```
#import nbconvert #recode the dataset
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
%matplotlib inline

train = pd.read_csv('/content/train.csv') # Training set is already available
train.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: View recommended plots

```
train.info(verbose=True)
```

```
<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
```

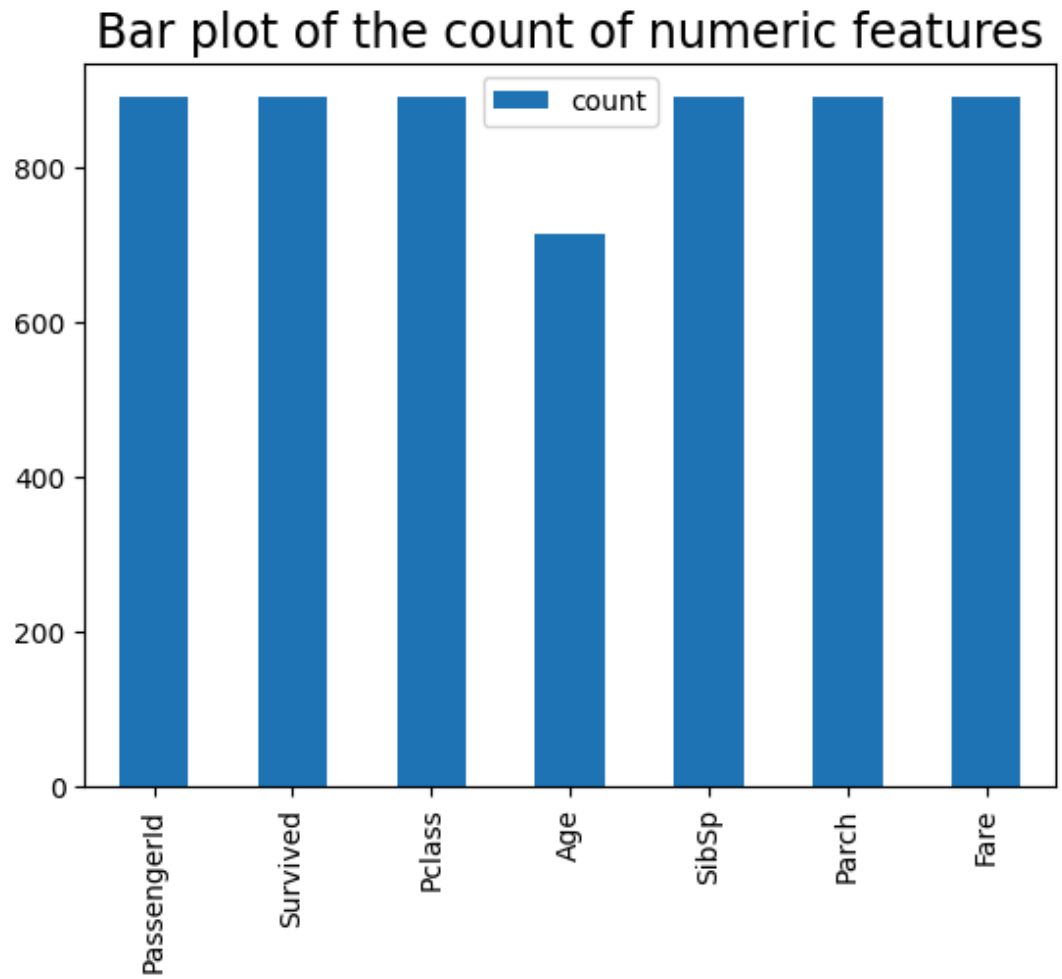
```
d=train.describe()
d
```

| | 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: View recommended plots

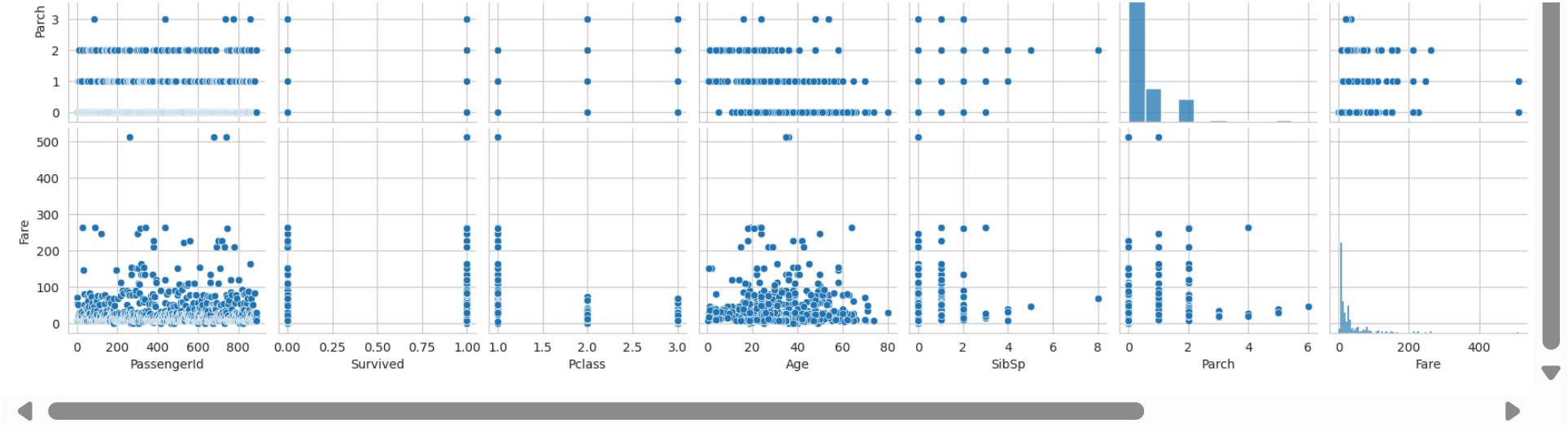
```
dT=d.T
dT.plot.bar(y='count')
plt.title("Bar plot of the count of numeric features",fontsize=17)
```

