```
import pandas as pd
import matplotlib.pyplot as plt
%matplotlib inline
import seaborn as sns
import numpy as np
import plotly.express as px
from scipy import stats


class DataUnderstanding:
    def __init__(self, df):
        self.df = df

    def get_summary_statistics(self):
        summary_stats = self.df.describe()
        return summary_stats

    def get_missing_values(self):
        missing_values = self.df.isnull().sum()
        return missing_values

    def get_info(self):
        info = self.df.info()
        return info

    def get_dtypes(self):
        dtypes = self.df.dtypes
        return dtypes

    def get_value_counts(self):
        value_counts = {}
        for column in self.df.columns:
            value_counts[column] = self.df[column].value_counts()
        return value_counts


df = pd.read_csv('data.csv')
df.head()
```

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embarked
0	1	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	A/5 21171	7.2500	NaN	S
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1	0	PC 17599	71.2833	C85	C
2	3	1	3	Heikkinen, Miss. Laina	female	26.0	0	0	STON/O2. 3101282	7.9250	NaN	S
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1	0	113803	53.1000	C123	S
4	5	0	3	Allen, Mr. William Henry	male	35.0	0	0	373450	8.0500	NaN	S

Next steps: Generate code with `df` View recommended plots

```
du = DataUnderstanding(df)


summary_stats = du.get_summary_statistics()
print("Summary Statistics:")
summary_stats
```

```
Summary Statistics:
```

	PassengerId	Survived	Pclass	Age	SibSp	Parch	Fare
count	891.000000	891.000000	891.000000	714.000000	891.000000	891.000000	891.000000
mean	446.000000	0.383838	2.308642	29.699118	0.523008	0.381594	32.204208
std	257.353842	0.486592	0.836071	14.526497	1.102743	0.806057	49.693429
min	1.000000	0.000000	1.000000	0.420000	0.000000	0.000000	0.000000
25%	223.500000	0.000000	2.000000	20.125000	0.000000	0.000000	7.910400
50%	446.000000	0.000000	3.000000	28.000000	0.000000	0.000000	14.454200
75%	668.500000	1.000000	3.000000	38.000000	1.000000	0.000000	31.000000
max	891.000000	1.000000	3.000000	80.000000	8.000000	6.000000	512.329200

Next steps: Generate code with `summary_stats` View recommended plots

```
du.get_info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 891 entries, 0 to 890
Data columns (total 12 columns):
 #   Column       Non-Null Count  Dtype  
---  ------       --------------  -----  
 0   PassengerId  891 non-null    int64  
 1   Survived     891 non-null    int64  
 2   Pclass       891 non-null    int64  
 3   Name         891 non-null    object 
 4   Sex          891 non-null    object 
 5   Age          714 non-null    float64
 6   SibSp        891 non-null    int64  
 7   Parch        891 non-null    int64  
 8   Ticket       891 non-null    object 
 9   Fare         891 non-null    float64
 10  Cabin        204 non-null    object 
 11  Embarked     889 non-null    object 
dtypes: float64(2), int64(5), object(5)
memory usage: 83.7+ KB
```

```
du.get_dtypes()
```

```
PassengerId      int64
Survived         int64
Pclass           int64
Name            object
Sex             object
Age            float64
SibSp            int64
Parch            int64
Ticket          object
Fare           float64
Cabin           object
Embarked        object
dtype: object
```

```
df['Survived'].value_counts()
```

```
Survived
0    549
1    342
Name: count, dtype: int64
```

```
du.get_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
```

```
df = df.drop('Cabin', axis=1)
```

```
most_frequent_port = df['Embarked'].mode()[0]

df['Embarked'].fillna(most_frequent_port, inplace=True)
```

```
df.dropna(subset=['Age'], inplace=True)
```

```
du.get_value_counts()
```

