```
!pip install matplot

Requirement already satisfied: matplot in c:\users\ilove\appdata\
local\programs\python\python311\lib\site-packages (0.1.9)
Requirement already satisfied: pyloco>=0.0.134 in c:\users\ilove\
appdata\local\programs\python\python311\lib\site-packages (from
matplot) (0.0.139)
Requirement already satisfied: matplotlib>=3.1.1 in c:\users\ilove\
appdata\local\programs\python\python311\lib\site-packages (from
matplot) (3.7.3)
Requirement already satisfied: contourpy>=1.0.1 in c:\users\ilove\
appdata\local\programs\python\python311\lib\site-packages (from
matplotlib>=3.1.1->matplot) (1.1.0)
Requirement already satisfied: cycler>=0.10 in c:\users\ilove\appdata\
local\programs\python\python311\lib\site-packages (from
matplotlib>=3.1.1->matplot) (0.11.0)
Requirement already satisfied: fonttools>=4.22.0 in c:\users\ilove\
appdata\local\programs\python\python311\lib\site-packages (from
matplotlib>=3.1.1->matplot) (4.42.1)
Requirement already satisfied: kiwisolver>=1.0.1 in c:\users\ilove\
appdata\local\programs\python\python311\lib\site-packages (from
matplotlib>=3.1.1->matplot) (1.4.5)
Requirement already satisfied: numpy<2,>=1.20 in c:\users\ilove\
appdata\local\programs\python\python311\lib\site-packages (from
matplotlib>=3.1.1->matplot) (1.25.2)
Requirement already satisfied: packaging>=20.0 in c:\users\ilove\
appdata\local\programs\python\python311\lib\site-packages (from
matplotlib>=3.1.1->matplot) (23.1)
Requirement already satisfied: pillow>=6.2.0 in c:\users\ilove\
appdata\local\programs\python\python311\lib\site-packages (from
matplotlib>=3.1.1->matplot) (10.0.0)
Requirement already satisfied: pyparsing>=2.3.1 in c:\users\ilove\
appdata\local\programs\python\python311\lib\site-packages (from
matplotlib>=3.1.1->matplot) (3.1.1)
Requirement already satisfied: python-dateutil>=2.7 in c:\users\ilove\
appdata\local\programs\python\python311\lib\site-packages (from
matplotlib>=3.1.1->matplot) (2.8.2)
Requirement already satisfied: ushlex in c:\users\ilove\appdata\local\
programs\python\python311\lib\site-packages (from pyloco>=0.0.134-
>matplot) (0.99.1)
Requirement already satisfied: websocket-client in c:\users\ilove\
appdata\local\programs\python\python311\lib\site-packages (from
pyloco>=0.0.134->matplot) (1.6.2)
Requirement already satisfied: twine in c:\users\ilove\appdata\local\
programs\python\python311\lib\site-packages (from pyloco>=0.0.134-
>matplot) (4.0.2)
Requirement already satisfied: typing in c:\users\ilove\appdata\local\
programs\python\python311\lib\site-packages (from pyloco>=0.0.134-
>matplot) (3.7.4.3)
Requirement already satisfied: SimpleWebSocketServer in c:\users\
```

```
ilove\appdata\local\programs\python\python311\lib\site-packages (from
pyloco>=0.0.134->matplot) (0.1.2)
Requirement already satisfied: six>=1.5 in c:\users\ilove\appdata\
local\programs\python\python311\lib\site-packages (from python-
dateutil>=2.7->matplotlib>=3.1.1->matplot) (1.16.0)
Requirement already satisfied: pkginfo>=1.8.1 in c:\users\ilove\
appdata\local\programs\python\python311\lib\site-packages (from twine-
>pyloco>=0.0.134->matplot) (1.9.6)
Requirement already satisfied: readme-renderer>=35.0 in c:\users\
ilove\appdata\local\programs\python\python311\lib\site-packages (from
twine->pyloco>=0.0.134->matplot) (42.0)
Requirement already satisfied: requests>=2.20 in c:\users\ilove\
appdata\local\programs\python\python311\lib\site-packages (from twine-
>pyloco>=0.0.134->matplot) (2.31.0)
Requirement already satisfied: requests-toolbelt!=0.9.0,>=0.8.0 in c:\
users\ilove\appdata\local\programs\python\python311\lib\site-packages
(from twine->pyloco>=0.0.134->matplot) (1.0.0)
Requirement already satisfied: urllib3>=1.26.0 in c:\users\ilove\
appdata\local\programs\python\python311\lib\site-packages (from twine-
>pyloco>=0.0.134->matplot) (2.0.4)
Requirement already satisfied: importlib-metadata>=3.6 in c:\users\
ilove\appdata\local\programs\python\python311\lib\site-packages (from
twine->pyloco>=0.0.134->matplot) (6.8.0)
Requirement already satisfied: keyring>=15.1 in c:\users\ilove\
appdata\local\programs\python\python311\lib\site-packages (from twine-
>pyloco>=0.0.134->matplot) (24.2.0)
Requirement already satisfied: rfc3986>=1.4.0 in c:\users\ilove\
appdata\local\programs\python\python311\lib\site-packages (from twine-
>pyloco>=0.0.134->matplot) (2.0.0)
Requirement already satisfied: rich>=12.0.0 in c:\users\ilove\appdata\
local\programs\python\python311\lib\site-packages (from twine-
>pyloco>=0.0.134->matplot) (13.5.2)
Requirement already satisfied: zipp>=0.5 in c:\users\ilove\appdata\
local\programs\python\python311\lib\site-packages (from importlib-
metadata>=3.6->twine->pyloco>=0.0.134->matplot) (3.16.2)
Requirement already satisfied: jaraco.classes in c:\users\ilove\
appdata\local\programs\python\python311\lib\site-packages (from
keyring>=15.1->twine->pyloco>=0.0.134->matplot) (3.3.0)
Requirement already satisfied: pywin32-ctypes>=0.2.0 in c:\users\
ilove\appdata\local\programs\python\python311\lib\site-packages (from
keyring>=15.1->twine->pyloco>=0.0.134->matplot) (0.2.2)
Requirement already satisfied: nh3>=0.2.14 in c:\users\ilove\appdata\
local\programs\python\python311\lib\site-packages (from readme-
renderer>=35.0->twine->pyloco>=0.0.134->matplot) (0.2.14)
Requirement already satisfied: docutils>=0.13.1 in c:\users\ilove\
appdata\local\programs\python\python311\lib\site-packages (from
readme-renderer>=35.0->twine->pyloco>=0.0.134->matplot) (0.20.1)
Requirement already satisfied: Pygments>=2.5.1 in c:\users\ilove\
appdata\local\programs\python\python311\lib\site-packages (from
```

```
readme-renderer>=35.0->twine->pyloco>=0.0.134->matplot) (2.16.1)
Requirement already satisfied: charset-normalizer<4,>=2 in c:\users\
ilove\appdata\local\programs\python\python311\lib\site-packages (from
requests>=2.20->twine->pyloco>=0.0.134->matplot) (3.2.0)
Requirement already satisfied: idna<4,>=2.5 in c:\users\ilove\appdata\
local\programs\python\python311\lib\site-packages (from
requests>=2.20->twine->pyloco>=0.0.134->matplot) (3.4)
Requirement already satisfied: certifi>=2017.4.17 in c:\users\ilove\
appdata\local\programs\python\python311\lib\site-packages (from
requests>=2.20->twine->pyloco>=0.0.134->matplot) (2023.7.22)
Requirement already satisfied: markdown-it-py>=2.2.0 in c:\users\
ilove\appdata\local\programs\python\python311\lib\site-packages (from
rich>=12.0.0->twine->pyloco>=0.0.134->matplot) (3.0.0)
Requirement already satisfied: mdurl~=0.1 in c:\users\ilove\appdata\
local\programs\python\python311\lib\site-packages (from markdown-it-
py>=2.2.0->rich>=12.0.0->twine->pyloco>=0.0.134->matplot) (0.1.2)
Requirement already satisfied: more-itertools in c:\users\ilove\
appdata\local\programs\python\python311\lib\site-packages (from
jaraco.classes->keyring>=15.1->twine->pyloco>=0.0.134->matplot)
(10.1.0)
```

```
!pip install scikit-learn
```

```
Collecting scikit-learn
  Obtaining dependency information for scikit-learn from
https://files.pythonhosted.org/packages/77/85/bff3a1e818ec6aa3dd466ff4
f4b0a727db9fdb41f2e849747ad902ddbe95/scikit_learn-1.3.0-cp311-cp311-
win_amd64.whl.metadata
  Downloading scikit_learn-1.3.0-cp311-cp311-win_amd64.whl.metadata
(11 kB)
Requirement already satisfied: numpy>=1.17.3 in c:\users\ilove\
appdata\local\programs\python\python311\lib\site-packages (from
scikit-learn) (1.25.2)
Requirement already satisfied: scipy>=1.5.0 in c:\users\ilove\appdata\
local\programs\python\python311\lib\site-packages (from scikit-learn)
(1.11.2)
Requirement already satisfied: joblib>=1.1.1 in c:\users\ilove\
appdata\local\programs\python\python311\lib\site-packages (from
scikit-learn) (1.1.1)
Collecting threadpoolctl>=2.0.0 (from scikit-learn)
  Obtaining dependency information for threadpoolctl>=2.0.0 from
https://files.pythonhosted.org/packages/81/12/fd4dea011af9d69e1cad05c7
5f3f7202cdcbeac9b712eea58ca779a72865/threadpoolctl-3.2.0-py3-none-
any.whl.metadata
  Downloading threadpoolctl-3.2.0-py3-none-any.whl.metadata (10.0 kB)
Downloading scikit_learn-1.3.0-cp311-cp311-win_amd64.whl (9.2 MB)
   ---------------------------------------- 0.0/9.2 MB ? eta -:--:--
    --------------------------------------- 0.2/9.2 MB 3.5 MB/s eta
0:00:03
   -- ------------------------------------- 0.5/9.2 MB 5.7 MB/s eta
```

```
0:00:02
   ---- ----------------------------------- 0.9/9.2 MB 6.6 MB/s eta
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   ------ --------------------------------- 1.6/9.2 MB 8.4 MB/s eta
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   ----------------- ---------------------- 4.0/9.2 MB 9.0 MB/s eta
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   ------------------- -------------------- 4.4/9.2 MB 9.1 MB/s eta
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   -------------------- ------------------- 4.8/9.2 MB 9.3 MB/s eta
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   ---------------------- ----------------- 5.2/9.2 MB 8.9 MB/s eta
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   ------------------------ --------------- 5.6/9.2 MB 9.1 MB/s eta
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   ---------------------------------- ----- 8.3/9.2 MB 9.1 MB/s eta
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   ------------------------------------  9.2/9.2 MB 9.0 MB/s eta
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   ------------------------------------ 9.2/9.2 MB 8.4 MB/s eta
0:00:00
Downloading threadpoolctl-3.2.0-py3-none-any.whl (15 kB)
Installing collected packages: threadpoolctl, scikit-learn
Successfully installed scikit-learn-1.3.0 threadpoolctl-3.2.0
```

```python
import pandas as pd
import numpy as np
import seaborn as sns
```

```
import matplotlib.pyplot as plt
import warnings
warnings.filterwarnings('ignore')
%matplotlib inline
```

