```
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('train.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

```
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

```
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()
```

	0
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()
```

	count
Survived	
0	549
1	342

dtype: int64

```
du.get_missing_values()
```

	0
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)
```

```
<ipython-input-11-e7e60def0c98>:4: FutureWarning: A value is trying to be set on a copy of a DataFrame or Series through chained assignm
The behavior will change in pandas 3.0. This inplace method will never work because the intermediate object on which we are setting valu

For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method({col: value}, inplace=True)' or df[col] = df[col].me


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

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

```
du.get_value_counts()
```

```
{'PassengerId': PassengerId
 1      1
 599    1
 588    1
 589    1
 590    1
       ..
 301    1
 302    1
 303    1
 304    1
 891    1
 Name: count, Length: 891, dtype: int64,
 'Survived': Survived
 0    549
 1    342
 Name: count, dtype: int64,
 'Pclass': Pclass
 3    491
 1    216
 2    184
 Name: count, dtype: int64,
 'Name': Name
 Braund, Mr. Owen Harris                     1
 Boulos, Mr. Hanna                           1
 Frolicher-Stehli, Mr. Maxmillian            1
 Gilinski, Mr. Eliezer                       1
 Murdlin, Mr. Joseph                         1
                                            ..
 Kelly, Miss. Anna Katherine "Annie Kate"    1
 McCoy, Mr. Bernard                          1
 Johnson, Mr. William Cahoone Jr             1
```

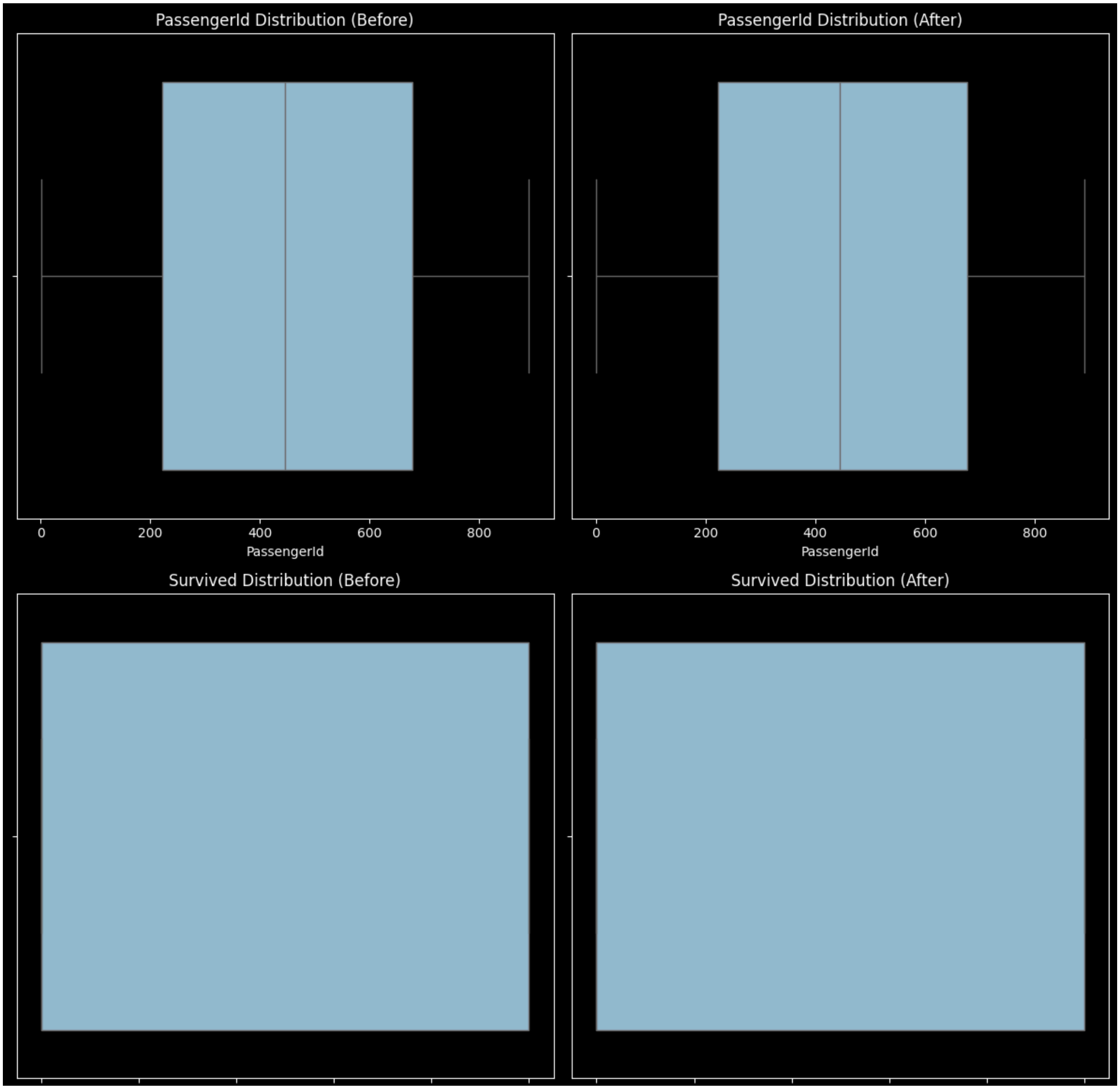
```
Keane, Miss. Nora A                         1
Dooley, Mr. Patrick                         1
Name: count, Length: 891, dtype: int64,
'Sex': Sex
male      577
female    314
Name: count, dtype: int64,
'Age': Age
24.00    30
22.00    27
18.00    26
19.00    25
28.00    25
         ..
36.50     1
55.50     1
0.92      1
23.50     1
74.00     1
Name: count, Length: 88, dtype: int64,
'SibSp': SibSp
0    608
1    209
2     28
4     18
3     16
```

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

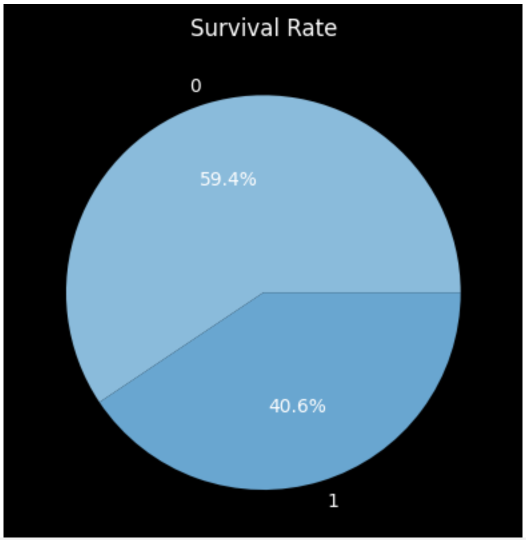
```
0
```

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

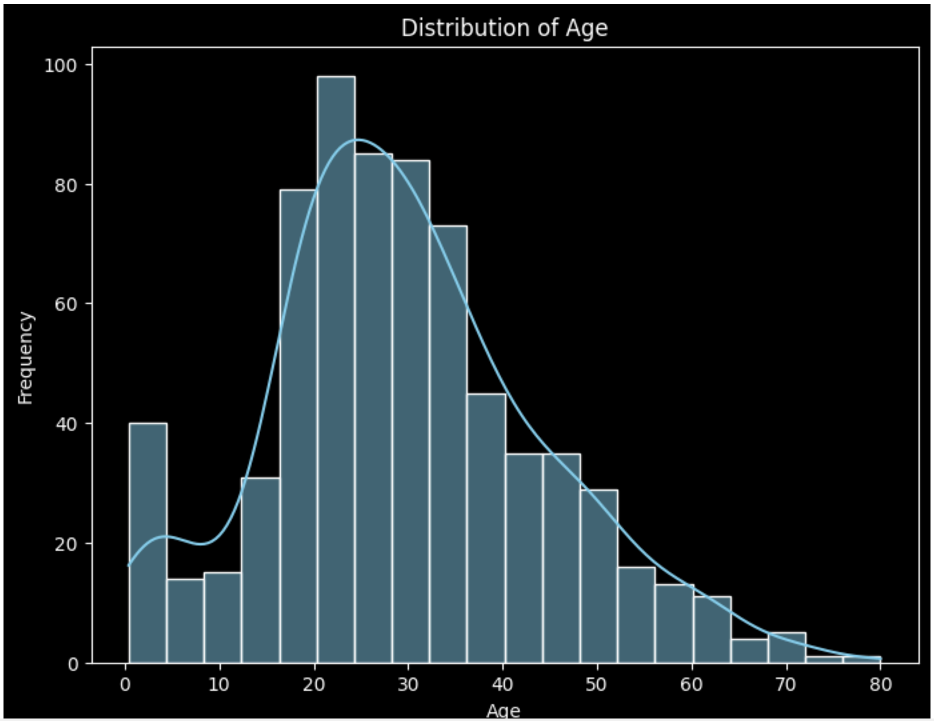
```
plt.style.use('dark_background')
custom_palette = sns.color_palette("Blues_d")
sns.set_palette(custom_palette)
def outlier_plot_box(df, column_name, ax=None):
    sns.boxplot(x=df[column_name], ax=ax)
def remove_outliers(data, cols, threshold=3):
    for col in cols:
        z_scores = np.abs(stats.zscore(data[col]))
        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()
plot_outliers_before_and_after(df, numerical_columns)
```