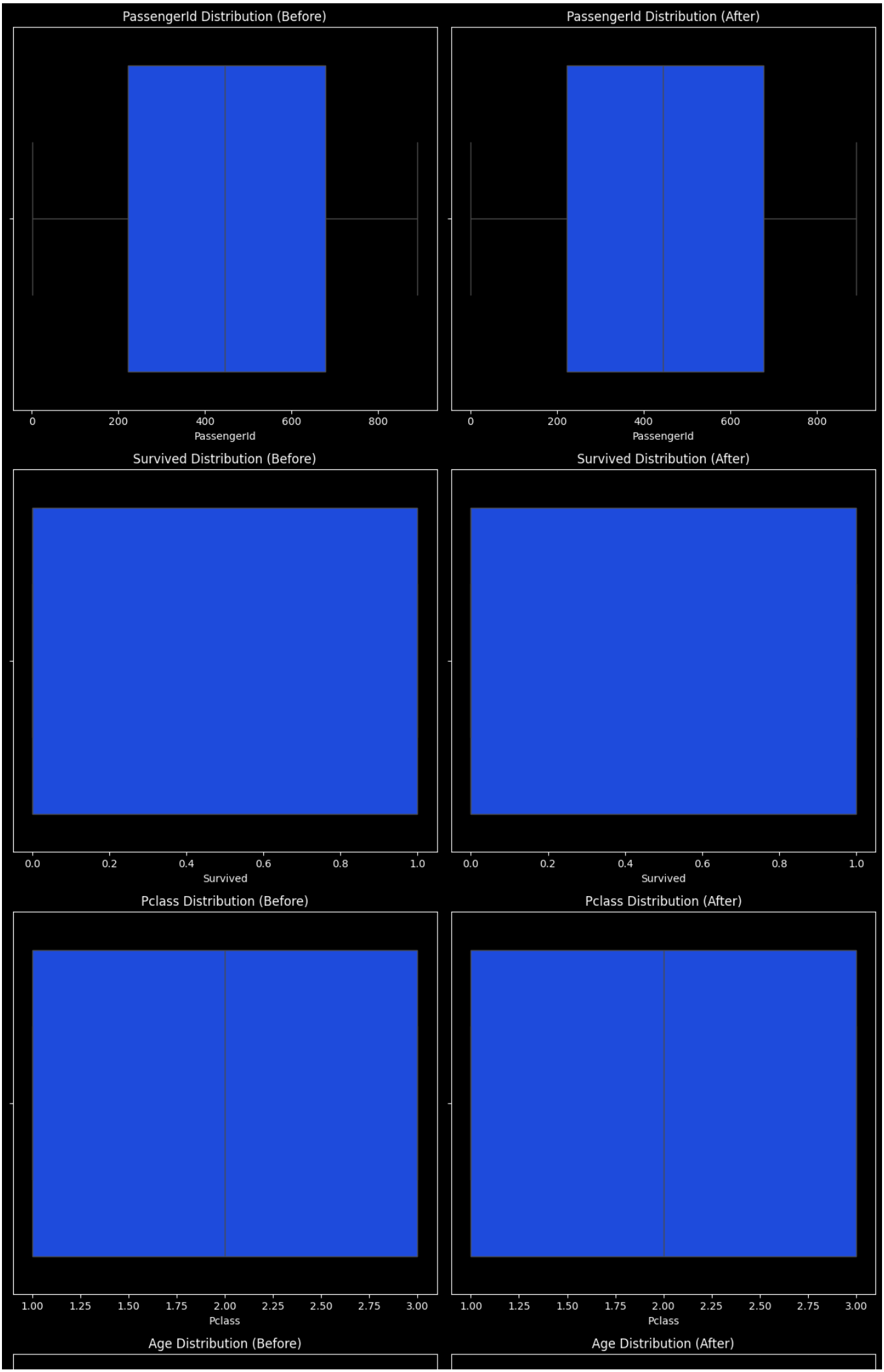
```
3      3
4      4
6      1
Name: count, dtype: int64,
'Ticket': Ticket
347082      7
CA. 2343    7
1601        7
3101295     6
CA 2144     6
           ..
9234        1
19988       1
2693        1
PC 17612    1
370376      1
Name: count, Length: 681, dtype: int64,
'Fare': Fare
8.0500     43
13.0000    42
7.8958     38
7.7500     34
26.0000    31
           ..
35.0000     1
28.5000     1
6.2375      1
14.0000     1
10.5167     1
Name: count, Length: 248, dtype: int64,
'Cabin': Cabin
B96 B98        4
G6             4
C23 C25 C27    4
C22 C26        3
F33            3
              ..
E34            1
C7             1
C54            1
E36            1
C148           1
Name: count, Length: 147, dtype: int64,
'Embarked': Embarked
S    644
C    168
Q     77
Name: count, dtype: int64}
```