```
Text(0.5, 1.0, 'Bar plot of the count of numeric features')
```



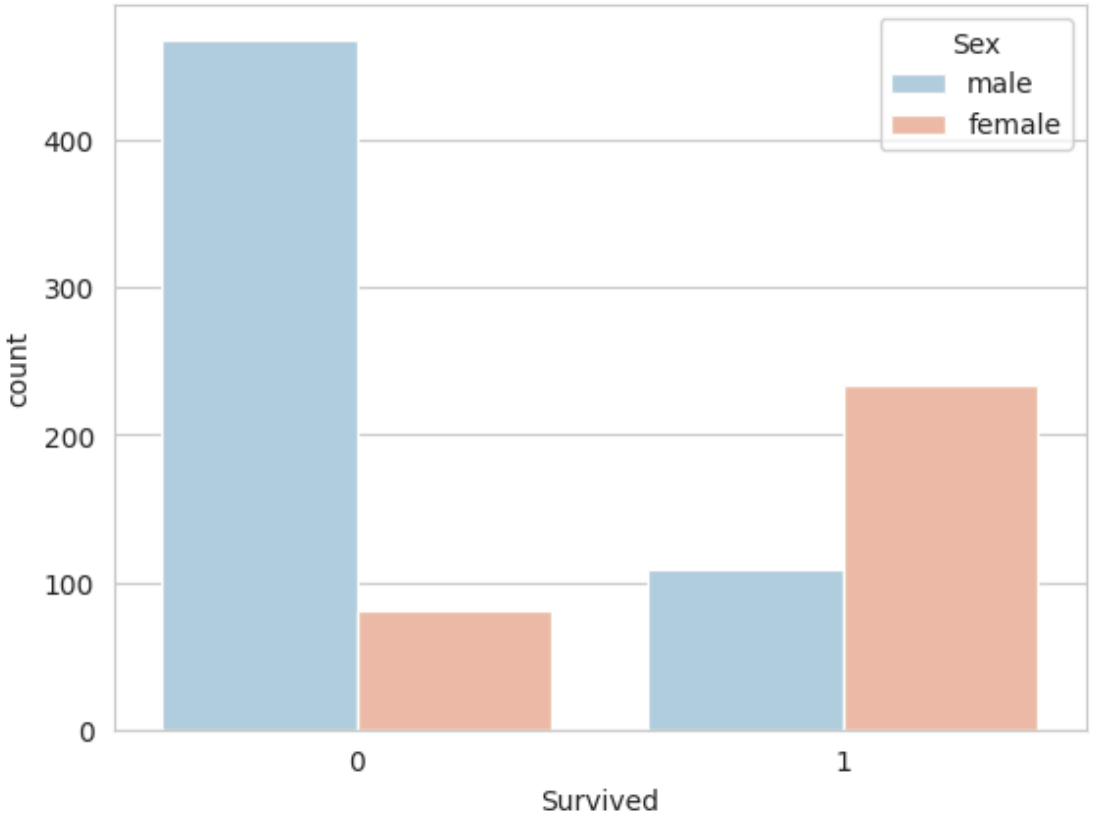

