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1. IMPORT THE LIBRARIES

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns from
scipy import stats
from sklearn.preprocessing import LabelEncoder from
sklearn.preprocessing import StandardScaler from
sklearn.model_selection import train_test_split
```

2. IMPORT THE DATASET

```
df=pd.read_csv("Titanic-Dataset.csv")
df
```

```
     PassengerId  Survived  Pclass  \
0              1         0
1              2         1
2              3         1
3              4         1
4              5         0        3
..           ...       ...     ..
886          887         0         .
                                  2
887          888         1
888          889         0
889          890         1
890          891         0
```

	Name	Sex	Age	SibSp	\
0	Braund, Mr. Owen Harris	male	22.0		
1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0		
1	Heikkinen, Miss. Laina	female	26.0		
1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0		
2	Allen, Mr. William Henry	male	35.0		
0					
3					
1					
4					

```
..                                                 ...     ...   ...
..
386                            Montvila, Rev. Juozas    male  27.0

387                      Graham, Miss. Margaret Edith  female  19.0

388            Johnston, Miss. Catherine Helen "Carrie"  female   NaN

389                              Behr, Mr. Karl Howell    male  26.0

390                                Dooley, Mr. Patrick    male  32.0


0




0

0

1

0
0
     Parch             Ticket     Fare Cabin Embarked
0        0         A/5 21171   7.2500   NaN        S
1        0          PC 17599  71.2833   C85        C  2
0  STON/O2. 3101282   7.9250   NaN        S  3
0            113803  53.1000  C123        S
4        0            373450   8.0500   NaN        S
..     ...               ...      ...   ...      ...
886      0            211536  13.0000   NaN        S
887      0            112053  30.0000   B42        S
888      2        W./C. 6607  23.4500   NaN        S
889      0            111369  30.0000  C148        C
890      0            370376   7.7500   NaN        Q
[891 rows x 12 columns]
df.head()
   PassengerId  Survived  Pclass  \
0            1         0
1            2         1
2            3         1
3            4         1
4            5         0
```

	Name	Sex	Age	SibSp	\
0	Braund, Mr. Owen Harris	male	22.0	1	
1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1	
2	Heikkinen, Miss. Laina	female	26.0	0	
3	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1	
4	Allen, Mr. William Henry	male	35.0		

```
   Parch            Ticket     Fare Cabin Embarked  0
0         A/5 21171   7.2500   NaN        S
1      0          PC 17599  71.2833   C85        C
2      0  STON/O2. 3101282   7.9250   NaN        S
3      0            113803  53.1000  C123        S  4      0
       373450   8.0500   NaN        S  df.tail()

     PassengerId  Survived  Pclass
Name  \
886          887         0       2                     Montvila, Rev.
Juozas
887          888         1       1              Graham, Miss. Margaret
             Edith
888          889         0       3  Johnston, Miss. Catherine Helen
"Carrie"
889          890         1       1                       Behr, Mr. Karl
Howell
890          891         0       3                         Dooley, Mr.

Patrick

        Sex   Age  SibSp  Parch      Ticket   Fare Cabin Embarked  886
male  27.0      0      0      211536  13.00   NaN        S  887
female  19.0      0      0      112053  30.00   B42        S  888
female   NaN      1      2  W./C. 6607  23.45   NaN        S
889    male  26.0      0      0      111369  30.00  C148        C

890    male  32.0      0      0      370376   7.75   NaN        Q

df.shape (891, 12) df.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 df.describe()
```

