titanic-eda

November 25, 2025

```
[ ]: import pandas as pd
     import numpy as np
     import seaborn as sns
     import matplotlib.pyplot as plt
     %matplotlib inline
```

```
[3]: import os
     os.getcwd()
```

```
[3]: 'C:\\Users\\Shravya'
```

```
[11]: df = pd.read_excel(r'C:\Users\Shravya\titanic (2)\train.xlsx')
      df.head()
```

```
[11]:    PassengerId  Survived  Pclass  \
      0            1         0       3
      1            2         1       1
      2            3         1       3
      3            4         1       1
      4            5         0       3

                                                     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      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
```

```
[12]: # Shape and column names
      print("Shape:", df.shape)
      print("Columns:", df.columns)

      # Dataset info and summary
      df.info()
      df.describe(include='all')
```

```
Shape: (891, 12)
Columns: Index(['PassengerId', 'Survived', 'Pclass', 'Name', 'Sex', 'Age',
'SibSp',
       'Parch', 'Ticket', 'Fare', 'Cabin', 'Embarked'],
      dtype='object')
<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
```

```
[12]:         PassengerId    Survived      Pclass                     Name   Sex  \
       count    891.000000  891.000000  891.000000                      891   891
       unique          NaN         NaN         NaN                      891     2
       top             NaN         NaN         NaN  Braund, Mr. Owen Harris  male
       freq            NaN         NaN         NaN                        1   577
       mean     446.000000    0.383838    2.308642                      NaN   NaN
       std      257.353842    0.486592    0.836071                      NaN   NaN
       min        1.000000    0.000000    1.000000                      NaN   NaN
       25%      223.500000    0.000000    2.000000                      NaN   NaN
       50%      446.000000    0.000000    3.000000                      NaN   NaN
       75%      668.500000    1.000000    3.000000                      NaN   NaN
       max      891.000000    1.000000    3.000000                      NaN   NaN

                      Age       SibSp       Parch  Ticket        Fare  Cabin  \
       count   714.000000  891.000000  891.000000   891.0  891.000000    204
       unique         NaN         NaN         NaN   681.0         NaN    147
```

```
top             NaN         NaN         NaN  347082.0         NaN  B96 B98
freq            NaN         NaN         NaN       7.0         NaN        4
mean      29.699118    0.523008    0.381594       NaN   32.204208      NaN
std       14.526497    1.102743    0.806057       NaN   49.693429      NaN
min        0.420000    0.000000    0.000000       NaN    0.000000      NaN
25%       20.125000    0.000000    0.000000       NaN    7.910400      NaN
50%       28.000000    0.000000    0.000000       NaN   14.454200      NaN
75%       38.000000    1.000000    0.000000       NaN   31.000000      NaN
max       80.000000    8.000000    6.000000       NaN  512.329200      NaN

       Embarked
count       889
unique        3
top           S
freq        644
mean        NaN
std         NaN
min         NaN
25%         NaN
50%         NaN
75%         NaN
max         NaN
```

[13]:

```
df.isnull().sum()
```

[13]:

```
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
```

[14]:

```
# Fill Age with median (numeric and skewed)
df['Age'].fillna(df['Age'].median(), inplace=True)

# Fill Embarked with mode (categorical)
df['Embarked'].fillna(df['Embarked'].mode()[0], inplace=True)

# Drop Cabin (too many missing values)
df.drop('Cabin', axis=1, inplace=True)
```