```
sns.set_style('whitegrid')
sns.countplot(x='Survived',data=train,palette='RdBu_r')
sns.pairplot(train)
```


PassengerId
Survived
Pclass
Age
SibSp


Parch
Fare
PassengerId
Survived
Pclass
Age
SibSp
Parch
Fare

```
sns.set_style('whitegrid')
sns.countplot(x='Survived',hue='Sex',data=train,palette='RdBu_r')
```

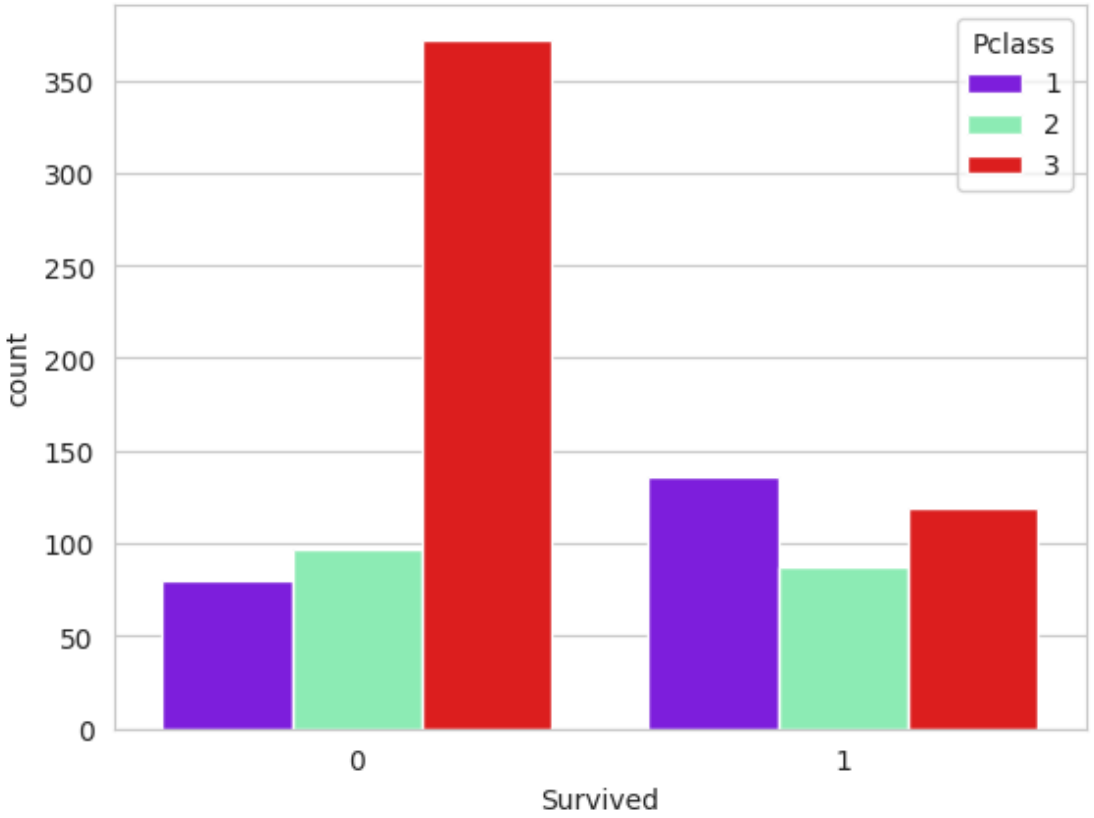
```
<Axes: xlabel='Survived', ylabel='count'>
```