loading the dataset

```
train = pd.read_csv('train.csv')

test = pd.read_csv('test.csv')

train.head()
```

```
   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
```

```
# statistical info
train.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
```

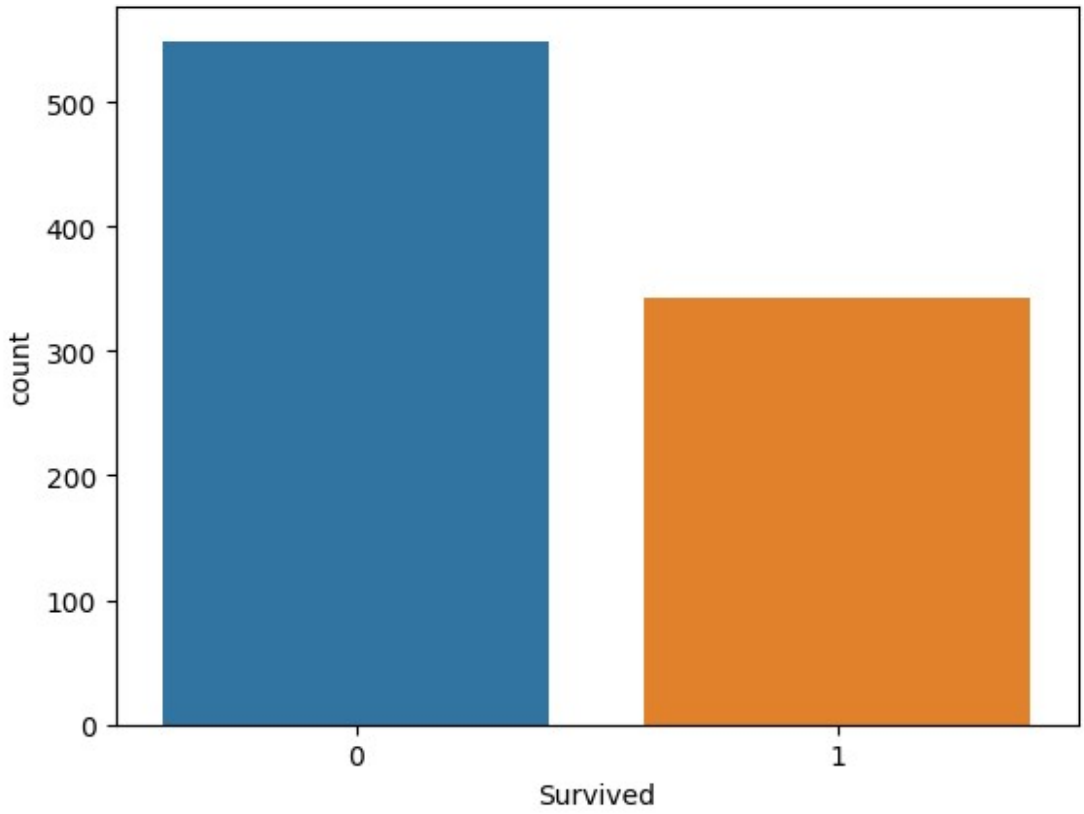
```
# datatype info
train.info()
```

```
<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
```

exploratory data analysis

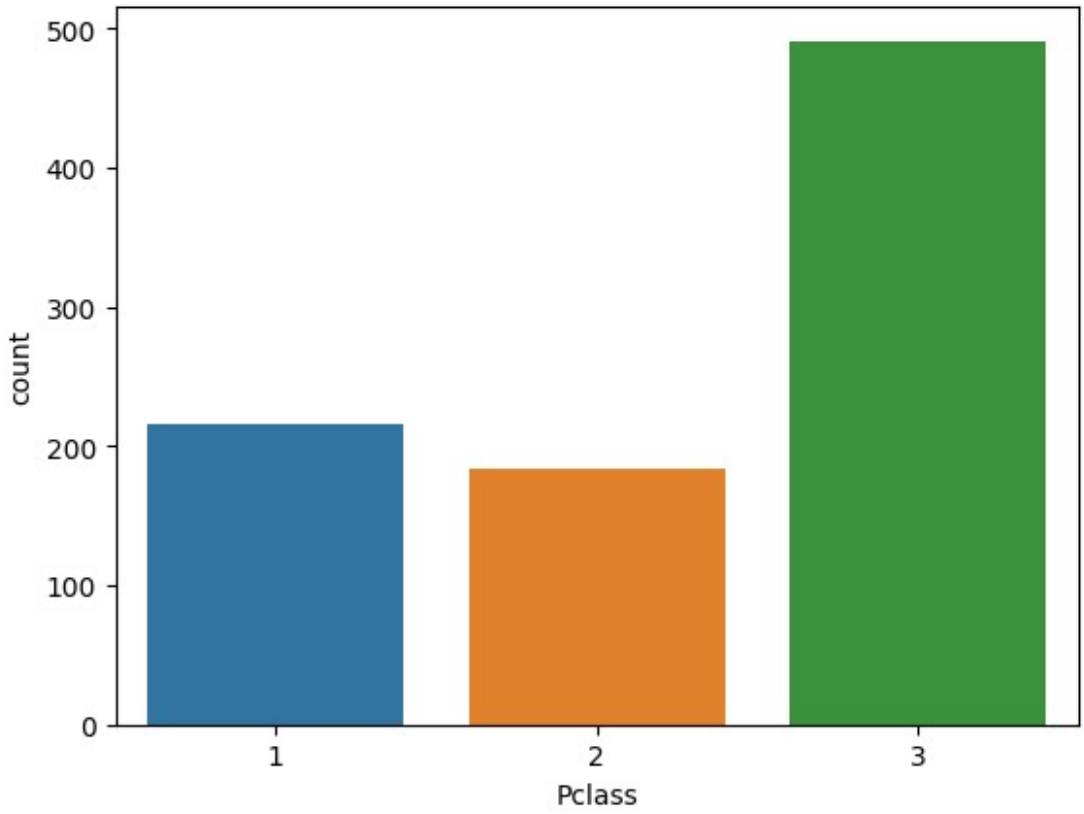
```
sns.countplot(x = 'Survived', data = train)
```

```
<Axes: xlabel='Survived', ylabel='count'>
```