```
       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
```

```
corr=df.corr()
corr
```

```
<ipython-input-13-7d5195e2bf4d>:1: FutureWarning: The default value of
numeric_only in DataFrame.corr is deprecated. In a future version, it
will default to False. Select only valid columns or specify the value
of numeric_only to silence this warning.   corr=df.corr()
```

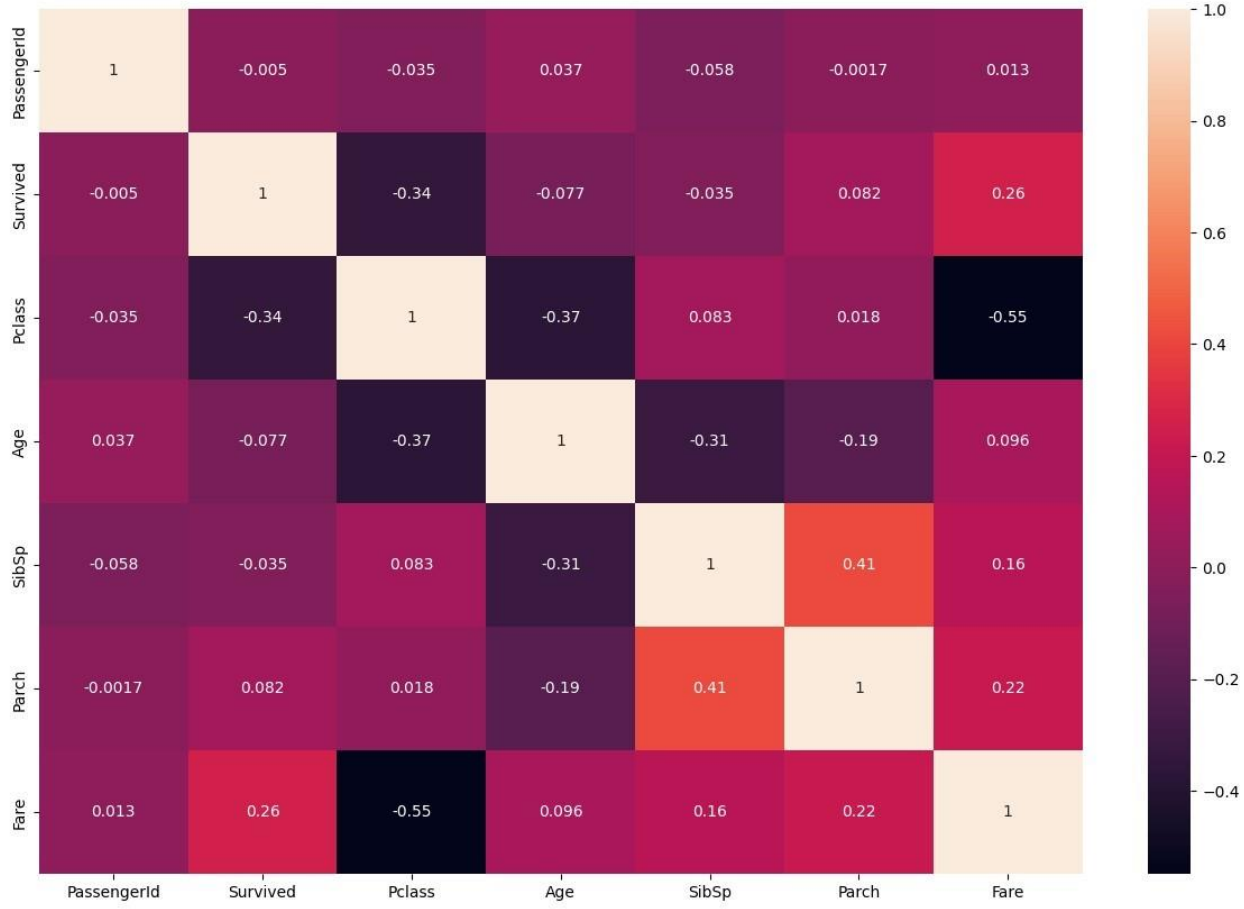
```
             PassengerId  Survived    Pclass       Age     SibSp
Parch  \
PassengerId     1.000000 -0.005007 -0.035144  0.036847 -0.057527 -
0.001652
Survived       -0.005007  1.000000 -0.338481 -0.077221 -0.035322
0.081629
Pclass         -0.035144 -0.338481  1.000000 -0.369226  0.083081
0.018443
Age             0.036847 -0.077221 -0.369226  1.000000 -0.308247 -
0.189119
SibSp          -0.057527 -0.035322  0.083081 -0.308247  1.000000
0.414838
Parch          -0.001652  0.081629  0.018443 -0.189119  0.414838
```

```
1.000000
Fare            0.012658  0.257307 -0.549500  0.096067  0.159651
0.216225
```

	Fare
PassengerId	0.012658
Survived	0.257307
Pclass	-0.549500
Age	0.096067
SibSp	0.159651
Parch	0.216225
Fare	1.000000

```
plt.subplots(figsize=(15,10))
sns.heatmap(corr,annot=True)
```

```
<Axes: >
```




```
df.Survived.value_counts()
```

```
0    549
1    342
Name: Survived, dtype: int64
df.Sex.value_counts()
male      577
female    314
Name: Sex, dtype: int64
df.Embarked.value_counts()
S    644
C    168
Q     77
Name: Embarked, dtype: int64
```

#3. CHECK FOR NULL VALUES

```
df.isnull().any()
PassengerId    False
Survived       False
Pclass         False
Name           False
Sex            False
Age             True
SibSp          False
Parch          False
Ticket         False
Fare           False
Cabin           True
Embarked        True
dtype: bool
df.isnull().sum()
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
```

Fill null values in the 'Age' column with the mean age