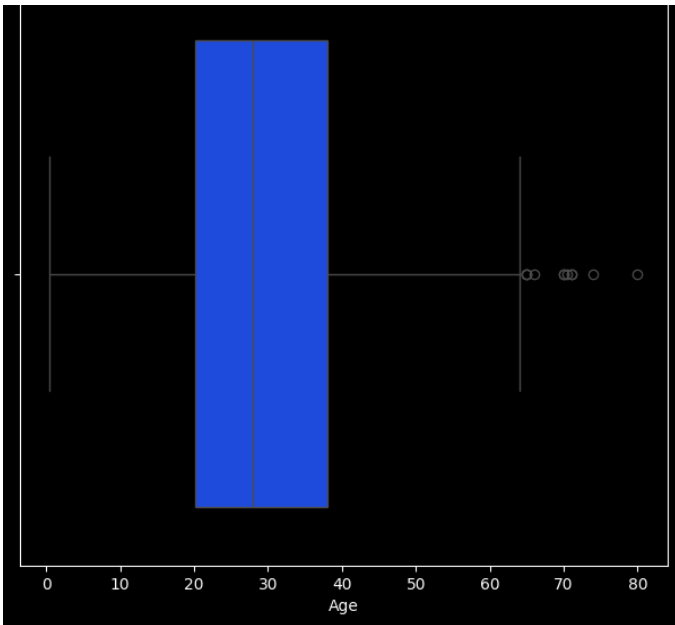
```
df.duplicated(subset='PassengerId').sum()
```

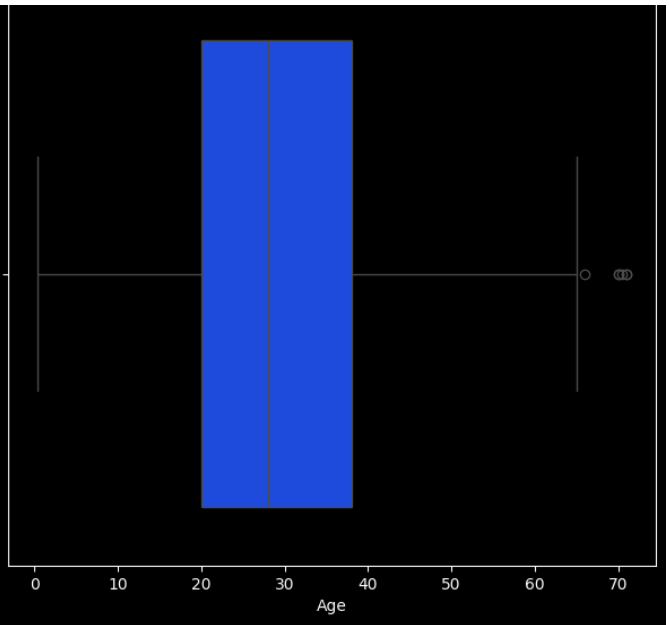
```
0
```

```
numerical_columns = ['PassengerId', 'Survived', 'Pclass', 'Age', 'SibSp', 'Parch', 'Fare']
```

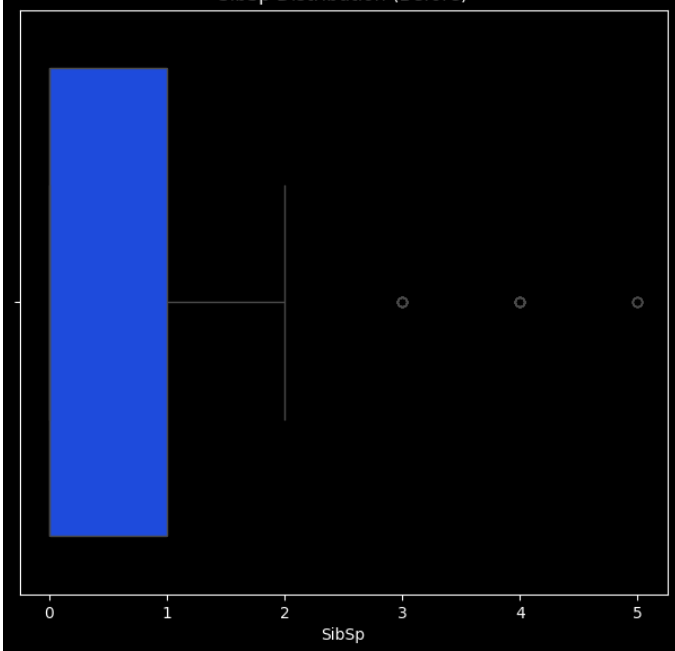
```
import matplotlib.pyplot as plt
import seaborn as sns
import numpy as np
from scipy import stats

# Set the background style
plt.style.use('dark_background')

# Define a custom color palette
custom_palette = sns.color_palette("bright")

# Set the palette
sns.set_palette(custom_palette)

def outlier_plot_box(df, column_name, ax=None):
    sns.boxplot(x=df[column_name], ax=ax)

def remove_outliers(data, cols, threshold=3):
    for col in cols:
        z_scores = np.abs(stats.zscore(data[col]))
        data = data[(z_scores < threshold)]
    return data

def plot_outliers_before_and_after(df, numerical_columns, threshold=3):
    fig, axes = plt.subplots(len(numerical_columns), 2, figsize=(12, len(numerical_columns) * 6))

    for i, column in enumerate(numerical_columns):
        ax1 = axes[i][0]
        ax2 = axes[i][1]

        outlier_plot_box(df, column, ax=ax1)
        ax1.set_title(f"{column} Distribution (Before)")

        df_cleaned = remove_outliers(df, [column], threshold=threshold)

        outlier_plot_box(df_cleaned, column, ax=ax2)
        ax2.set_title(f"{column} Distribution (After)")

    plt.tight_layout()
    plt.show()

# Assuming df and numerical_columns are defined elsewhere
plot_outliers_before_and_after(df, numerical_columns)
```