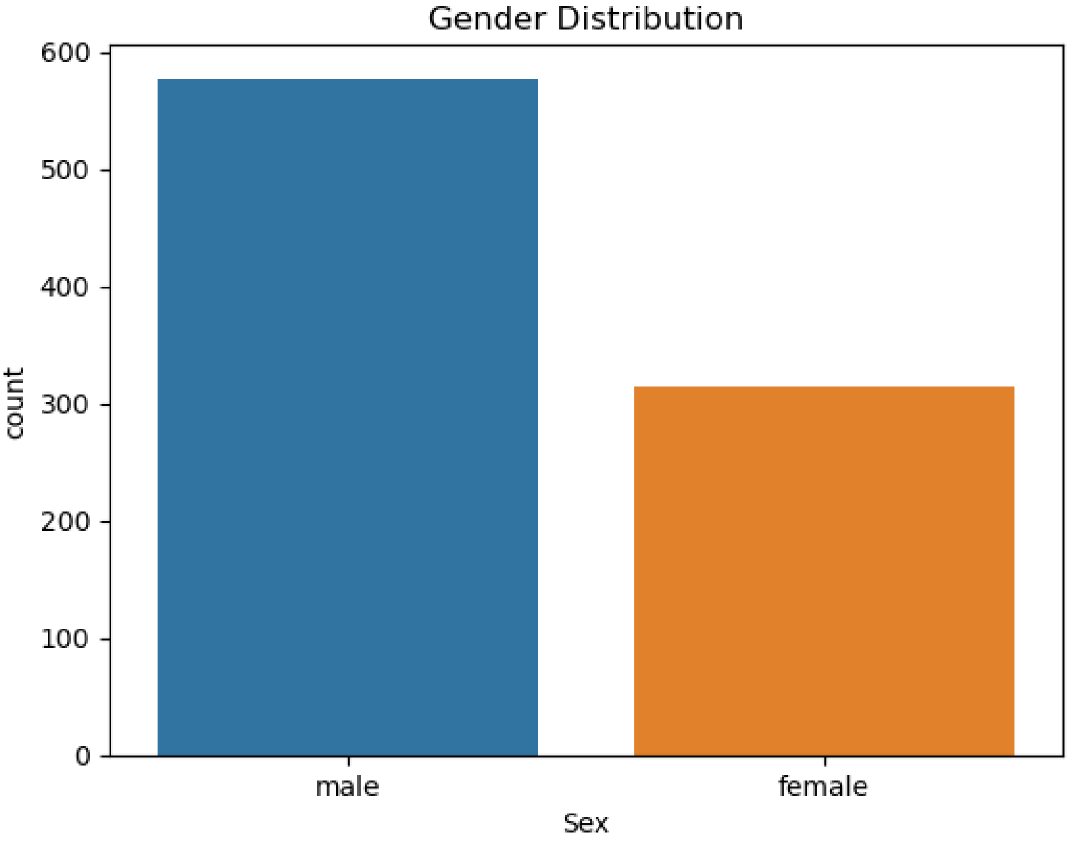
```
# Re-check missing values
df.isnull().sum()
```

[14]:

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

[16]:

```
# Gender Distribution
sns.countplot(x='Sex', data=df)
plt.title("Gender Distribution")
plt.show()
```