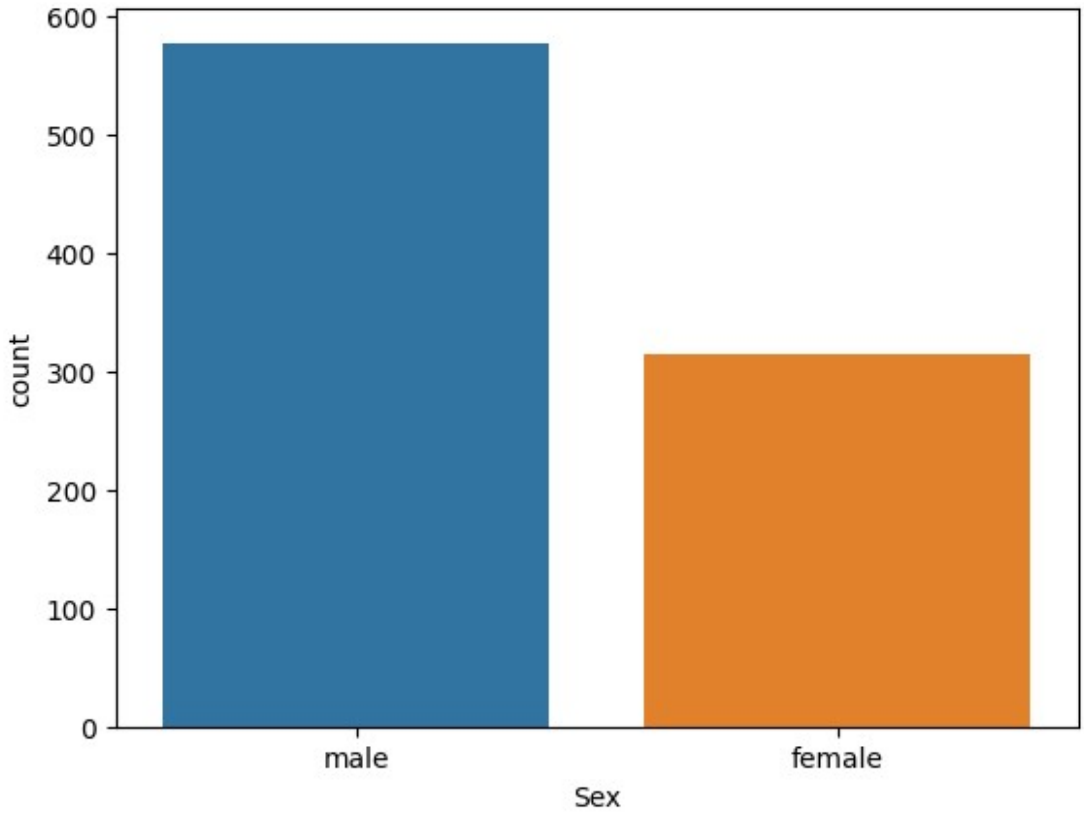

```
sns.countplot(x = 'Pclass', data = train)
```

```
<Axes: xlabel='Pclass', ylabel='count'>
```



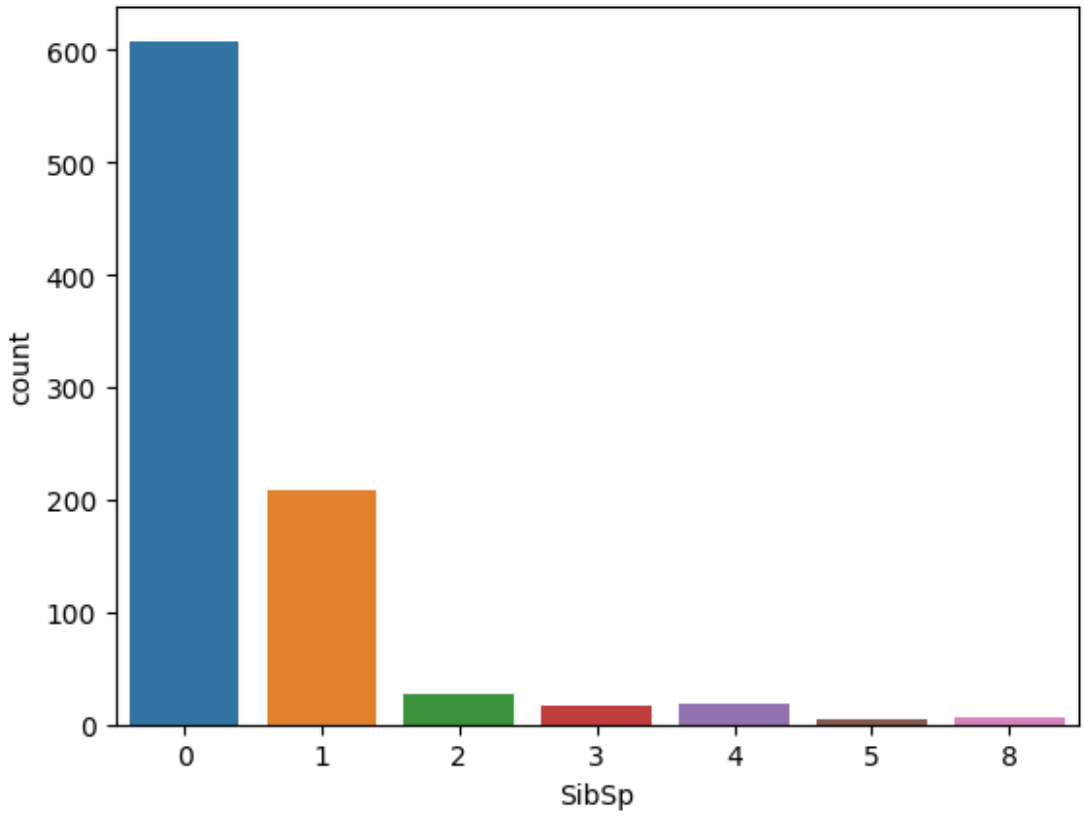

```
sns.countplot(x = 'Sex', data = train)
```

```
<Axes: xlabel='Sex', ylabel='count'>
```



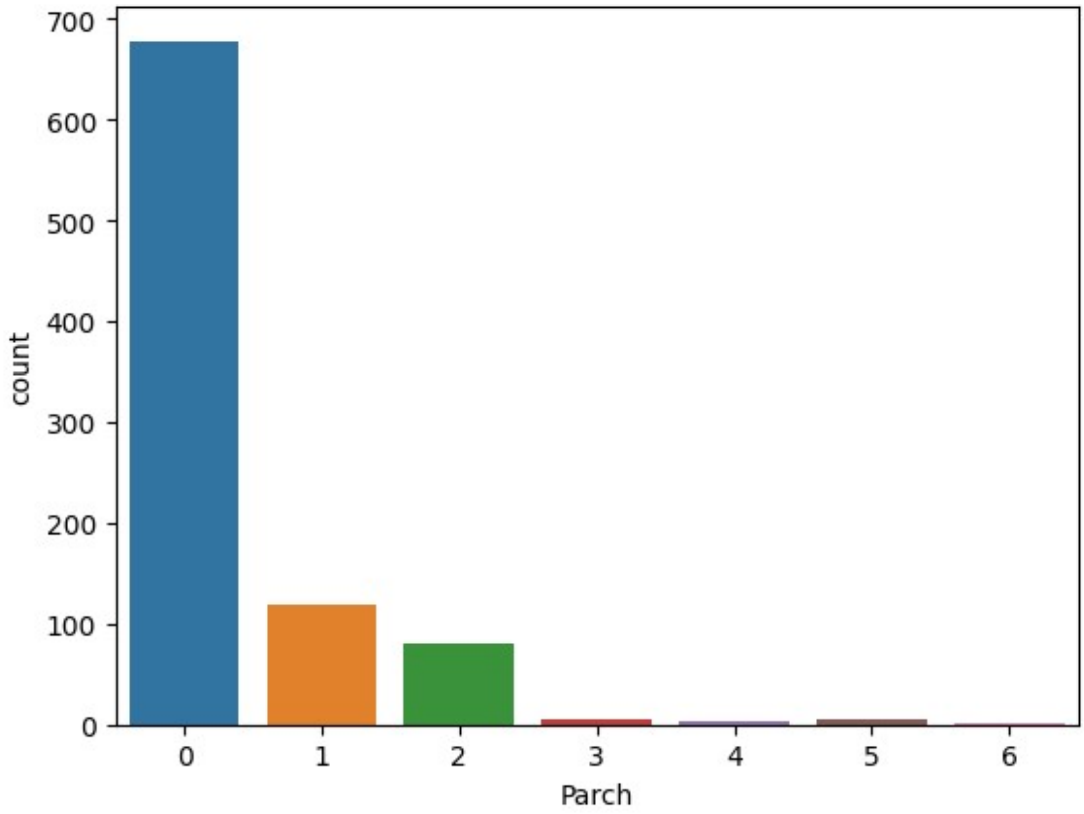

```
sns.countplot(x = 'SibSp', data = train)
```

```
<Axes: xlabel='SibSp', ylabel='count'>
```



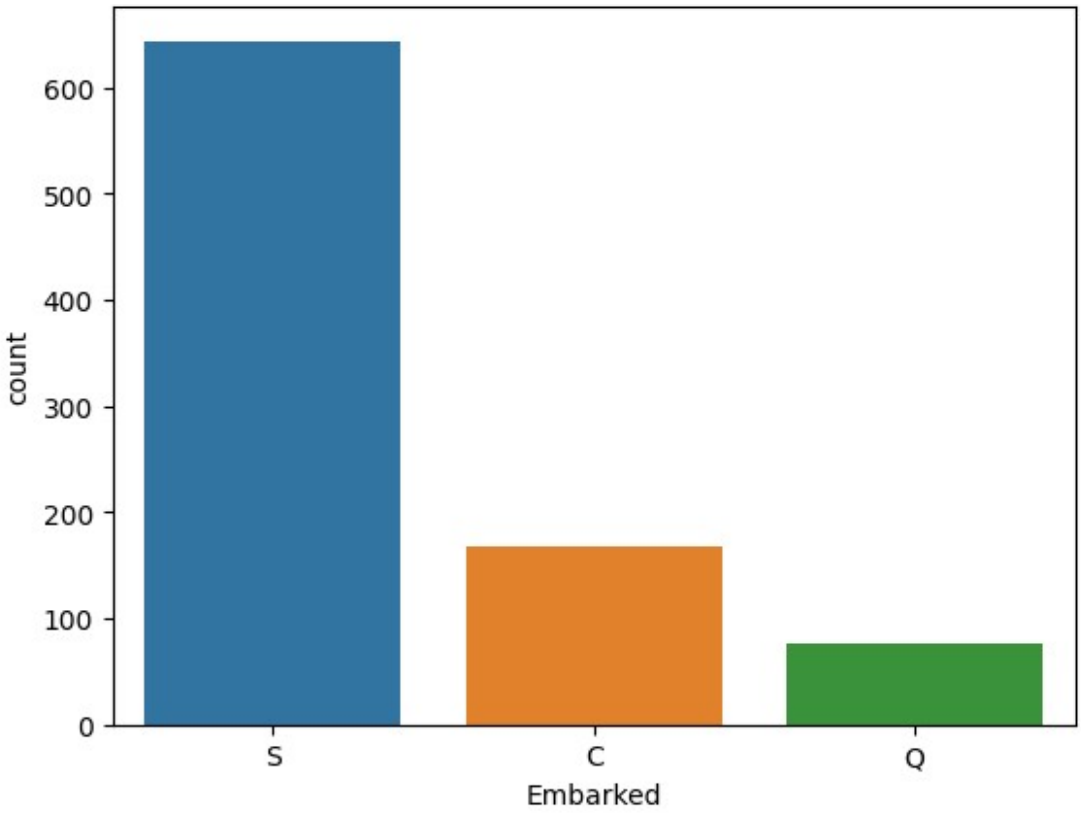

```
sns.countplot(x = 'Parch', data = train)
```

```
<Axes: xlabel='Parch', ylabel='count'>
```




```
sns.countplot(x = 'Embarked', data = train)
```

```
<Axes: xlabel='Embarked', ylabel='count'>
```