PassengerId Distribution (Before)
0
200
400
600
800
PassengerId
PassengerId Distribution (After)
0
200
400
600
800
PassengerId
Survived Distribution (Before)
0.0
0.2
0.4
0.6
0.8
1.0
Survived
Survived Distribution (After)
0.0
0.2
0.4
0.6
0.8
1.0
Survived
Pclass Distribution (Before)
1.00
1.25
1.50
1.75
2.00
2.25
2.50
2.75
3.00
Pclass
Pclass Distribution (After)
1.00
1.25
1.50
1.75
2.00
2.25
2.50
2.75
3.00
Pclass
Age Distribution (Before)
Age Distribution (After)

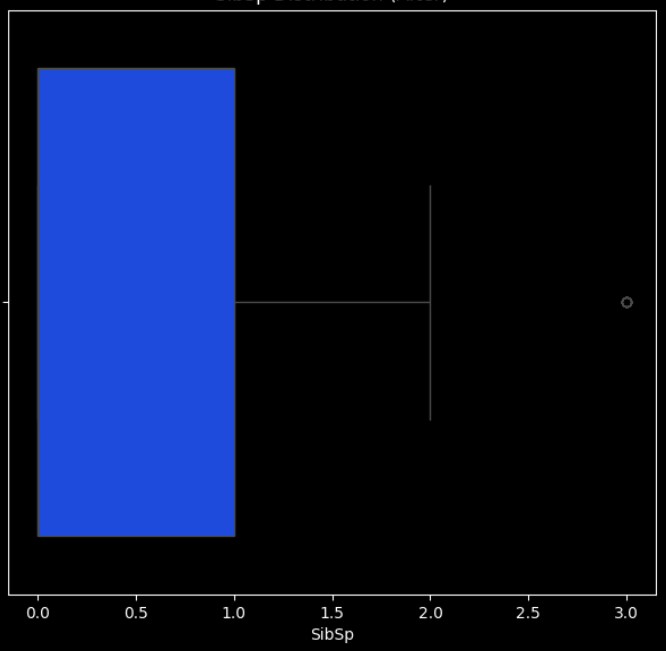




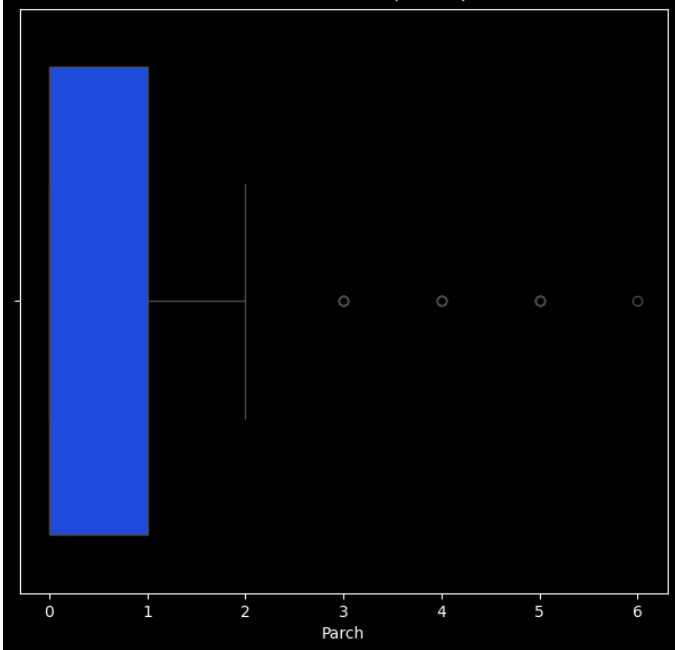
SibSp Distribution (Before)