```
sns.set_style('whitegrid')
```

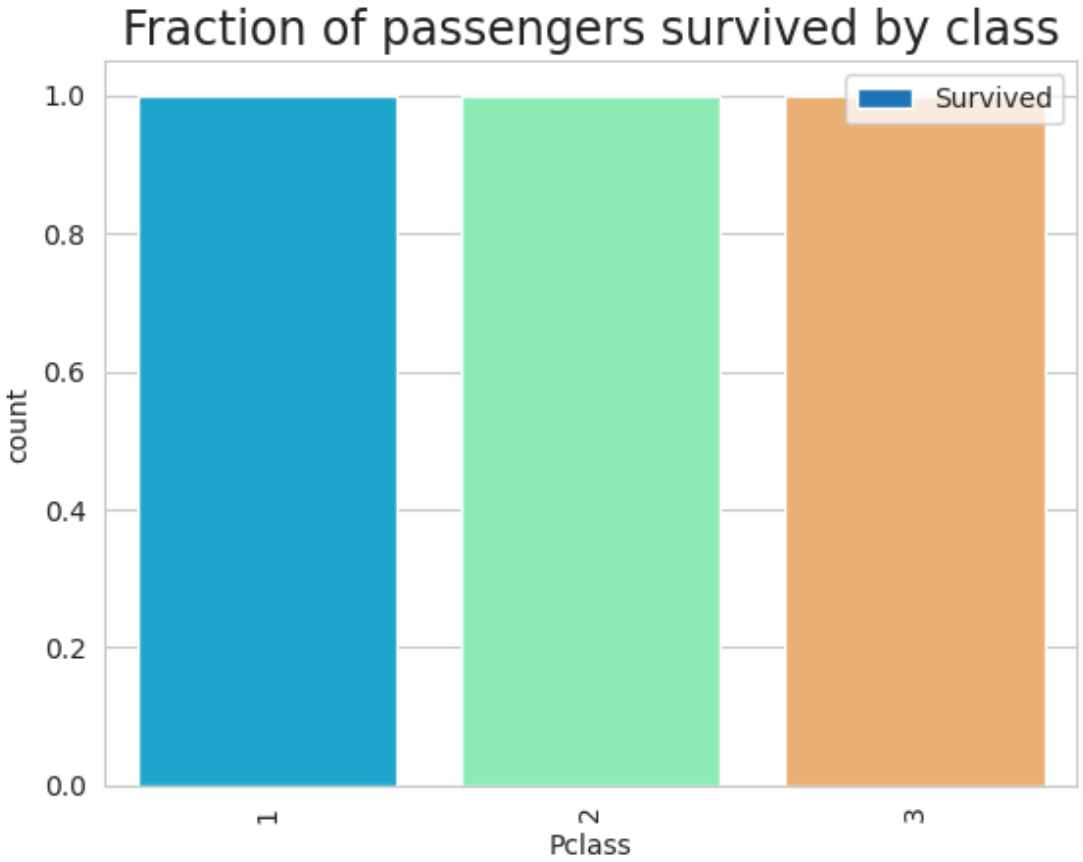
```
sns.countplot(x= 'Survived' ,hue= 'Pclass' ,data=train,palette= 'rainbow' )
```

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



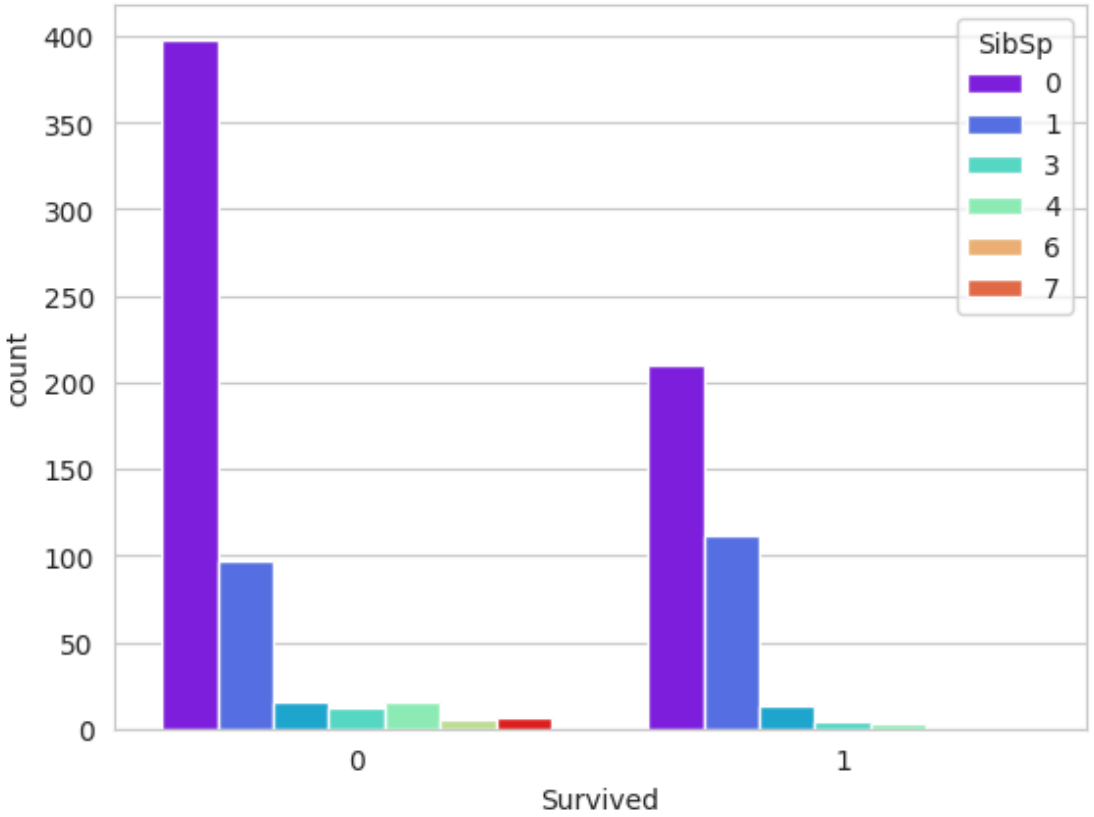