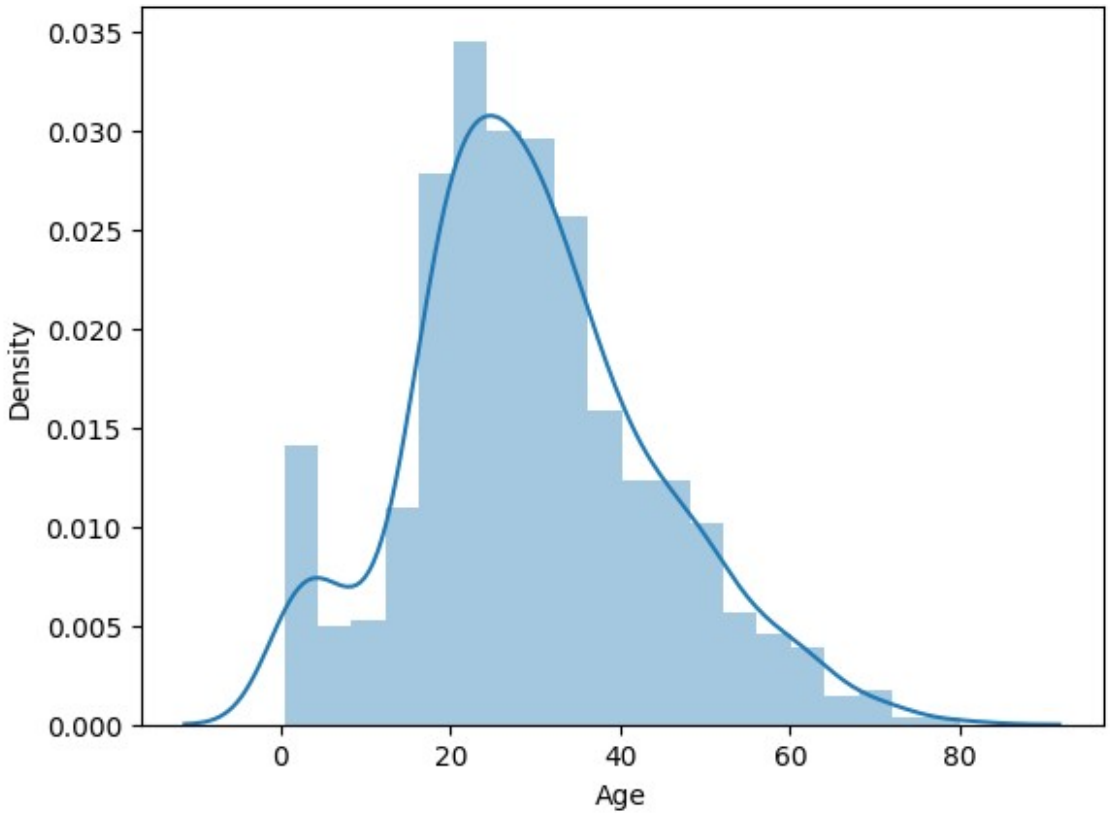
numerical attributes

```
'''
In summary, the main difference between countplot and distplot is the
type of data they
are designed to visualize:

countplot is for categorical data and shows the count of unique
categories.

distplot is for continuous numerical data and shows the distribution
of values along with
an estimation of the probability density function.

You should choose the appropriate plot based on the nature of your
data and the specific
insights you want to gain from your visualization.
'''
```

```
'\nIn summary, the main difference between countplot and distplot is
the type of data they \nare designed to visualize:\n\ncountplot is for
categorical data and shows the count of unique categories.\n\ndistplot
is for continuous numerical data and shows the distribution of values
```

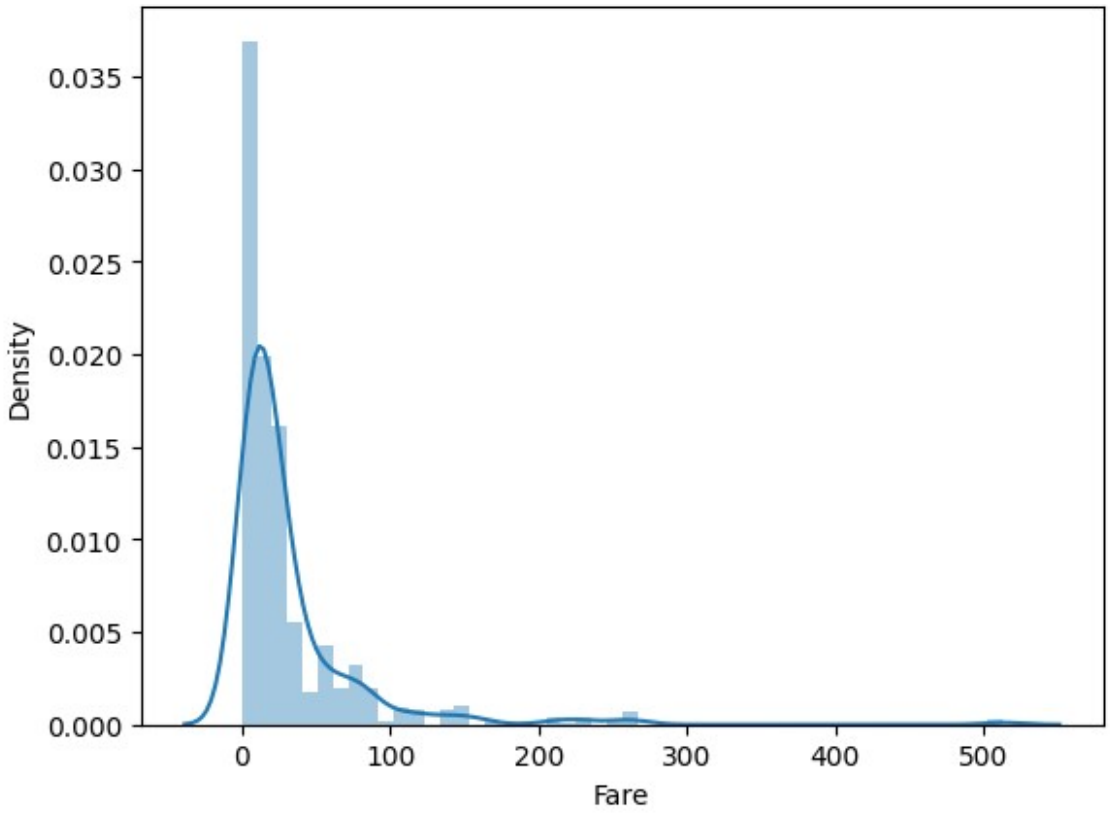
```
along with \nan estimation of the probability density function.\n\nYou
should choose the appropriate plot based on the nature of your data
and the specific \ninsights you want to gain from your visualization.\
n'

sns.distplot(train['Age'])
```

```
<Axes: xlabel='Age', ylabel='Density'>
```