```
def plot_survival_rate(df):
    fig, ax = plt.subplots()
    ax.pie(df['Survived'].value_counts(), labels=df['Survived'].value_counts().index, autopct='%1.1f%%')
    ax.set_title('Survival Rate')
    plt.show()
plot_survival_rate(df)
```

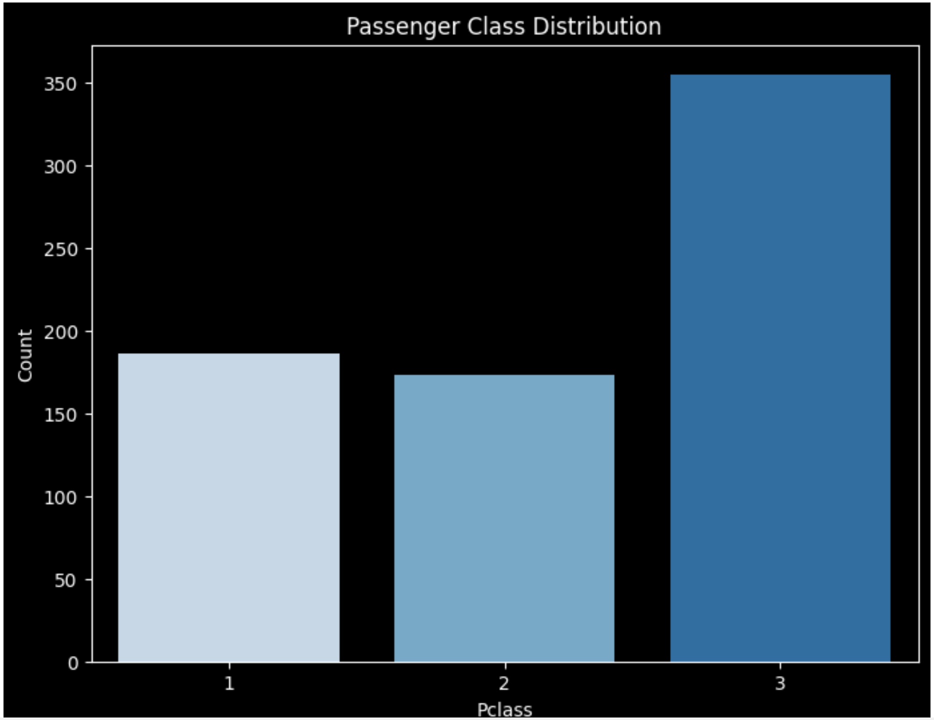