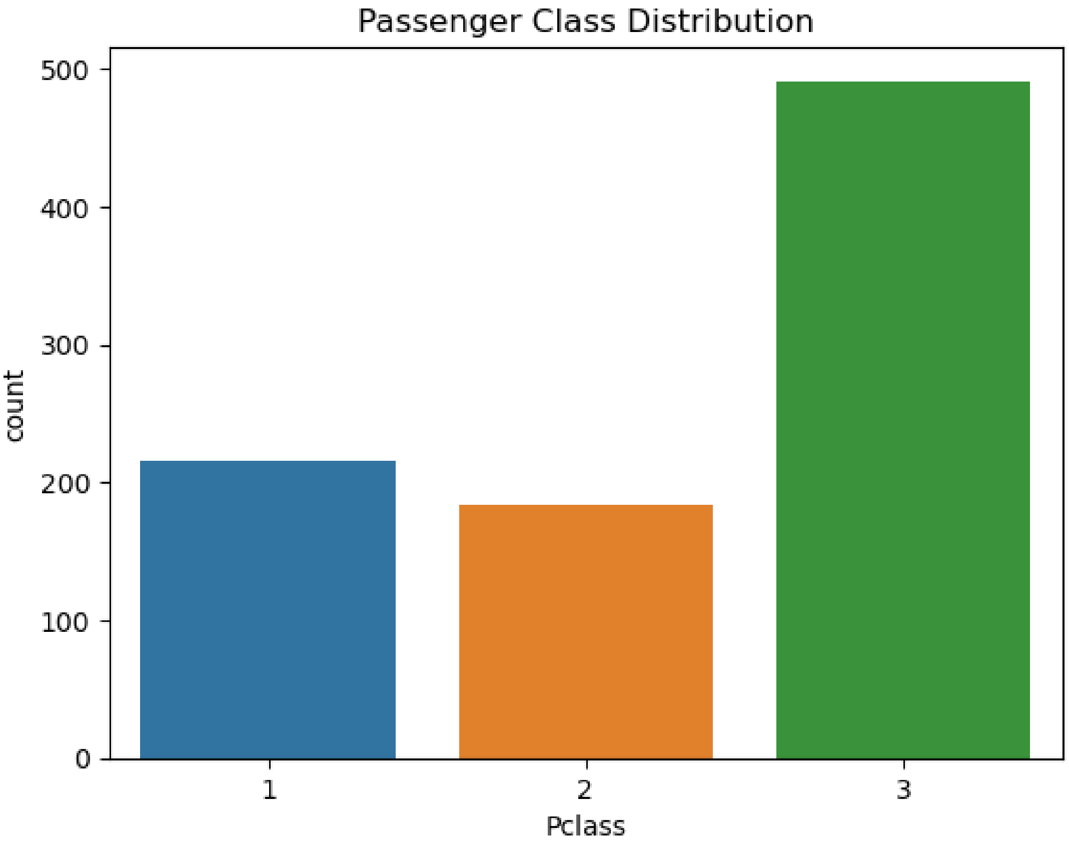


0.0.1 Observation:

- There were more male passengers (~65%) than female passengers (~35%) on board the Titanic.

[20]:

```
sns.countplot(x='Pclass', data=df)
plt.title("Passenger Class Distribution")
plt.show()
```

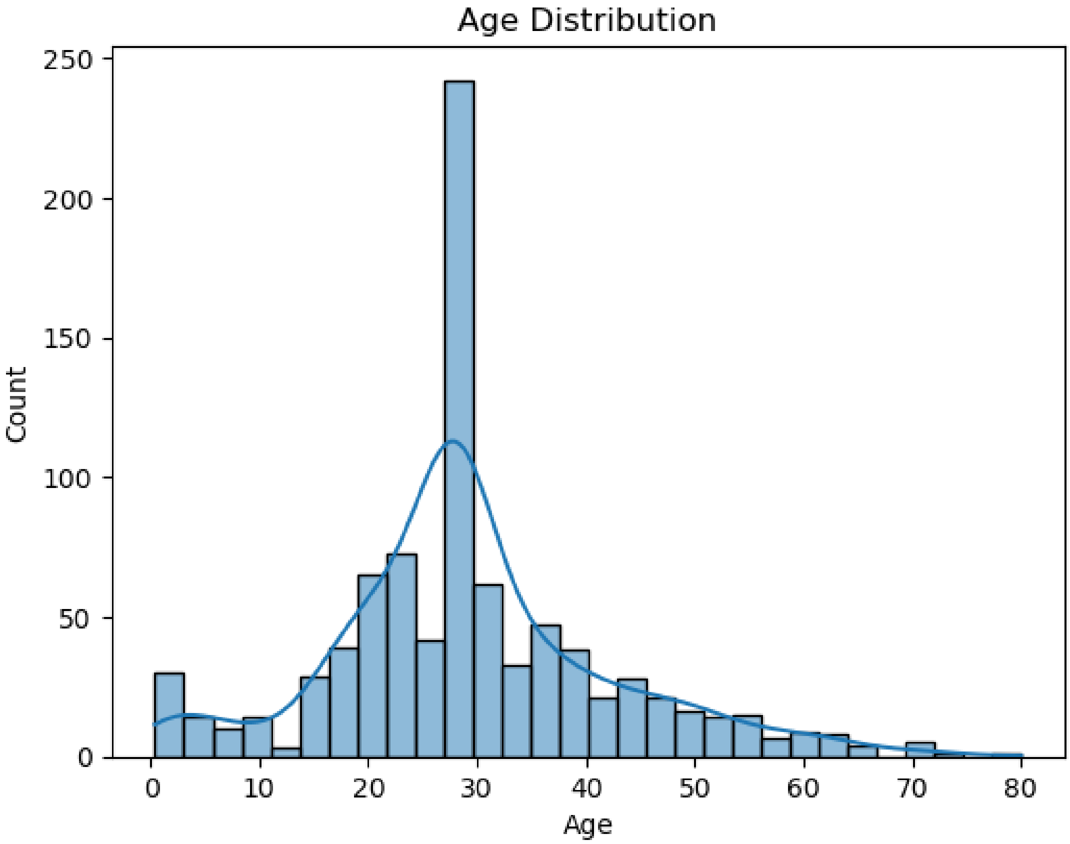


0.0.2 Observation:

- Most passengers were in 3rd class, followed by 1st and then 2nd class.
- This indicates more lower-income passengers on the Titanic.