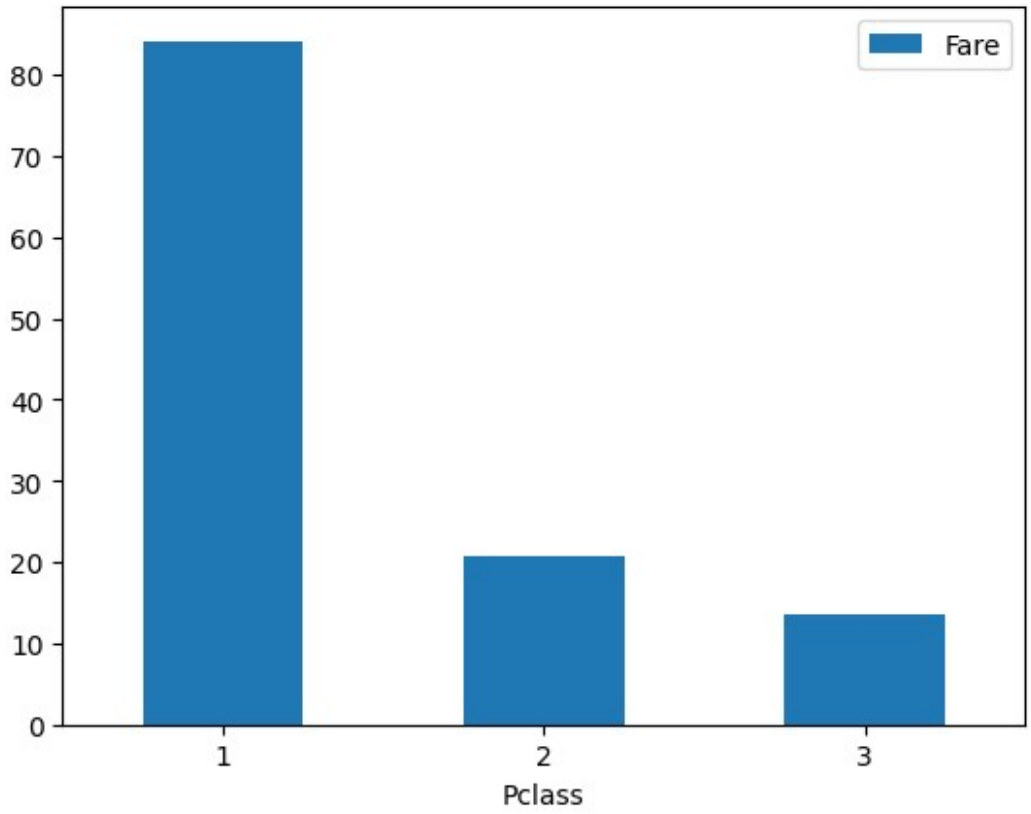



```
sns.distplot(train['Fare'])
```

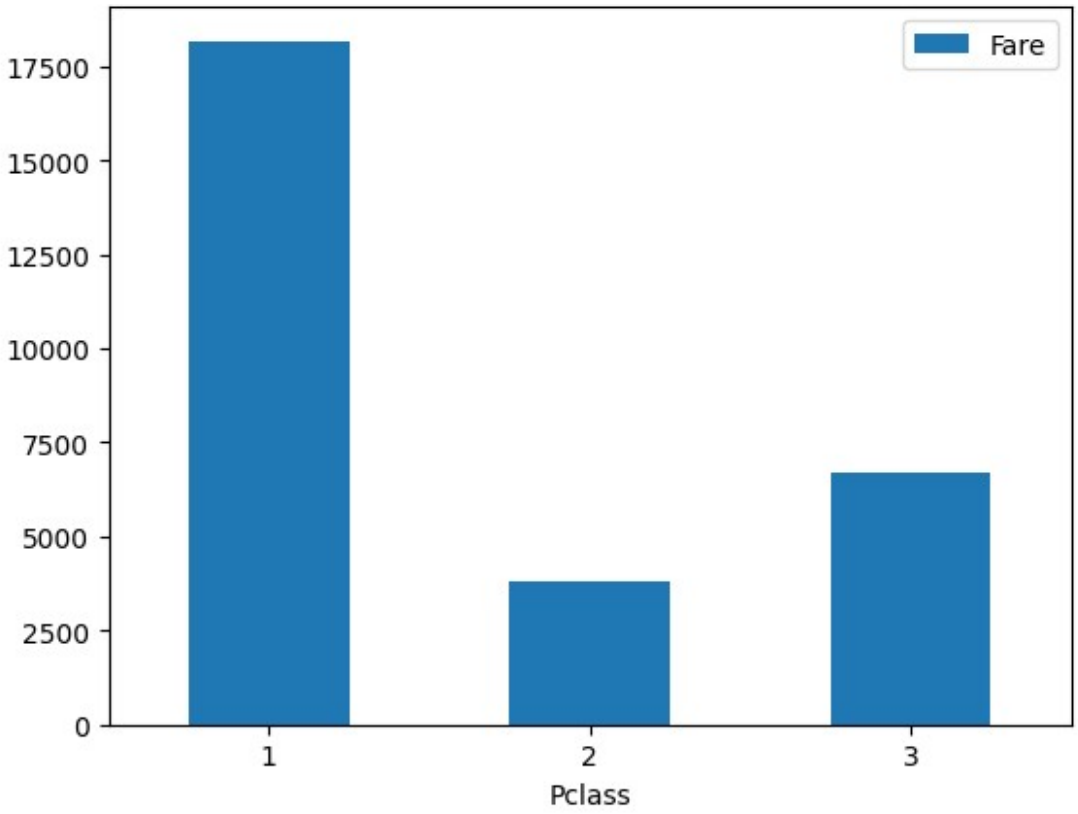
```
<Axes: xlabel='Fare', ylabel='Density'>
```




```
class_fare = train.pivot_table(index = 'Pclass', values = 'Fare')
class_fare.plot(kind = 'bar')
plt.xlabel('Pclass')
plt.xticks(rotation = 0)
plt.show()
```

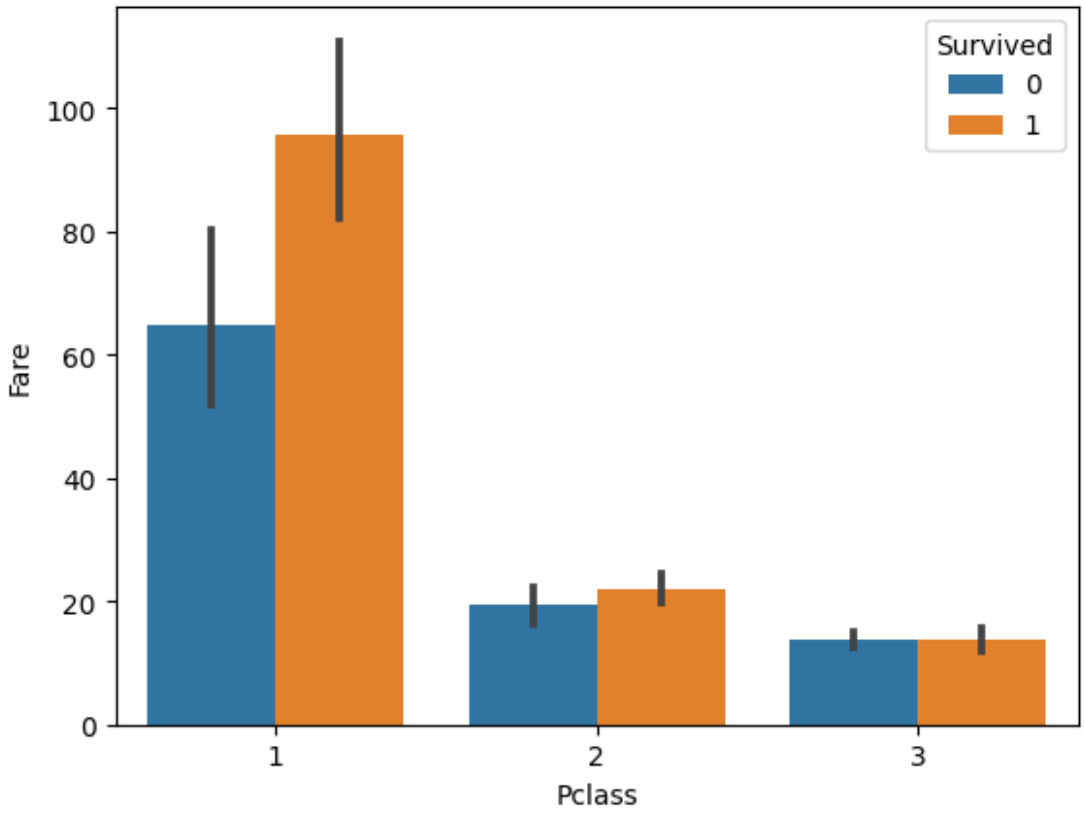



```
# this is for the total fare

class_fare = train.pivot_table(index = 'Pclass', values = 'Fare',
aggfunc = np.sum)
class_fare.plot(kind = 'bar')
plt.xlabel('Pclass')
plt.xticks(rotation = 0)
plt.show()
```