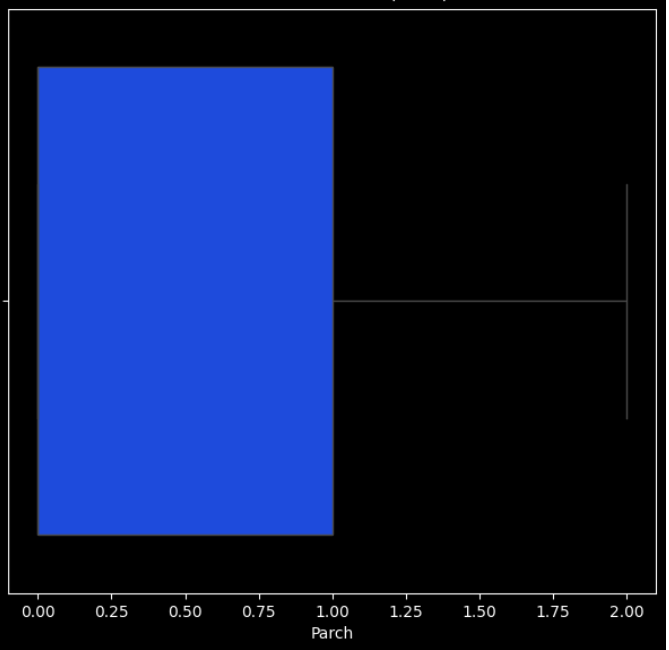
SibSp Distribution (After)



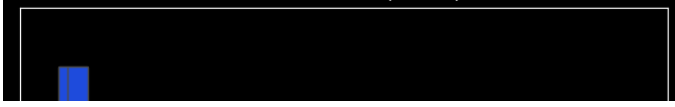
Parch Distribution (Before)



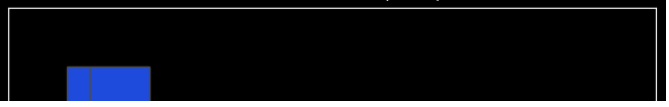
Parch Distribution (After)