[21]:

```
sns.histplot(df['Age'], kde=True)
plt.title("Age Distribution")
plt.show()
```

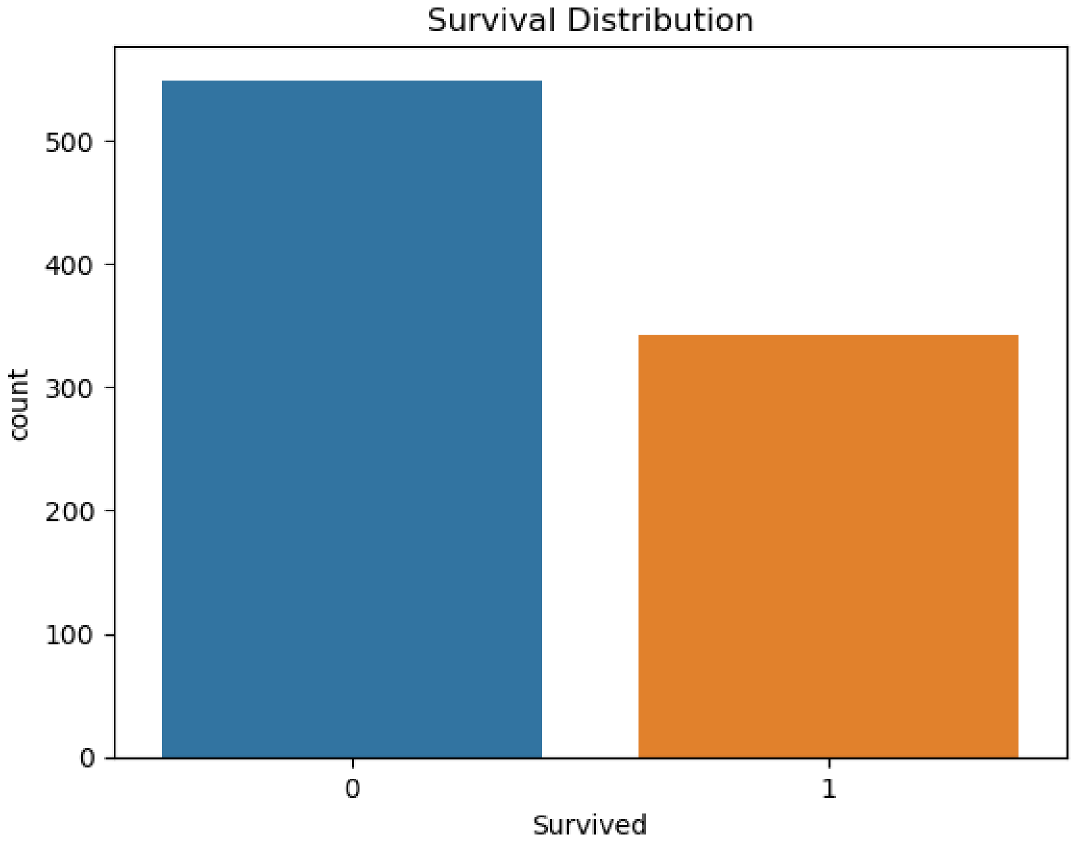


0.0.3 Observation:

- Most passengers were aged between 20 to 40.
- There were also children and elderly passengers, but in smaller numbers.