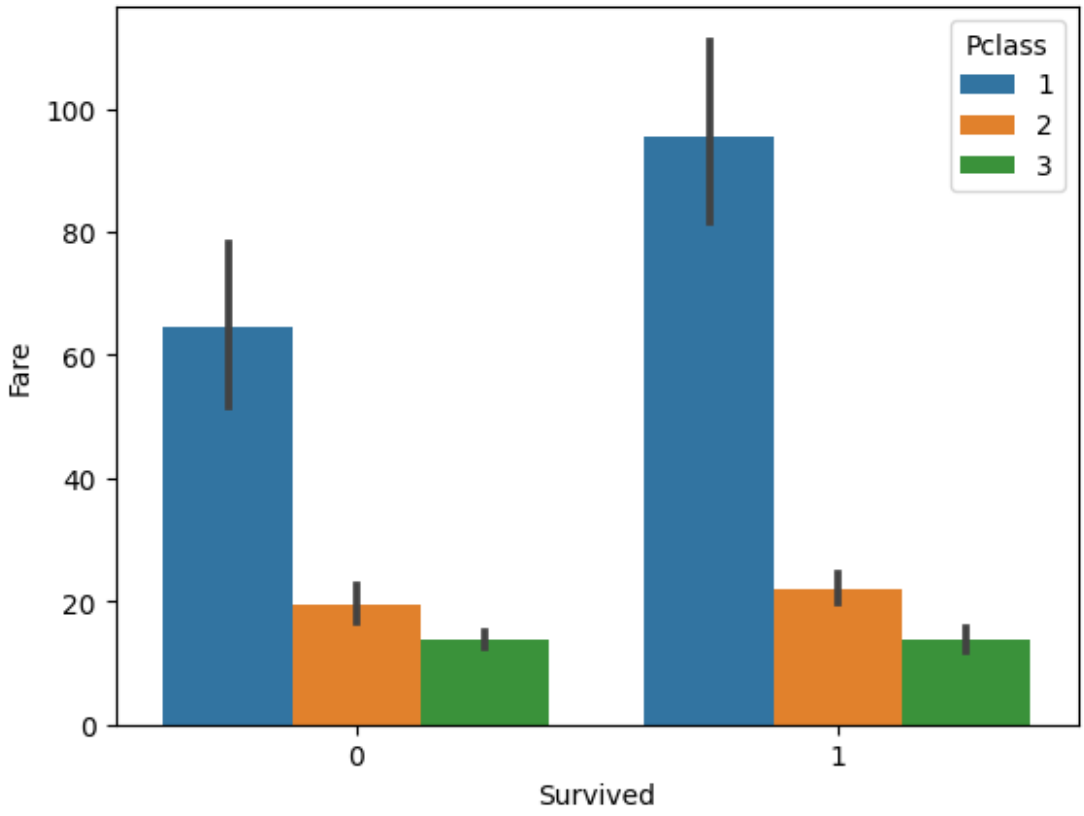

```
sns.barplot(data = train, x = 'Pclass',y = 'Fare', hue = 'Survived')

# this is for making the barplot
# hue here is used to color the barplot
```

```
<Axes: xlabel='Pclass', ylabel='Fare'>
```




```
sns.barplot(data = train, x = 'Survived',y = 'Fare', hue = 'Pclass')

# what this barplot tells us is that the number of people who survived
and whom did not
# survive based on their class and fare
```

```
<Axes: xlabel='Survived', ylabel='Fare'>
```



data pre processing

```
train_len = len(train)
# combine two data frames
df = pd.concat([train, test], axis = 0)
df = df.reset_index(drop = True )
df.head()
```

```
   PassengerId  Survived  Pclass  \
0            1       0.0       3
1            2       1.0       1
2            3       1.0       3
3            4       1.0       1
4            5       0.0       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

df.tail()

      PassengerId  Survived  Pclass                             Name
Sex  \
1304         1305       NaN       3                Spector, Mr. Woolf
male
1305         1306       NaN       1  Oliva y Ocana, Dona. Fermina
female
1306         1307       NaN       3  Saether, Mr. Simon Sivertsen
male
1307         1308       NaN       3             Ware, Mr. Frederick
male
1308         1309       NaN       3      Peter, Master. Michael J
male

       Age  SibSp  Parch              Ticket      Fare Cabin Embarked

1304   NaN      0      0           A.5. 3236    8.0500   NaN        S

1305  39.0      0      0            PC 17758  108.9000  C105        C

1306  38.5      0      0  SOTON/O.Q. 3101262    7.2500   NaN        S

1307   NaN      0      0              359309    8.0500   NaN        S

1308   NaN      1      1                2668   22.3583   NaN        C


# find the null values

train_len

891

df.isnull().sum()

PassengerId       0
Survived        418
Pclass            0
Name              0
```

```
Sex               0
Age             263
SibSp             0
Parch             0
Ticket            0
Fare              1
Cabin          1014
Embarked          2
dtype: int64
```

```
# dropping the coloumn cabin
df = df.drop(columns = ['Cabin'], axis = 1)
```

```
df['Age'].mean()
```

```
29.881137667304014
```

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

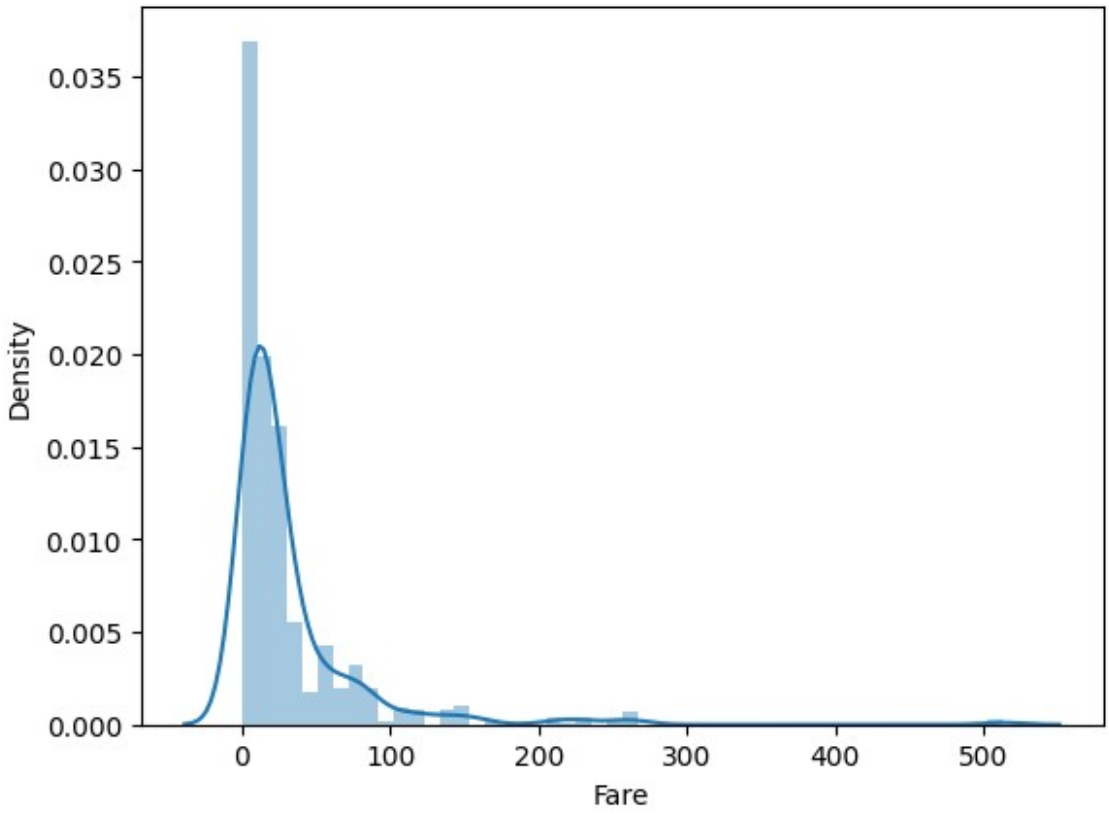
```
'S'
```

```
# filling the missing values using mean of that column
df['Age'] = df['Age'].fillna(df['Age'].mean())
df['Fare'] = df['Fare'].fillna(df['Fare'].mean())
df['Embarked'] = df['Embarked'].fillna(df['Embarked'].mode()[0])
```

log transformation for uniform data distribution

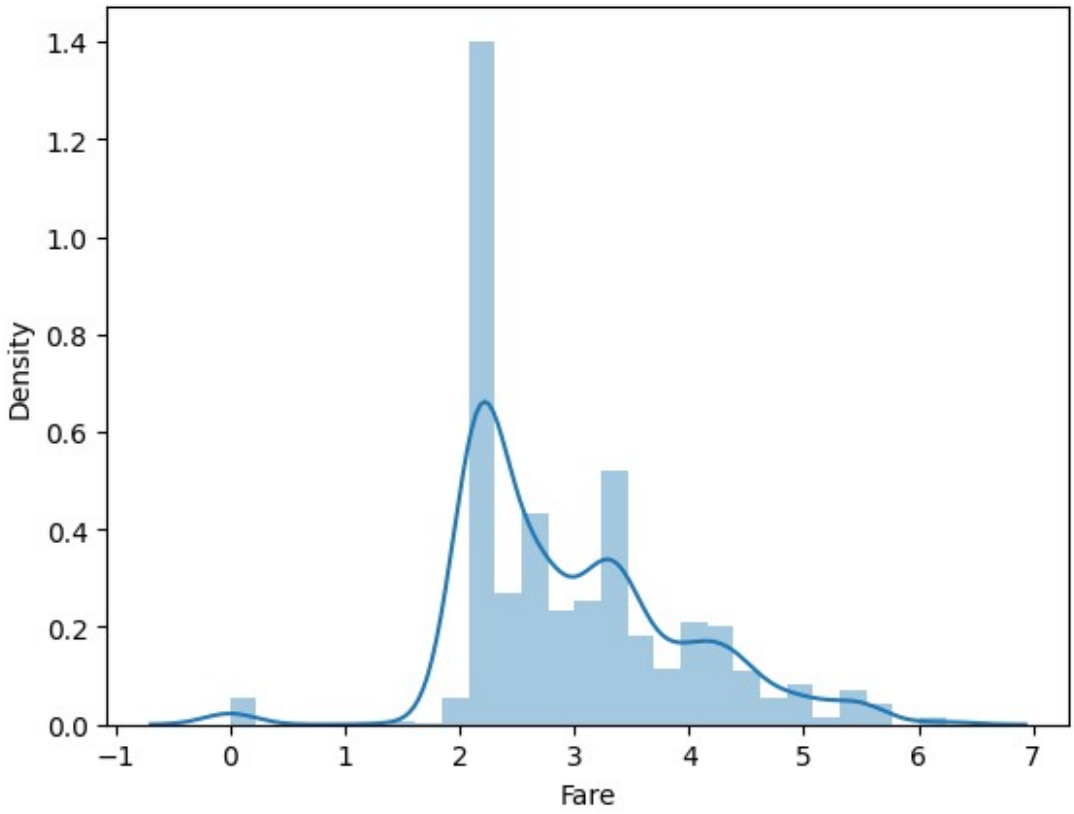
```
 sns.distplot(train['Fare'])
```

```
<Axes: xlabel='Fare', ylabel='Density'>
```




```
df['Fare'] = np.log(df['Fare'] + 1)

# what we are doing here is that we are replacing the null values with
mean

sns.distplot(df['Fare'])
```