```
mean_age = df['Age'].mean()
df['Age'].fillna(mean_age, inplace=True)
```

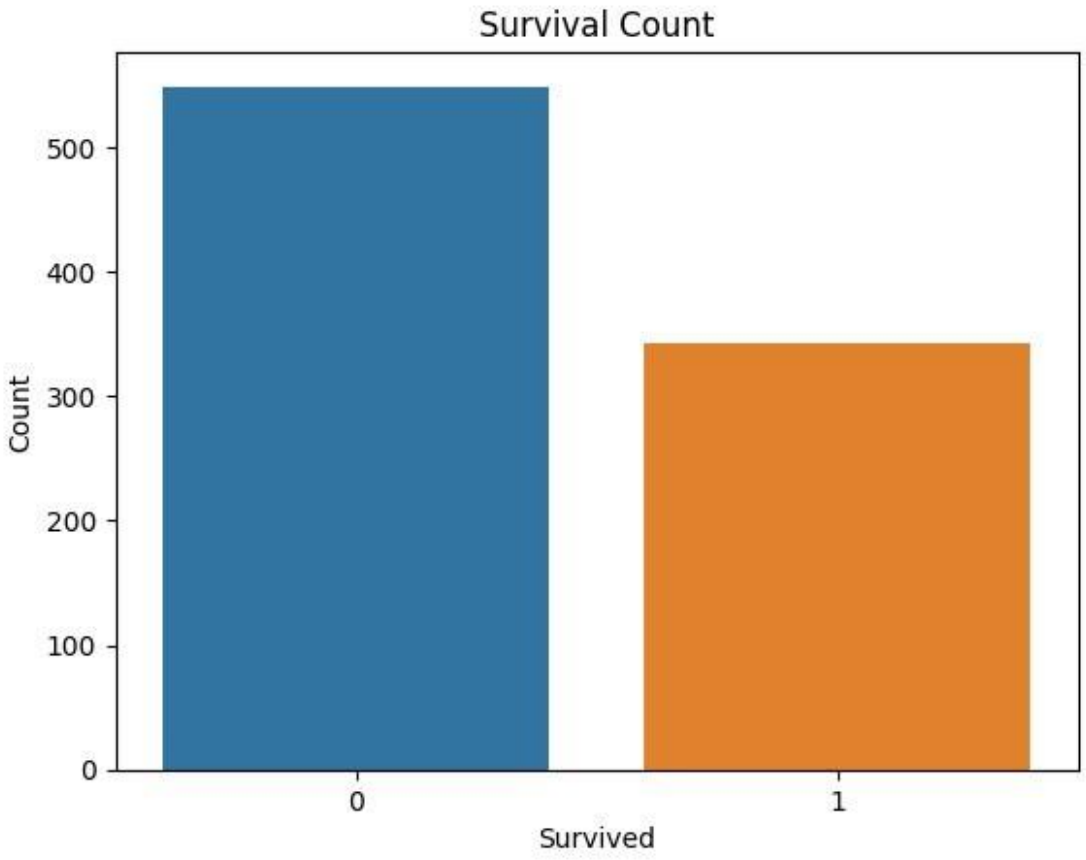
Fill null values in the 'Embarked' column with the most common value