[22]:

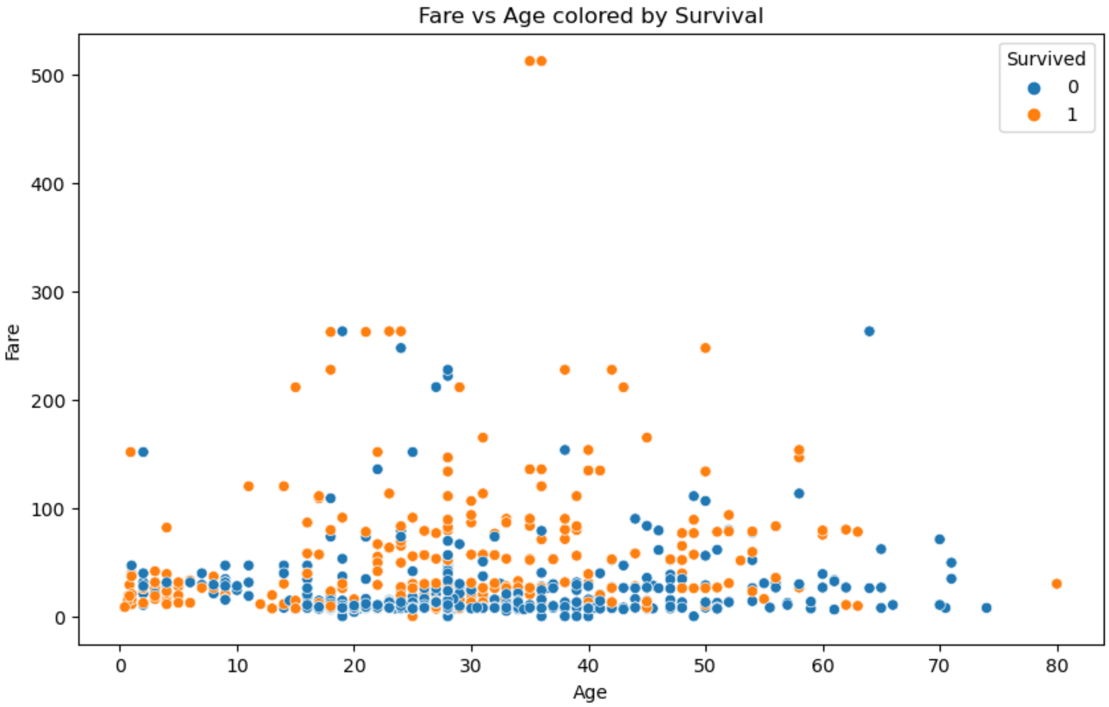
```
sns.countplot(x='Survived', data=df)
plt.title("Survival Distribution")
plt.show()
```



0.0.4 Observation:

- Around 38% of the passengers survived, while 62% did not.
- More people died than survived.

