valid data)')

plt.tight_layout()
plt.show()
```


Boxplot of PassengerId
PassengerId
Boxplot of Survived
Survived
Boxplot of Pclass
Pclass
Boxplot of Age
Age
Boxplot of SibSp
SibSp
Boxplot of Parch
Parch
Boxplot of Fare
Fare