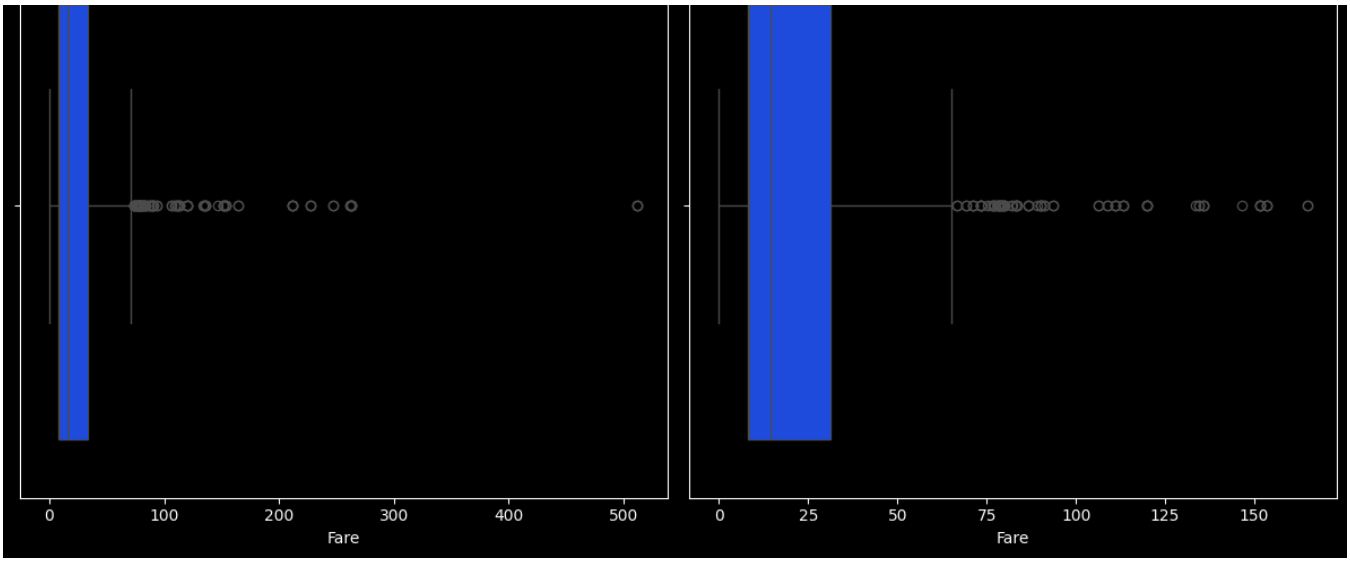


Fare Distribution (Before)

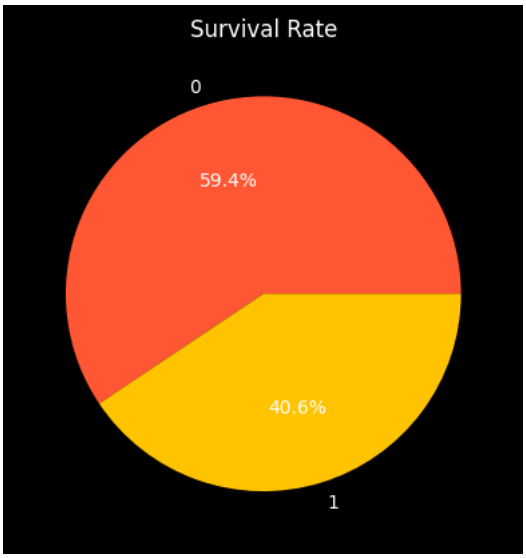


Fare Distribution (After)