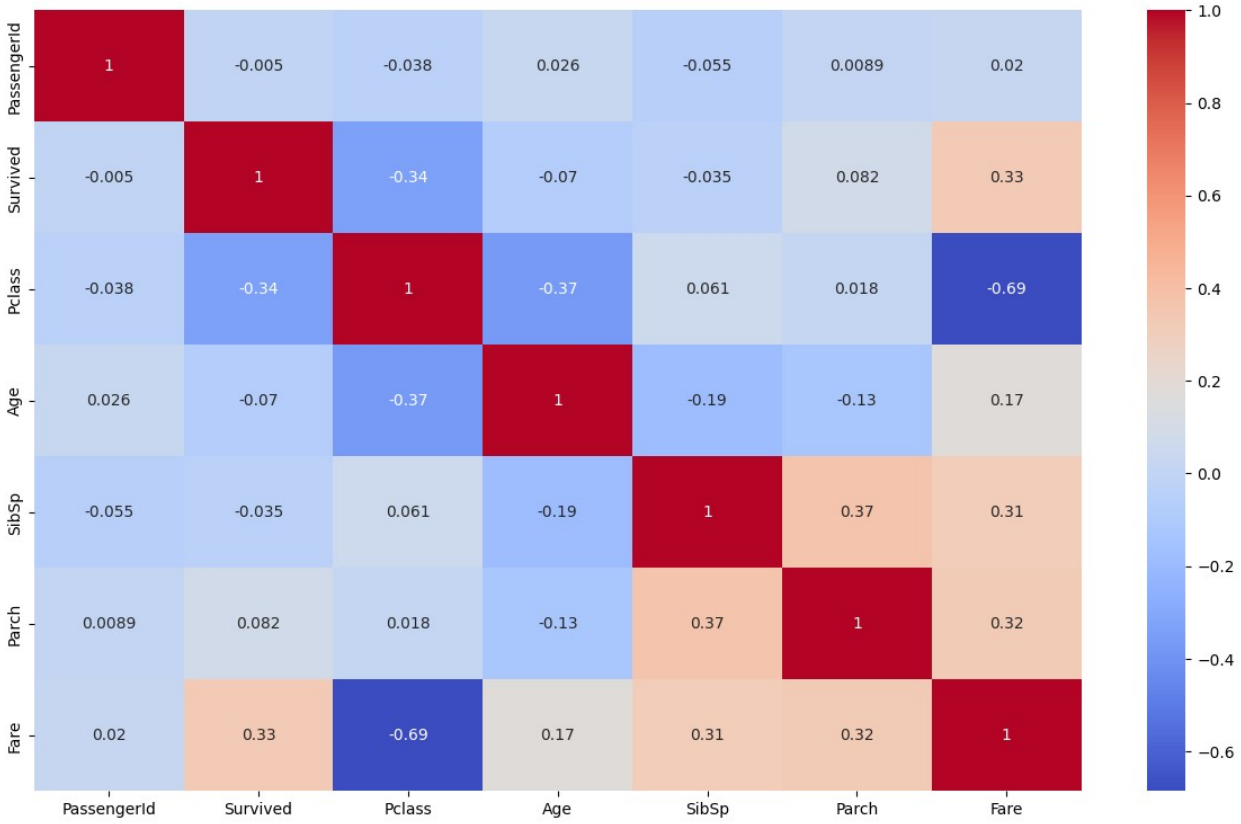
```
<Axes: xlabel='Fare', ylabel='Density'>
```



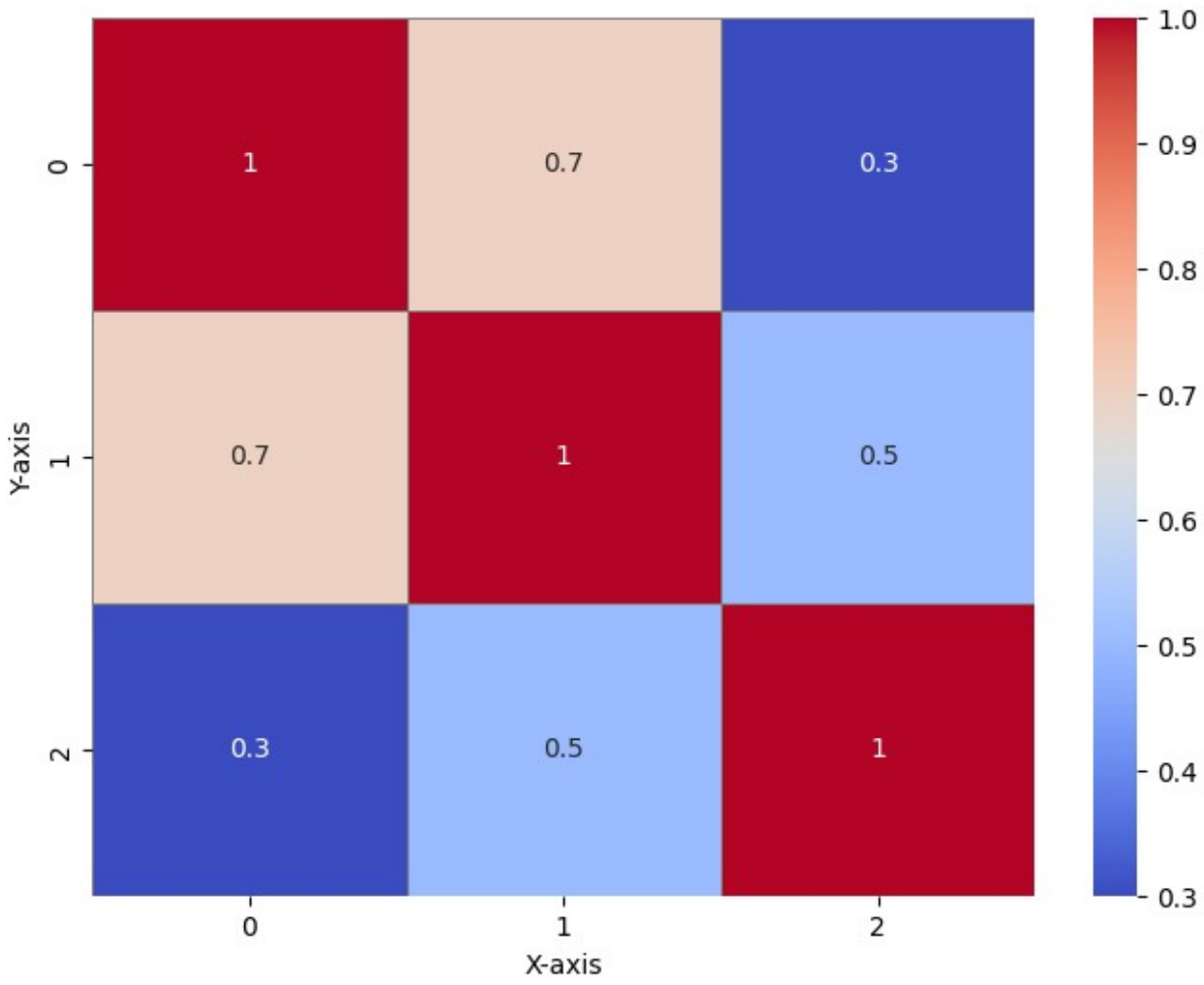
co relation matrix

```
# this will only include the numeric column and remove the non-numeric
ones
numeric_df = df.select_dtypes(include=['float64', 'int64'])

# co relation for the numeric column
corr = numeric_df.corr()

# Create the heatmap
plt.figure(figsize=(15, 9))
sns.heatmap(corr, annot=True, cmap='coolwarm')
```

```
<Axes: >
```




```
# small example for understanding heatmap

data = [[1, 0.7, 0.3],
        [0.7, 1, 0.5],
        [0.3, 0.5, 1]]

# Create the heatmap
plt.figure(figsize=(8, 6))  # Adjust the figure size if needed
sns.heatmap(data, annot=True, cmap='coolwarm', linewidths=0.5,
linecolor='gray')

# Add labels to the axes (optional)
plt.xlabel('X-axis')
plt.ylabel('Y-axis')

# Show the heatmap
plt.show()
```




```
df.head()
```