```
most_common_embarked = df['Embarked'].mode()[0]
df['Embarked'].fillna(most_common_embarked, inplace=True)
df.drop(['Cabin'],axis=1, inplace=True)
df.drop(['Ticket'],axis=1, inplace=True)
df.drop(['Name'],axis=1,inplace=True)
print(df.isnull().sum())
```

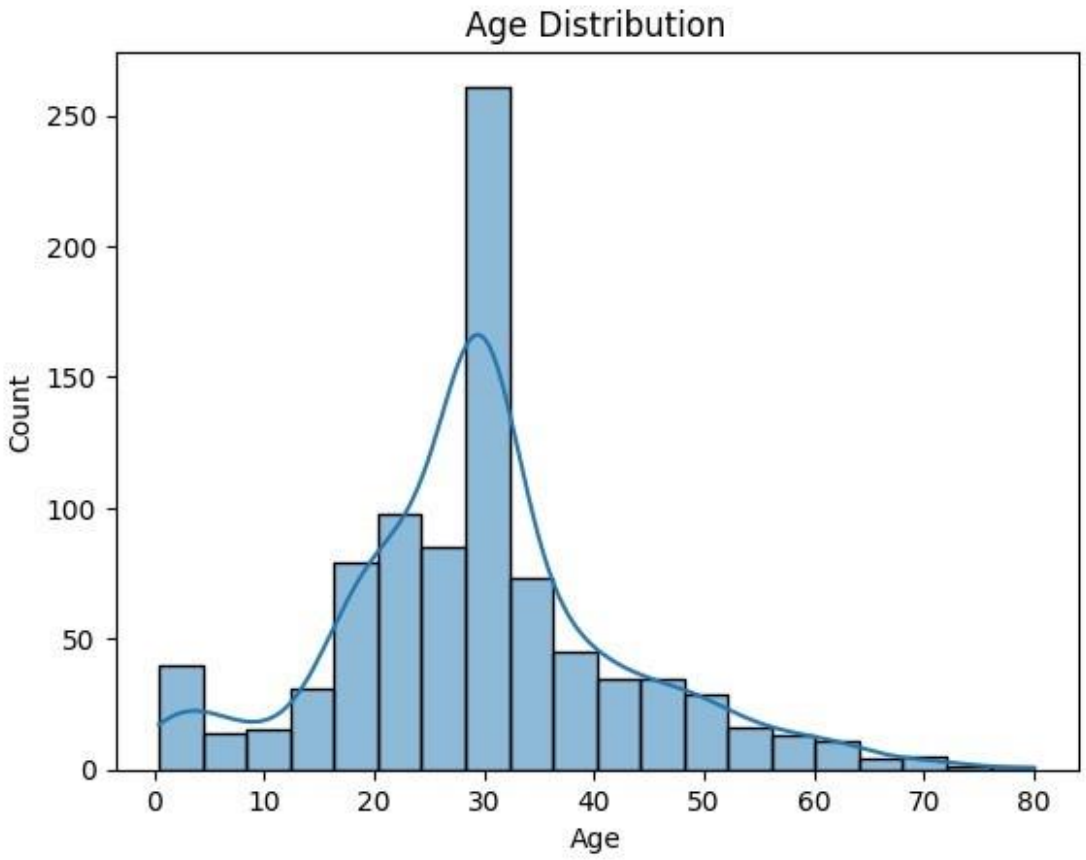
```
PassengerId    0
Survived       0
Pclass         0
Sex            0
Age            0
SibSp          0