```
plt.figure(figsize=(8, 6))
sns.histplot(data=df, x='Age', bins=20, kde=True, color='skyblue')
plt.xlabel('Age')
plt.ylabel('Frequency')
plt.title('Distribution of Age')
plt.show()
```



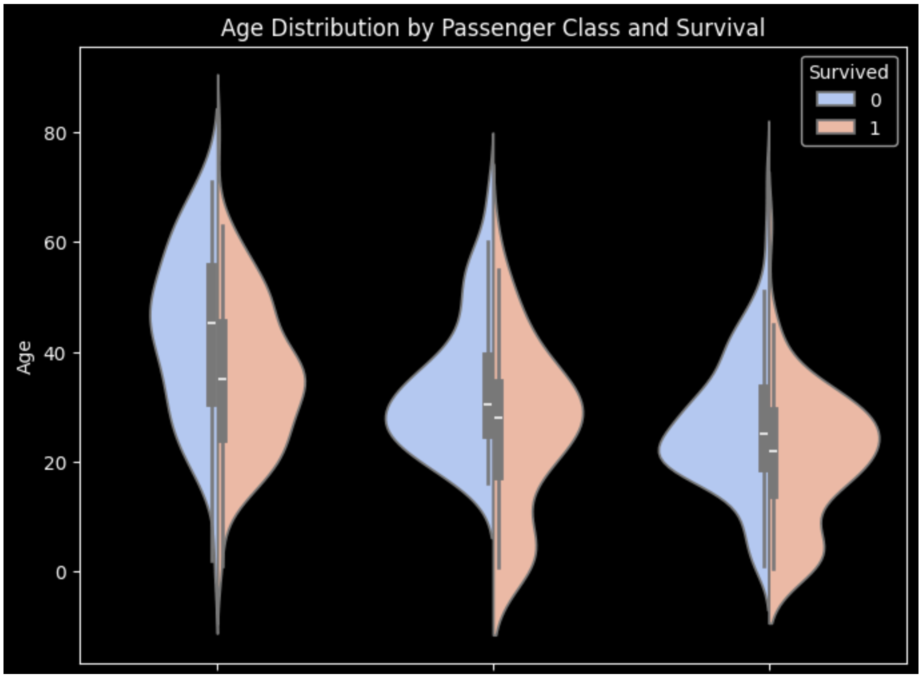
```
plt.figure(figsize=(8, 6))
sns.countplot(data=df, x='Pclass', palette='Blues')
plt.xlabel('Pclass')
plt.ylabel('Count')
plt.title('Passenger Class Distribution')
plt.show()
```

```
<ipython-input-20-8fde564c98f1>:2: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend

  sns.countplot(data=df, x='Pclass', palette='Blues')
```



```
sns.pairplot(df[['Age', 'Fare', 'Pclass', 'Survived']], hue='Survived', palette='coolwarm')
plt.title('Pair Plot of Numerical Variables')
plt.show()
```

```
plt.figure(figsize=(8, 6))
sns.violinplot(data=df, x='Pclass', y='Age', hue='Survived', palette='coolwarm', split=True)
plt.xlabel('Pclass')
plt.ylabel('Age')
plt.title('Age Distribution by Passenger Class and Survival')
plt.show()
```


Age Distribution by Passenger Class and Survival
Survived
Age