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp
0	1	0.0	3	Braund, Mr. Owen Harris	male	22.0	1
1	2	1.0	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1
2	3	1.0	3	Heikkinen, Miss. Laina	female	26.0	0
3	4	1.0	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1

```
4                            Allen, Mr. William Henry    male  35.0
0

   Parch            Ticket      Fare Embarked
0      0         A/5 21171  2.110213        S
1      0          PC 17599  4.280593        C
2      0  STON/O2. 3101282  2.188856        S
3      0            113803  3.990834        S
4      0            373450  2.202765        S
```

```
df = df.drop(columns = ['Name', 'Ticket'], axis = 1)

df.head()
```

```
   PassengerId  Survived  Pclass     Sex   Age  SibSp  Parch      Fare
\
0            1       0.0       3    male  22.0      1      0  2.110213

1            2       1.0       1  female  38.0      1      0  4.280593

2            3       1.0       3  female  26.0      0      0  2.188856

3            4       1.0       1  female  35.0      1      0  3.990834

4            5       0.0       3    male  35.0      0      0  2.202765


  Embarked
0        S
1        C
2        S
3        S
4        S
```

label encoding

```
from sklearn.preprocessing import LabelEncoder

cols = ['Sex', 'Embarked']
le = LabelEncoder()
# what we are doing here is that we are creating an instance of the
label encoder class

for col in cols:
    df[col] = le.fit_transform(df[col])
df.head()
```

```
   PassengerId  Survived  Pclass  Sex   Age  SibSp  Parch      Fare
Embarked
```

```
0             1       0.0       3    1  22.0      1      0  2.110213
2
1             2       1.0       1    0  38.0      1      0  4.280593
0
2             3       1.0       3    0  26.0      0      0  2.188856
2
3             4       1.0       1    0  35.0      1      0  3.990834
2
4             5       0.0       3    1  35.0      0      0  2.202765
2

# now  here what we can see is that the values of sex and embarked
which were strings
# before have been converted to numerical values which can now be used
to make and visuali
# properly
```

train test split

```
train = df.iloc[:train_len, :]
test = df.iloc[train_len:, :]

train.head()
```

```
   PassengerId  Survived  Pclass  Sex   Age  SibSp  Parch      Fare
Embarked
0            1       0.0       3    1  22.0      1      0  2.110213
2
1            2       1.0       1    0  38.0      1      0  4.280593
0
2            3       1.0       3    0  26.0      0      0  2.188856
2
3            4       1.0       1    0  35.0      1      0  3.990834
2
4            5       0.0       3    1  35.0      0      0  2.202765
2
```

```
test.head()
```

```
     PassengerId  Survived  Pclass  Sex   Age  SibSp  Parch      Fare
\
891          892       NaN       3    1  34.5      0      0  2.178064

892          893       NaN       3    0  47.0      1      0  2.079442

893          894       NaN       2    1  62.0      0      0  2.369075

894          895       NaN       3    1  27.0      0      0  2.268252
```

```
895          896       NaN       3    0  22.0      1      1  2.586824
```

```
     Embarked
891         1
892         2
893         1
894         2
895         2
```

```
X = train.drop(columns = ['PassengerId', 'Survived'], axis = 1)
y = train['Survived']

X.head()
```

```
   Pclass  Sex   Age  SibSp  Parch      Fare  Embarked
0       3    1  22.0      1      0  2.110213         2
1       1    0  38.0      1      0  4.280593         0
2       3    0  26.0      0      0  2.188856         2
3       1    0  35.0      1      0  3.990834         2
4       3    1  35.0      0      0  2.202765         2
```

model training

```
from sklearn.model_selection import train_test_split, cross_val_score
# classify coloumn

def classify(model):
    X_train, X_test, y_train, y_test = train_test_split(X, y,
test_size = 0.25, random_state = 42)
    model.fit(X_train, y_train)
    print('Accuracy: ', model.score(X_test, y_test))

    score = cross_val_score(model, X, y, cv = 5)
    print('CV Score: ', np.mean(score))

from sklearn.linear_model import LogisticRegression
model = LogisticRegression()
classify(model)
```

```
Accuracy:  0.8071748878923767
CV Score:  0.7833971502102819
```

```
from sklearn.tree import DecisionTreeClassifier
model = DecisionTreeClassifier()
classify(model)
```

```
Accuracy:  0.726457399103139
CV Score:  0.7677044755508129
```

```
from sklearn.ensemble import RandomForestClassifier
model = RandomForestClassifier()
classify(model)
```

```
Accuracy:  0.8026905829596412
CV Score:  0.815956311593748
```

```
!pip install xgboost
```

```
Collecting xgboost
  Obtaining dependency information for xgboost from
https://files.pythonhosted.org/packages/32/10/4689bda37403f7dd029d550c
4446e0097c2f33b8ae877b235e76d5c49bc2/xgboost-2.0.0-py3-none-
win_amd64.whl.metadata
  Downloading xgboost-2.0.0-py3-none-win_amd64.whl.metadata (2.0 kB)
Requirement already satisfied: numpy in c:\users\ilove\appdata\local\
programs\python\python311\lib\site-packages (from xgboost) (1.25.2)
Requirement already satisfied: scipy in c:\users\ilove\appdata\local\
programs\python\python311\lib\site-packages (from xgboost) (1.11.2)
Downloading xgboost-2.0.0-py3-none-win_amd64.whl (99.7 MB)
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Installing collected packages: xgboost
Successfully installed xgboost-2.0.0
```

```
from sklearn.svm import SVC
model = SVC()
classify(model)
```

```
Accuracy:  0.6188340807174888
CV Score:  0.6835289686774214
```

```
from sklearn.neighbors import KNeighborsClassifier
model = KNeighborsClassifier()
classify(model)
```

```
Accuracy:  0.7802690582959642
CV Score:  0.7744397715146569
```

```
import xgboost as xgb
```

```
from xgboost import XGBClassifier
model = XGBClassifier()
classify(model)
```

```
Accuracy:  0.7847533632286996
CV Score:  0.8148327160881301
```

```
!pip install lightgbm catboost
```

```
Collecting lightgbm
  Obtaining dependency information for lightgbm from
```

```
https://files.pythonhosted.org/packages/b3/f8/ee33e36194eb03a76eccf3adac3fba51f0e56fbd20609bb531659d48d3cb/lightgbm-4.1.0-py3-none-win_amd64.whl.metadata
  Downloading lightgbm-4.1.0-py3-none-win_amd64.whl.metadata (19 kB)
Collecting catboost
  Obtaining dependency information for catboost from https://files.pythonhosted.org/packages/e2/a7/aed402760cde64ca28b7787ad2a63a3f1d2066c2f058b2d974ce5479e32e/catboost-1.2.1.1-cp311-cp311-win_amd64.whl.metadata
  Downloading catboost-1.2.1.1-cp311-cp311-win_amd64.whl.metadata (1.2 kB)
Requirement already satisfied: numpy in c:\users\ilove\appdata\local\programs\python\python311\lib\site-packages (from lightgbm) (1.25.2)
Requirement already satisfied: scipy in c:\users\ilove\appdata\local\programs\python\python311\lib\site-packages (from lightgbm) (1.11.2)
Collecting graphviz (from catboost)
  Downloading graphviz-0.20.1-py3-none-any.whl (47 kB)
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Requirement already satisfied: matplotlib in c:\users\ilove\appdata\local\programs\python\python311\lib\site-packages (from catboost) (3.7.3)
Requirement already satisfied: pandas>=0.24 in c:\users\ilove\appdata\local\programs\python\python311\lib\site-packages (from catboost) (2.1.0)
Collecting plotly (from catboost)
  Obtaining dependency information for plotly from https://files.pythonhosted.org/packages/df/79/c80174d711ee26ee5da55a9cc3e248f1ec7a0188b5e4d6bbbbcd09b974b0/plotly-5.17.0-py2.py3-none-any.whl.metadata
  Downloading plotly-5.17.0-py2.py3-none-any.whl.metadata (7.0 kB)
Requirement already satisfied: six in c:\users\ilove\appdata\local\programs\python\python311\lib\site-packages (from catboost) (1.16.0)
Requirement already satisfied: python-dateutil>=2.8.2 in c:\users\ilove\appdata\local\programs\python\python311\lib\site-packages (from pandas>=0.24->catboost) (2.8.2)
Requirement already satisfied: pytz>=2020.1 in c:\users\ilove\appdata\local\programs\python\python311\lib\site-packages (from pandas>=0.24->catboost) (2023.3)
Requirement already satisfied: tzdata>=2022.1 in c:\users\ilove\appdata\local\programs\python\python311\lib\site-packages (from pandas>=0.24->catboost) (2023.3)
Requirement already satisfied: contourpy>=1.0.1 in c:\users\ilove\appdata\local\programs\python\python311\lib\site-packages (from matplotlib->catboost) (1.1.0)
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Requirement already satisfied: packaging>=20.0 in c:\users\ilove\
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Requirement already satisfied: pillow>=6.2.0 in c:\users\ilove\
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Requirement already satisfied: pyparsing>=2.3.1 in c:\users\ilove\
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Collecting tenacity>=6.2.0 (from plotly->catboost)
  Obtaining dependency information for tenacity>=6.2.0 from
https://files.pythonhosted.org/packages/f4/f1/990741d5bb2487d529d20a43
3210ffa136a367751e454214013b441c4575/tenacity-8.2.3-py3-none-
any.whl.metadata
  Downloading tenacity-8.2.3-py3-none-any.whl.metadata (1.0 kB)
Downloading lightgbm-4.1.0-py3-none-win_amd64.whl (1.3 MB)
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Downloading tenacity-8.2.3-py3-none-any.whl (24 kB)
Installing collected packages: tenacity, graphviz, plotly, lightgbm,
catboost
Successfully installed catboost-1.2.1.1 graphviz-0.20.1 lightgbm-4.1.0
plotly-5.17.0 tenacity-8.2.3
```

```
from lightgbm import LGBMClassifier
from catboost import CatBoostClassifier

from lightgbm import LGBMClassifier
model = LGBMClassifier(verbose = -1)
classify(model)
```

```
Accuracy:  0.8116591928251121
CV Score:  0.8238277572029377
```

```
from catboost import CatBoostClassifier
model = CatBoostClassifier(verbose = 0)
classify(model)
```

```
Accuracy:  0.8295964125560538
CV Score:  0.8226790534178645
```