Parch          0
Fare           0
Embarked       0
dtype: int64
```

#4. Data Visualization

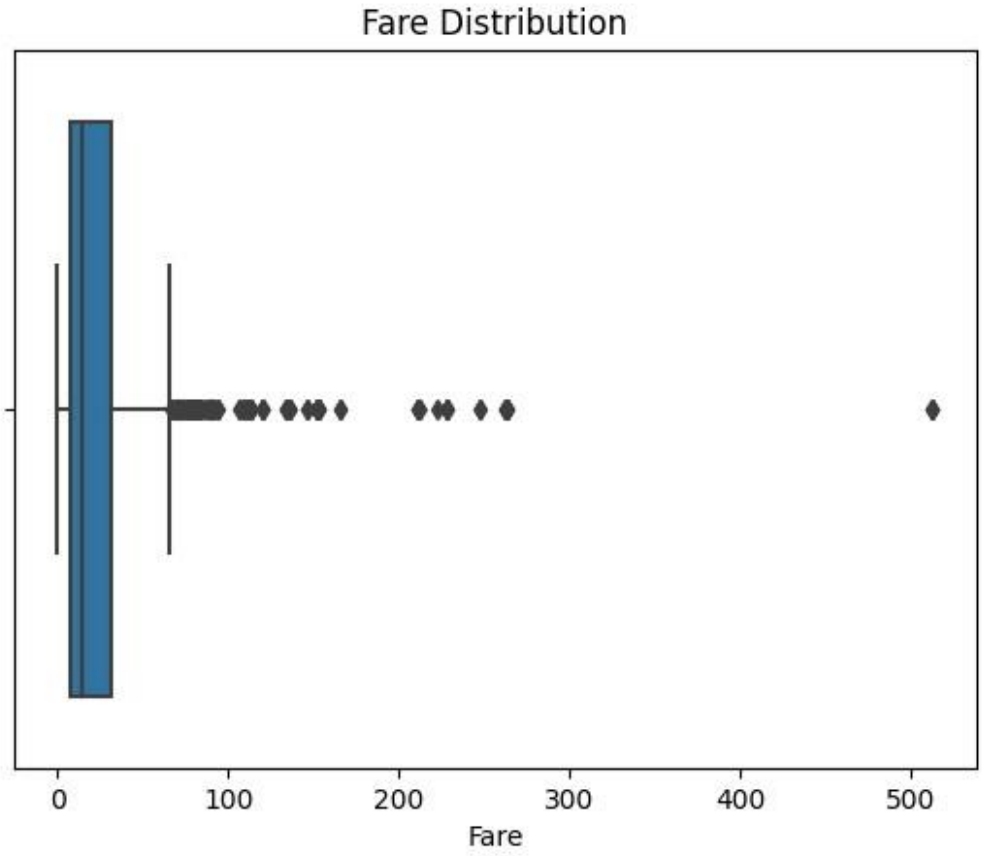
```
# Visualize the distribution of the 'Survived' column (0 = Not
Survived, 1 = Survived)
sns.countplot(data=df, x='Survived')
plt.title('Survival Count')
plt.xlabel('Survived')
plt.ylabel('Count') plt.show()
```



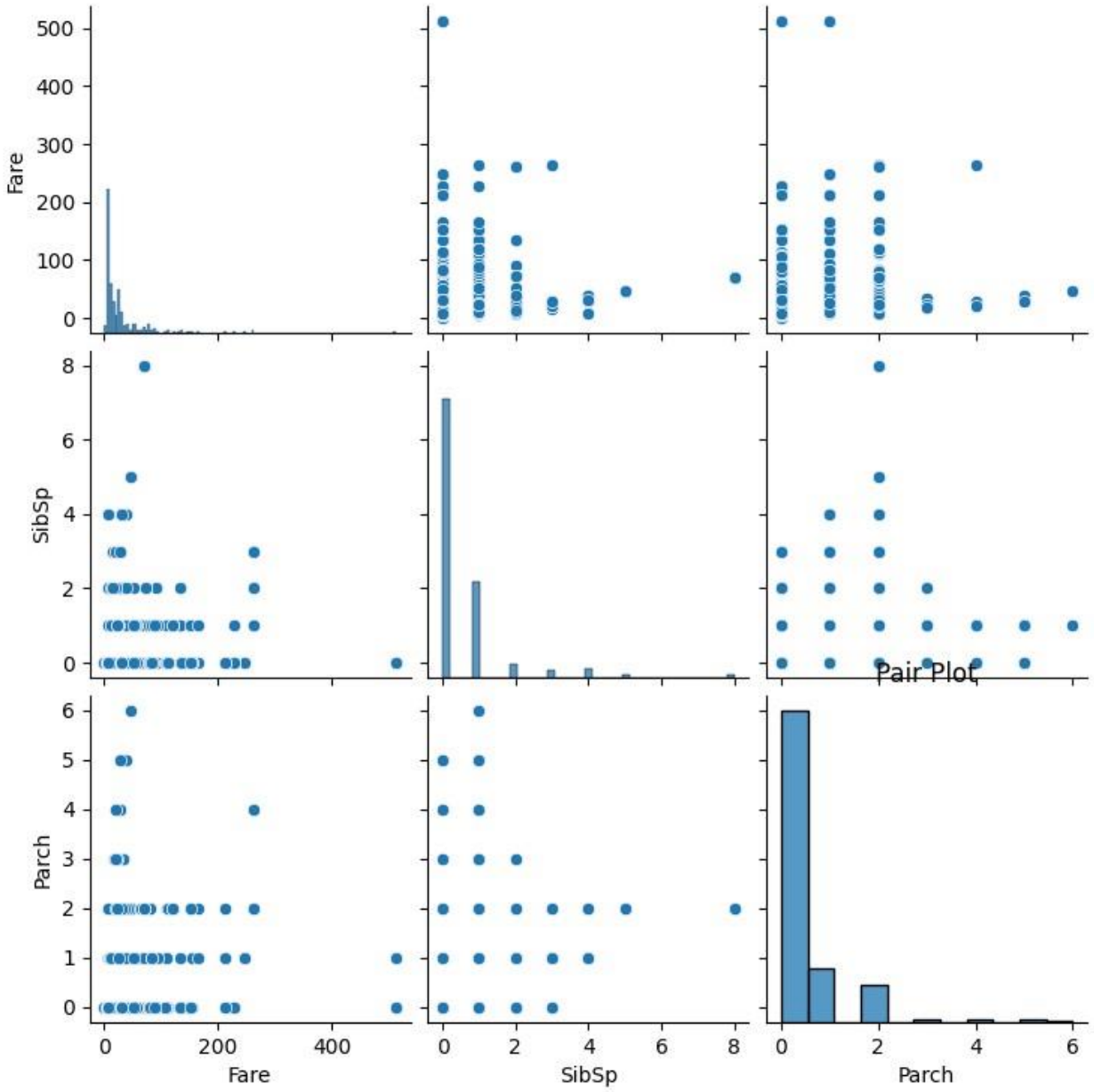