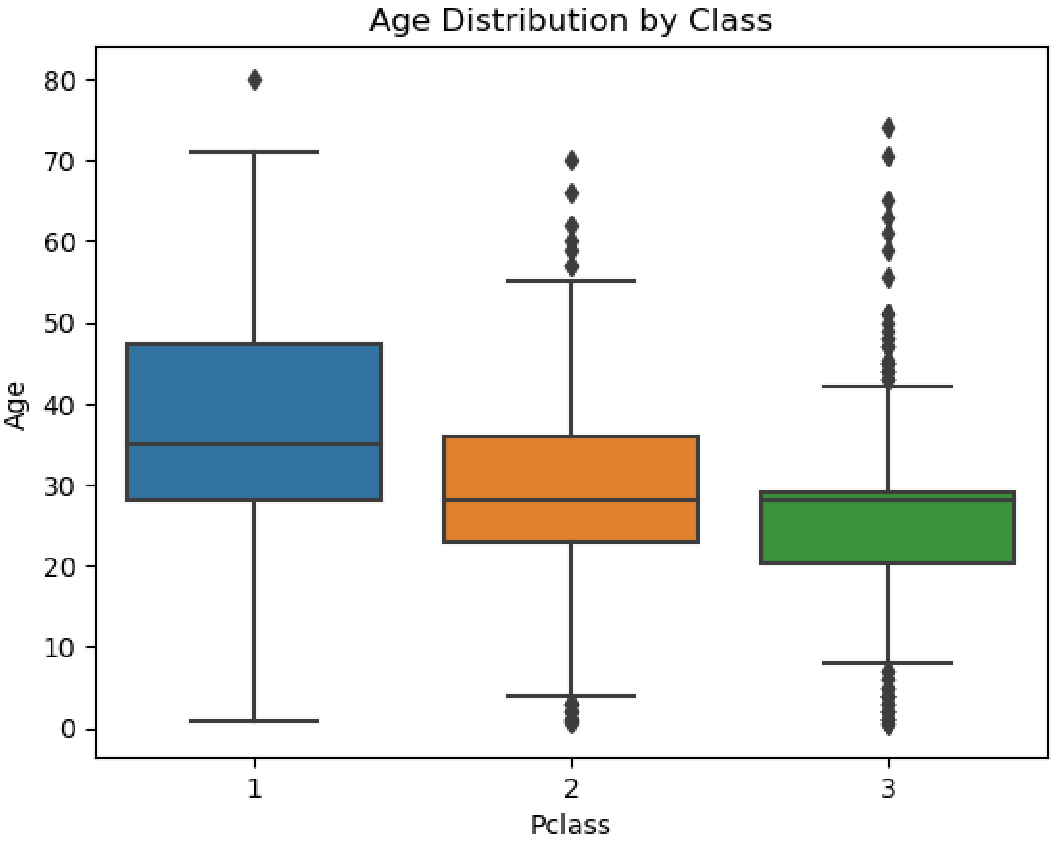
[23]:
```
plt.figure(figsize=(10,6))
sns.scatterplot(x='Age', y='Fare', hue='Survived', data=df)
plt.title("Fare vs Age colored by Survival")
plt.xlabel("Age")
plt.ylabel("Fare")
plt.show()
```



0.0.5 Observation:

- Passengers who paid higher fares had higher survival rates.
- Many low-fare passengers (likely 3rd class) did not survive.
- Younger passengers had varied survival, but more survivors appear at higher fares.

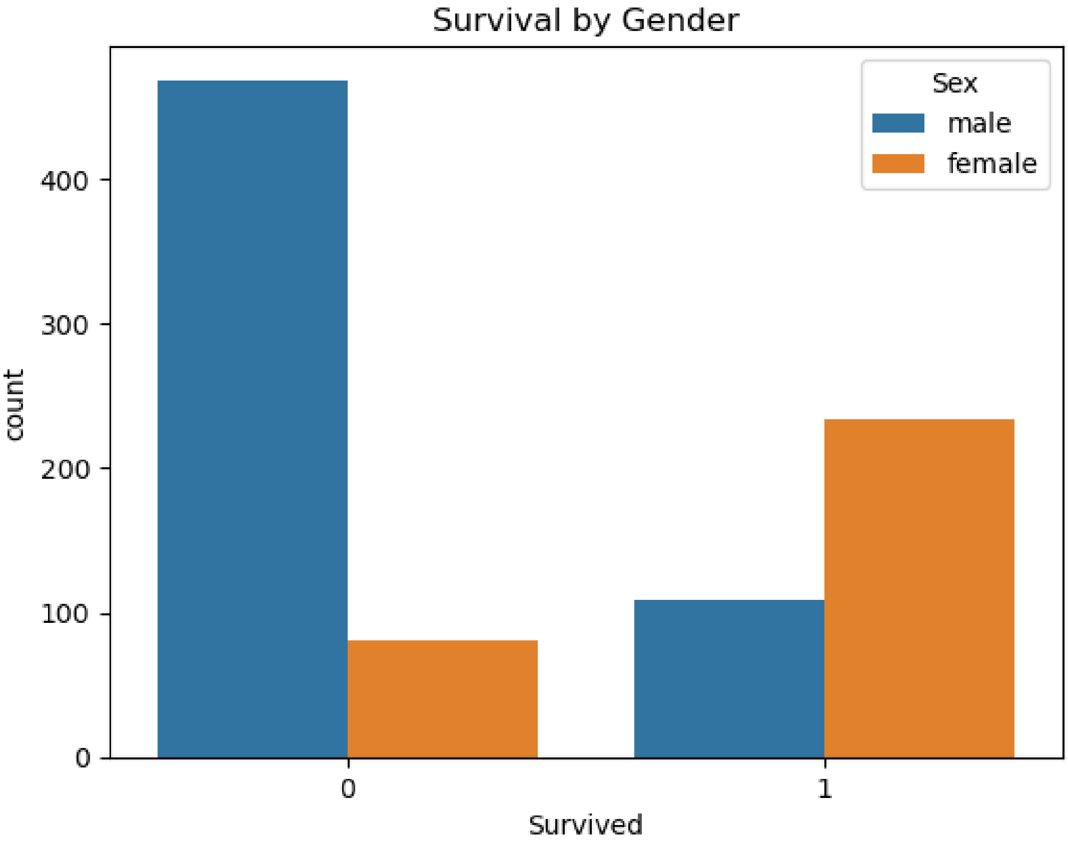
[24]:
```
sns.boxplot(x='Pclass', y='Age', data=df)
plt.title("Age Distribution by Class")
plt.show()
```