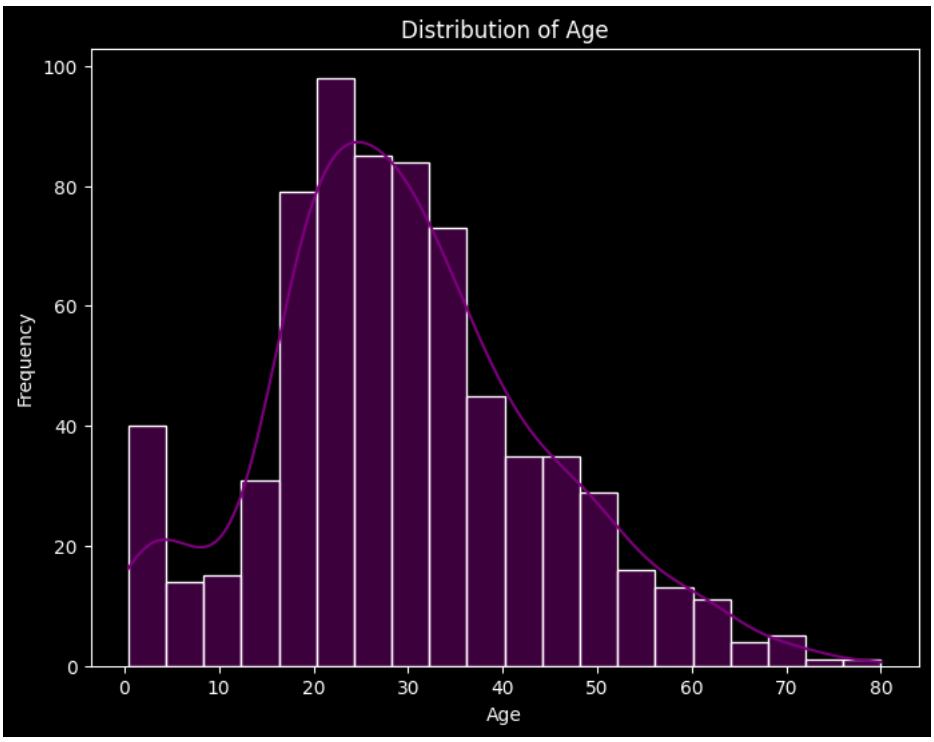




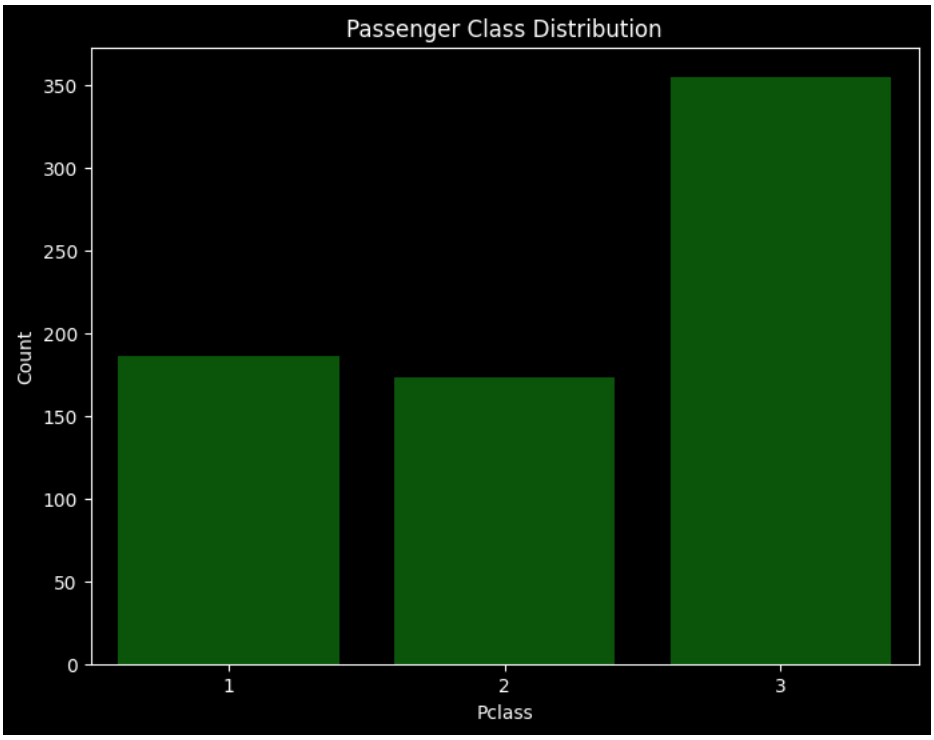

```
import matplotlib.pyplot as plt

def plot_survival_rate(df):
    plt.style.use('dark_background')

    fig, ax = plt.subplots()

    colors = ['#FF5733', '#FFC300']

    ax.pie(df['Survived'].value_counts(), labels=df['Survived'].value_counts().index, autopct='%1.1f%%', colors=colors)

    ax.set_title('Survival Rate')

    plt.show()

plot_survival_rate(df)
```



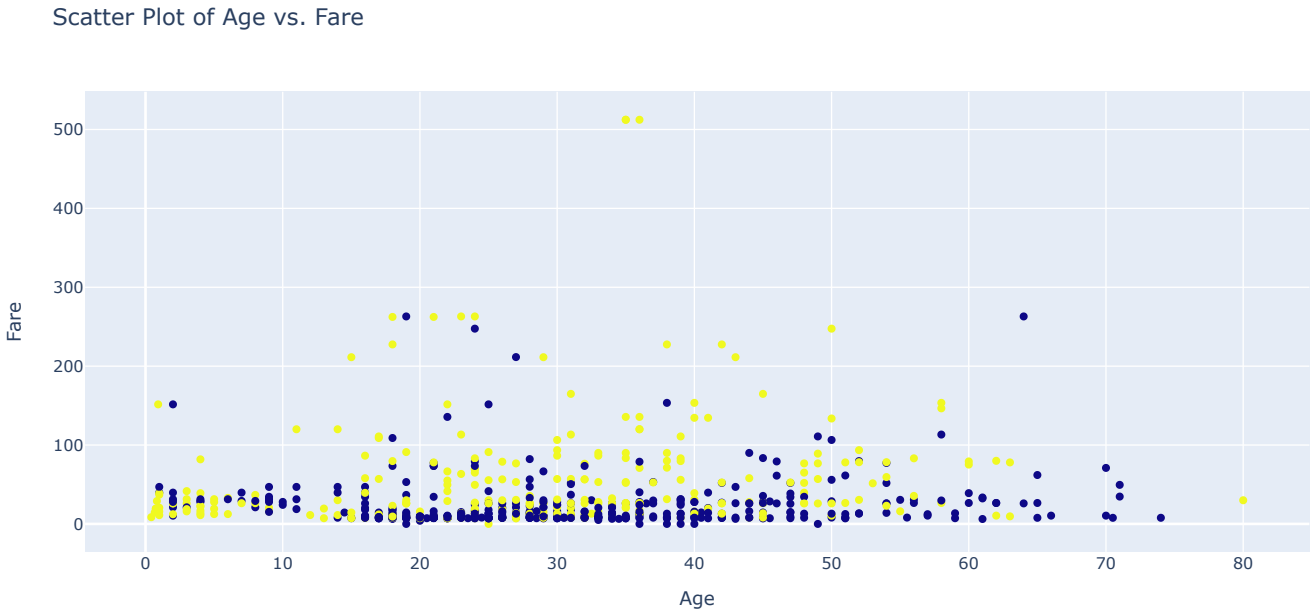

```
import seaborn as sns
import matplotlib.pyplot as plt

plt.figure(figsize=(8, 6))

# Change the color here
sns.histplot(data=df, x='Age', bins=20, kde=True, color='purple')

plt.xlabel('Age')
plt.ylabel('Frequency')
plt.title('Distribution of Age')
plt.show()
```