```
#Visualize the distribution of the 'Age' column
sns.histplot(data=df, x='Age', bins=20, kde=True)
plt.title('Age Distribution') plt.xlabel('Age')
plt.ylabel('Count') plt.show()
```




```
#Visualize the distribution of the 'Fare' column and detect outliers
we will handle outliers in the next step sns.boxplot(data=df,
x='Fare') plt.title('Fare Distribution') plt.xlabel('Fare')
plt.show()
```

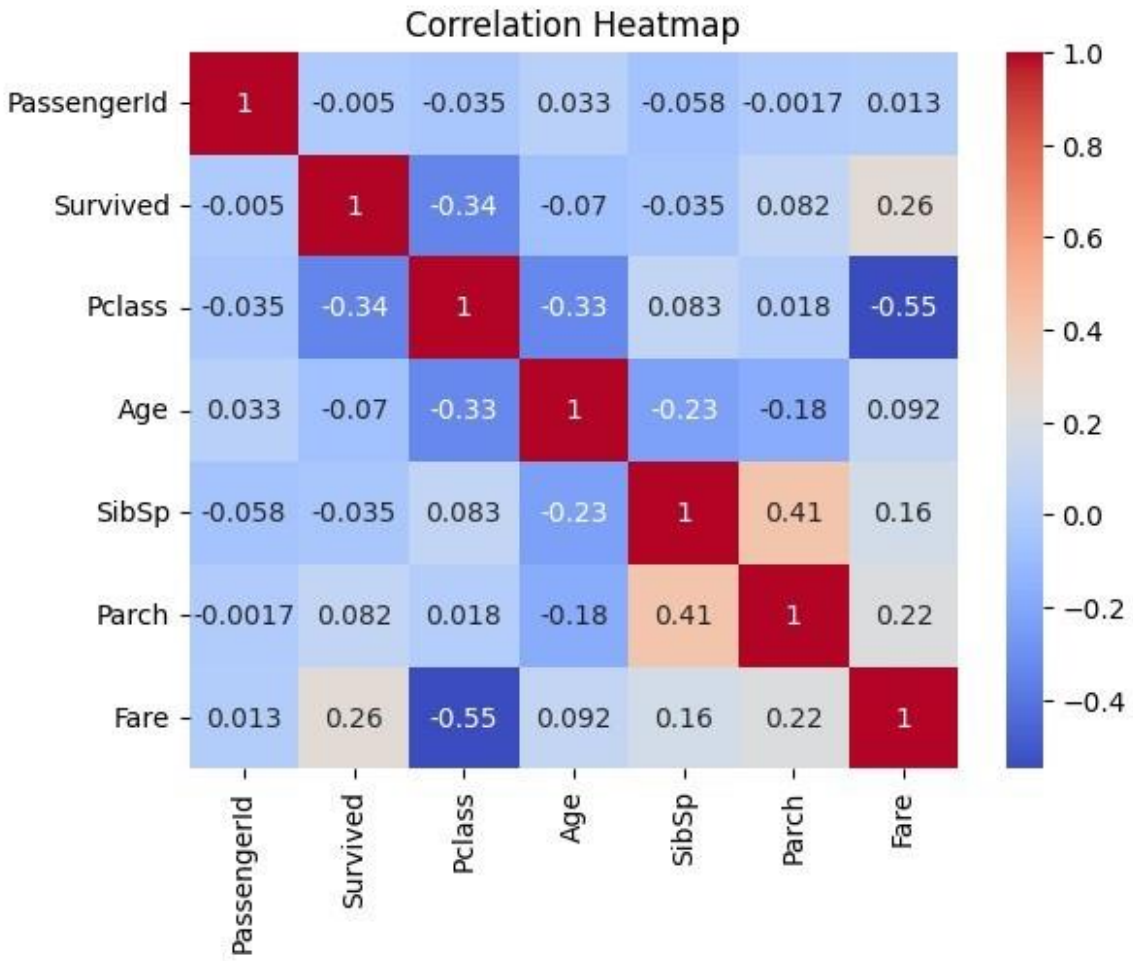



```
#Pair plot for selected numerical columns
sns.pairplot(data=df[['Fare', 'SibSp', 'Parch']])
plt.title('Pair Plot') plt.show()
```




```
corr_matrix = df.corr()
sns.heatmap(corr_matrix, annot=True,cmap='coolwarm')
plt.title('Correlation Heatmap')
plt.show()
```