0.0.6 Observation:

- 1st class passengers were generally older.
- 3rd class had more younger passengers and children.

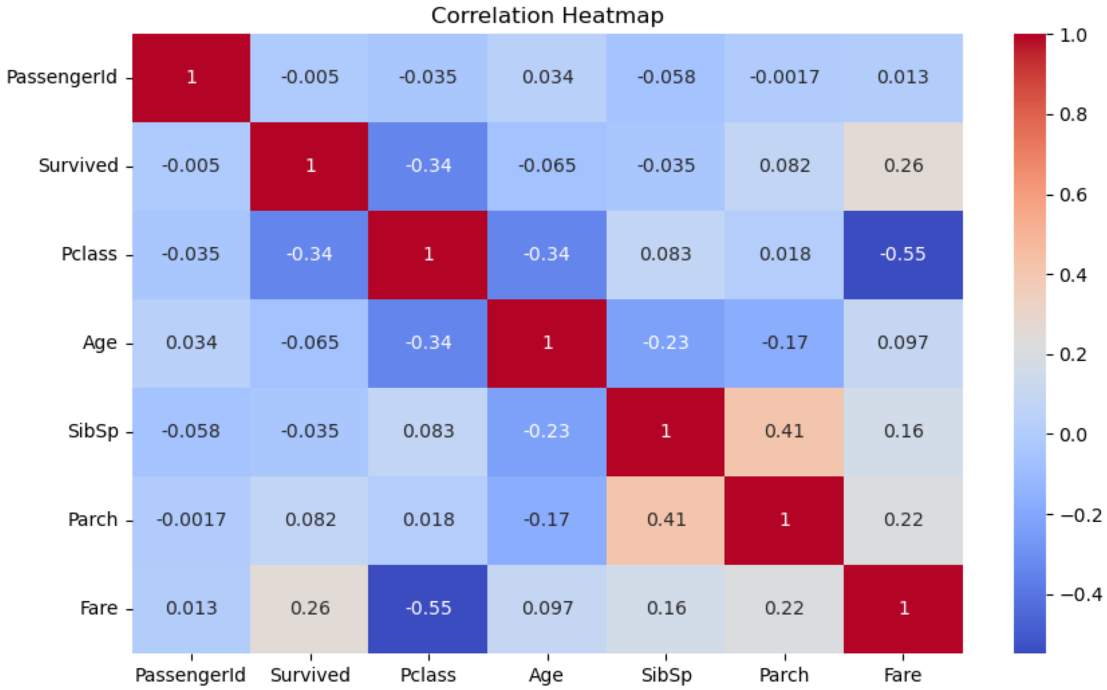
[26]:
```
sns.countplot(x='Survived', hue='Sex', data=df)
plt.title("Survival by Gender")
plt.show()
```



0.0.7 Observation:

- Most of the survivors were females.
- A large number of males did not survive.
- “Women and children first” seems to have been followed.