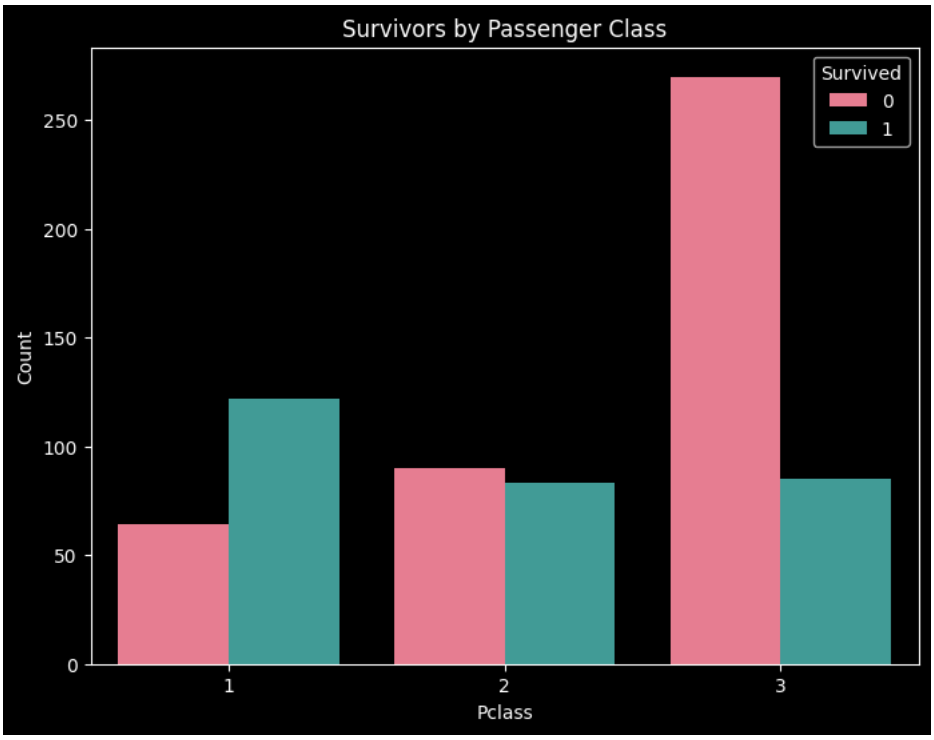

```
import seaborn as sns
import matplotlib.pyplot as plt

plt.figure(figsize=(8, 6))

# Change the color here
sns.countplot(data=df, x='Pclass', color='darkgreen')

plt.xlabel('Pclass')
plt.ylabel('Count')
plt.title('Passenger Class Distribution')
plt.show()
```




```
fig = px.scatter(df, x='Age', y='Fare', color='Survived', title='Scatter Plot of Age vs. Fare')
fig.show()
```




```
import seaborn as sns
import matplotlib.pyplot as plt

plt.figure(figsize=(8, 6))

# Change the palette here
sns.countplot(data=df, x='Pclass', hue='Survived', palette='husl')

plt.xlabel('Pclass')
plt.ylabel('Count')
plt.title('Survivors by Passenger Class')
plt.show()
```




```
import seaborn as sns
import matplotlib.pyplot as plt

plt.figure(figsize=(8, 6))

# Change the color here
sns.boxplot(data=df, x='Pclass', y='Fare', color='cyan')

plt.xlabel('Pclass')
plt.ylabel('Fare')
plt.title('Fare Distribution by Passenger Class')
plt.show()
```