```
<ipython-input-30-8dcbd071fff3>:1: FutureWarning: The default value of
numeric_only in DataFrame.corr is deprecated. In a future version, it
will default to False. Select only valid columns or specify the value
of numeric_only to silence this warning.
  corr_matrix = df.corr()
```


Correlation Heatmap
PassengerId
Survived
Pclass
Age
SibSp
Parch
Fare
1 -0.005 -0.035 0.033 -0.058 -0.0017 0.013
-0.005 1 -0.34 -0.07 -0.035 0.082 0.26
-0.035 -0.34 1 -0.33 0.083 0.018 -0.55
0.033 -0.07 -0.33 1 -0.23 -0.18 0.092
-0.058 -0.035 0.083 -0.23 1 0.41 0.16
-0.0017 0.082 0.018 -0.18 0.41 1 0.22
0.013 0.26 -0.55 0.092 0.16 0.22 1
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4

5. Detect and Handle Outliers

```
z_scores = np.abs(stats.zscore(df['Age']))
max_threshold=3
outliers = df['Age'][z_scores > max_threshold]

# Print and visualize the outliers
print("Outliers detected using Z-Score:")
print(outliers)
```

```
Outliers detected using Z-Score:
96     71.0
116    70.5
493    71.0
630    80.0
672    70.0
745    70.0
851    74.0
Name: Age, dtype: float64
```

```
z_scores = np.abs(stats.zscore(df['Fare']))
max_threshold=3
outliers = df['Fare'][z_scores > max_threshold]

# Print and visualize the outliers
print("Outliers detected using Z-Score:")
print(outliers)
Outliers detected using Z-Score:
27     263.0000
88     263.0000
118    247.5208
258    512.3292
299    247.5208
311    262.3750
341    263.0000
377    211.5000
380    227.5250
438    263.0000
527    221.7792
557    227.5250
679    512.3292
689    211.3375
700    227.5250
716    227.5250
730    211.3375
737    512.3292
742    262.3750
779    211.3375
Name: Fare, dtype: float64
column_name = 'Fare'

# Calculate the first quartile (Q1) and third quartile (Q3)
Q1 = df[column_name].quantile(0.25)
Q3 = df[column_name].quantile(0.75)

# Calculate the IQR
IQR = Q3 - Q1

# Define the lower and upper bounds for outliers
lower_bound = Q1 - 1.5 * IQR upper_bound = Q3 +
1.5 * IQR

# Filter rows with values outside the IQR bounds
df_cleaned = df[(df[column_name] > lower_bound) & (df[column_name]
<upper_bound)]

# Display the original and cleaned DataFrame sizes
print(f"Original DataFrame size: {df.shape}")
```

```
print(f"Cleaned DataFrame size: {df_cleaned.shape}")
df_cleaned
```

```
Original DataFrame size: (891, 9)
Cleaned DataFrame size: (775, 9)
```

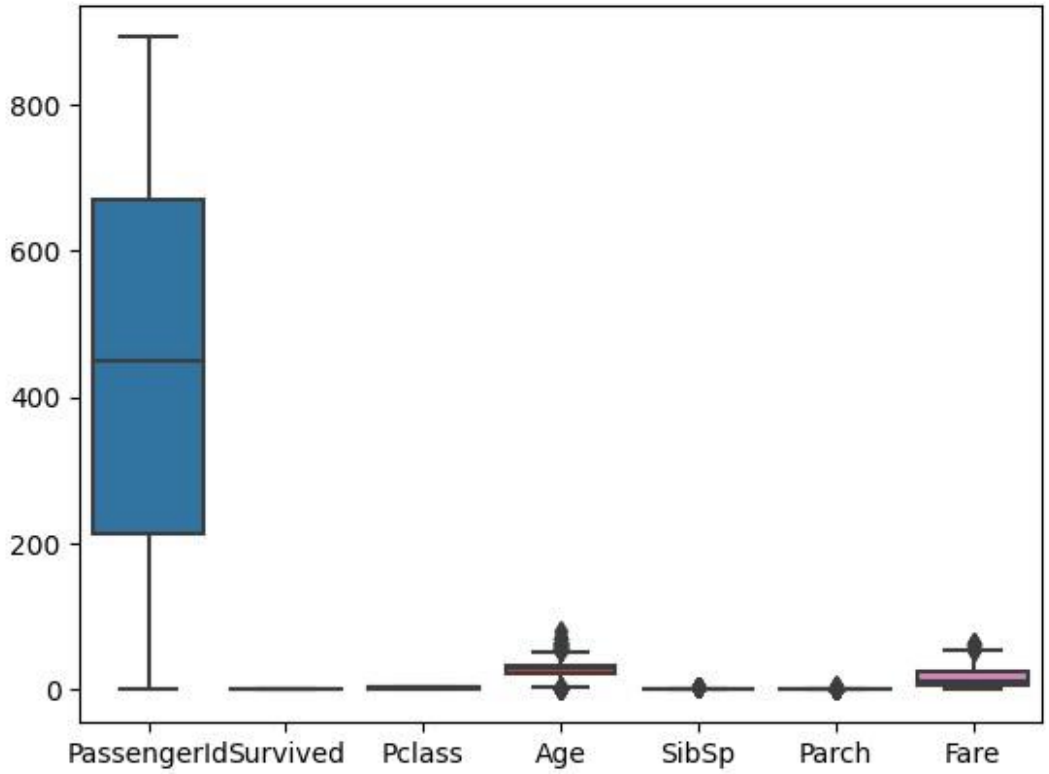
```
     PassengerId  Survived  Pclass     Sex         Age  SibSp  Parch
Fare  \
0              1         0       3    male  22.000000      1      0
7.2500
2              3         1       3  female  26.000000      0      0
               7.9250
3              4         1       1  female  35.000000      1      0
               53.1000
4              5         0       3    male  35.000000      0      0
8.0500
5              6         0       3    male  29.699118      0      0
8.4583
..           ...       ...     ...     ...         ...    ...    ...
...
886          887         0       2    male  27.000000      0      0
13.0000
887          888         1       1  female  19.000000      0      0
30.0000
888          889         0       3  female  29.699118      1      2
23.4500
889          890         1       1    male  26.000000      0      0
               30.0000
890          891         0       3    male  32.000000      0      0
7.7500