[31]:
```
plt.figure(figsize=(10,6))
sns.heatmap(df.corr(), annot=True, cmap='coolwarm')
plt.title("Correlation Heatmap")
plt.show()
```

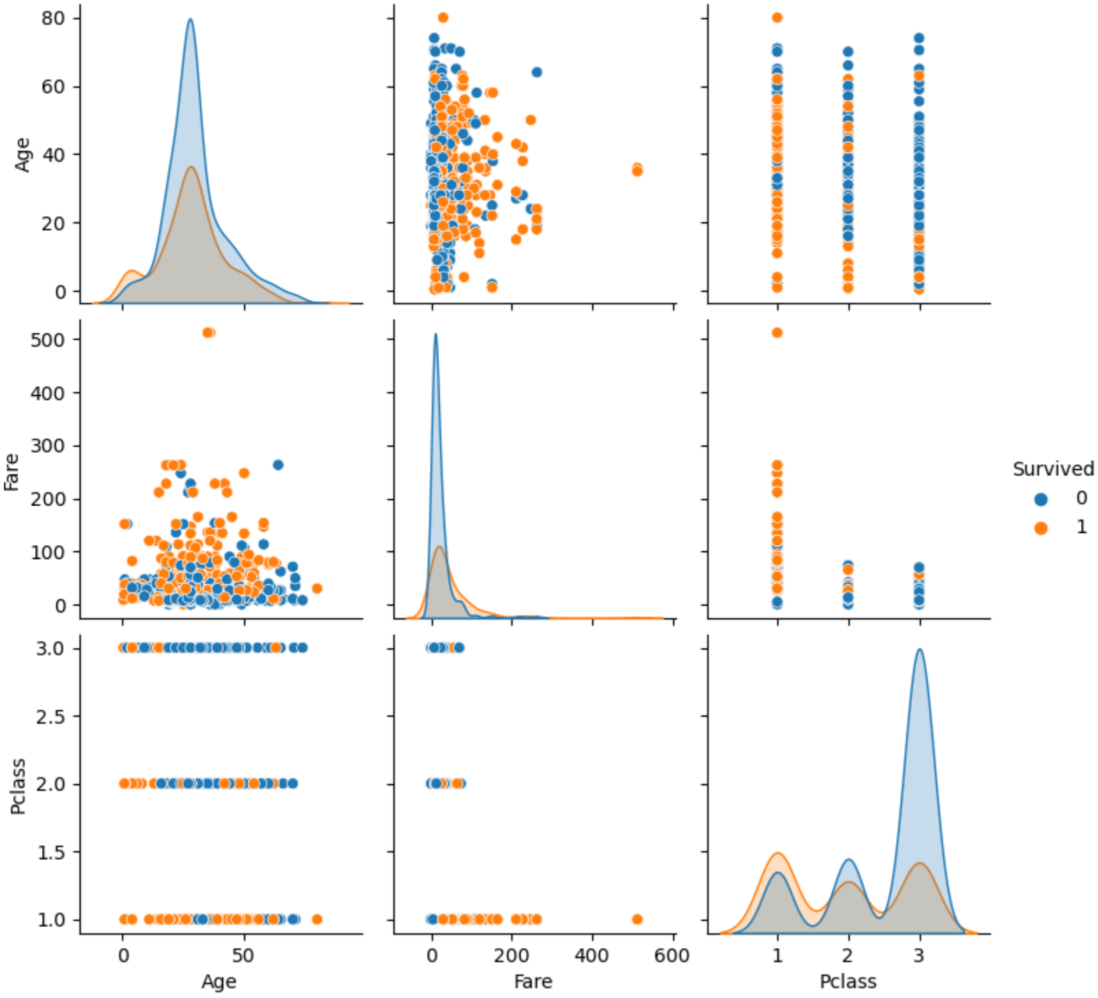


0.0.8 Observation:

- Survived has a positive correlation with Fare and Pclass.
- Age and number of siblings/parents had weak or no correlation with survival.

[32]:

```
sns.pairplot(df[['Survived', 'Age', 'Fare', 'Pclass']], hue='Survived')
plt.show()
```



0.0.9 Observation:

- Surviving passengers generally had higher fares and were more from 1st class.
- Clusters show that 3rd class passengers had lower chances of survival.

0.1 Final Summary:

- Females had a significantly higher survival rate than males.
- 1st class passengers were more likely to survive than those in 2nd or 3rd class.
- Passengers who paid a higher fare had better survival chances.
- Younger passengers had slightly higher survival rates.
- The dataset clearly shows the effect of gender, class, and fare on survival outcomes.