    Embarked  0
S
2          S
3          S
4          S
5          Q  ..       ...
886        S
887        S
888        S
889        C
890        Q

[775 rows x 9 columns]
```

```
sns.boxplot(df_cleaned)
```

```
<Axes: >
```


800
600
400
200
0
PassengerId
Survived
Pclass
Age
SibSp
Parch
Fare

```
df=df_cleaned

x=df.drop('Survived', axis=1)
y=df['Survived'] x.head()
```

```
   PassengerId  Pclass     Sex        Age  SibSp  Parch     Fare
Embarked
                                                                 0
             1       3    male  22.000000      1      0   7.2500
S
                                                                 2
             3       3  female  26.000000      0      0   7.9250
S
                                                                 3
                                                                 S
             4       1  female  35.000000      1      0  53.1000
4
S
             5       3    male  35.000000      0      0   8.0500


             6       3    male  29.699118      0      0   8.4583


5
Q
```

```
y.head()
0    0
2    1
3    1
4    0


5    0

Name: Survived, dtype: int64
```

#7. Perform Encoding

```
en = LabelEncoder()
x['Sex'] = en.fit_transform(x['Sex'])
x.head()
```

	PassengerId	Pclass	Sex	Age	SibSp	Parch	Fare	Embarked
0	1	3	1	22.000000	1	0	7.2500	S
2	3	3	0	26.000000	0	0	7.9250	S
3	4	1	0	35.000000	1	0	53.1000	S
4	5	3	1	35.000000	0	0	8.0500	S
5	6	3	1	29.699118	0	0	8.4583	Q

```
x = pd.get_dummies(x,columns=['Embarked'])

x.head()
```

	PassengerId	Pclass	Sex	Age	SibSp	Parch	Fare	Embarked_C	Embarked_Q	Embarked_S
0	1	3	1	22.000000	1	0	7.2500	0	0	1
2	3	3	0	26.000000	0	0	7.9250	0	0	1
3	4	1	0	35.000000	1	0	53.1000	0	0	1
4	5	3	1	35.000000	0	0	8.0500	0	0	1
5	6	3	1	29.699118	0	0	8.4583	0	1	0

#8. Feature Scaling

```
scale = StandardScaler()
x[['Age', 'Fare']] = scale.fit_transform(x[['Age', 'Fare']])
x.head()
```

	PassengerId	Pclass	Sex	Age	SibSp	Parch	Fare	Embarked_C	Embarked_Q	Embarked_S
0	1	3	1	-0.556219	1	0	-0.779117	0	0	1
2	3	3	0	-0.243027	0	0	-0.729373	0	0	1
3	4	1	0	0.461654	1	0	2.599828	0	0	1

```
4              5        3    1   0.461654       0       0 -0.720161
0
5              6        3    1   0.046606       0       0 -0.690071
               0
```

```
   Embarked_Q  Embarked_S
0           0           1
2           0           1
3           0           1
4           0           1
5           1           0
```

#9. Splitting the data into Train and Test

```
x_train, x_test, y_train, y_test = train_test_split(x, y,
test_size=0.2, random_state=42)

print(x_train.shape)
print(x_test.shape)
print(y_train.shape)
print(y_test.shape)
```

```
(620, 10)
(155, 10)
(620,)
(155,)
```