```
f_class_survived=train.groupby('Pclass')['Survived'].mean()
f_class_survived = pd.DataFrame(f_class_survived)
f_class_survived
f_class_survived.plot.bar(y='Survived')
sns.countplot(x='Survived',data=f_class_survived,palette='rainbow')
plt.title("Fraction of passengers survived by class",fontsize=17)
```

```
<ipython-input-9-0920c7b673ab>:5: FutureWarning:

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

  sns.countplot(x='Survived',data=f_class_survived,palette='rainbow')
Text(0.5, 1.0, 'Fraction of passengers survived by class')
```



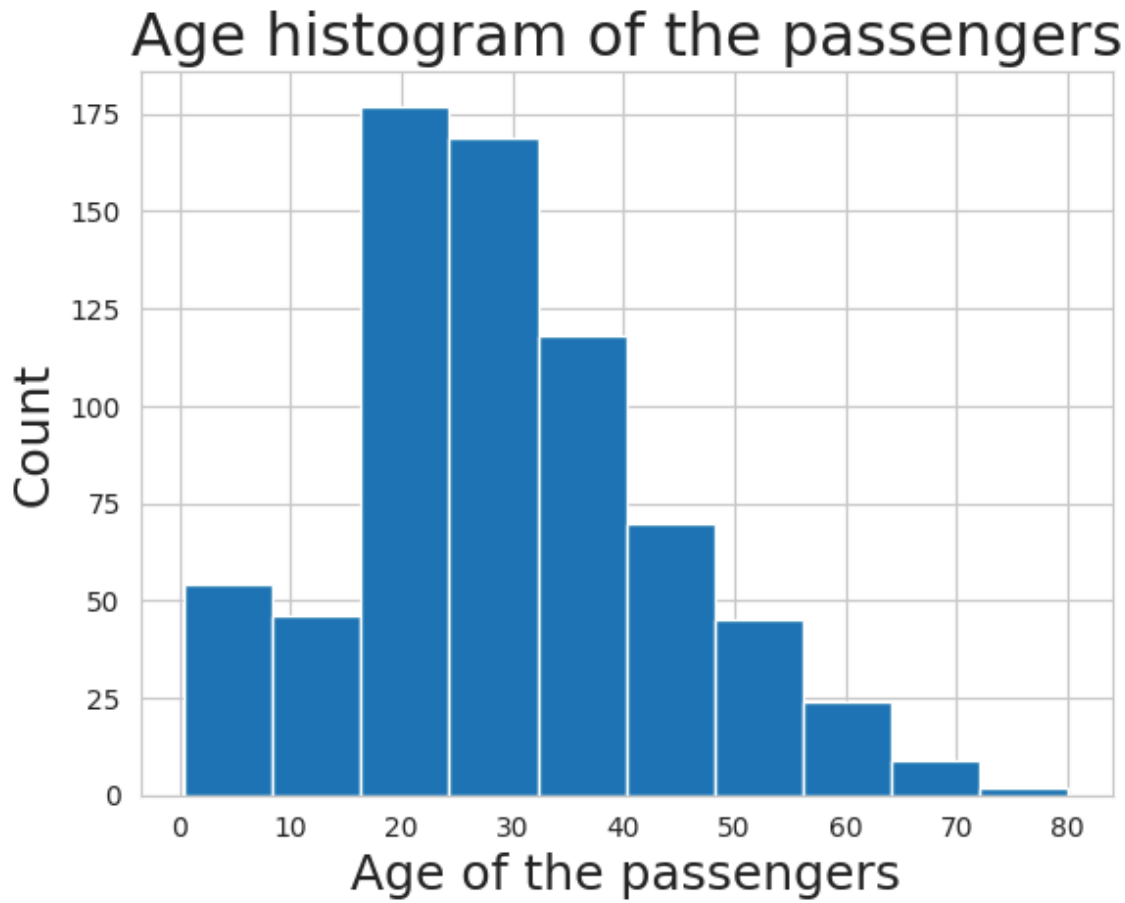

```
sns.set_style('whitegrid')
sns.countplot(x='Survived',hue='SibSp',data=train,palette='rainbow')
```

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



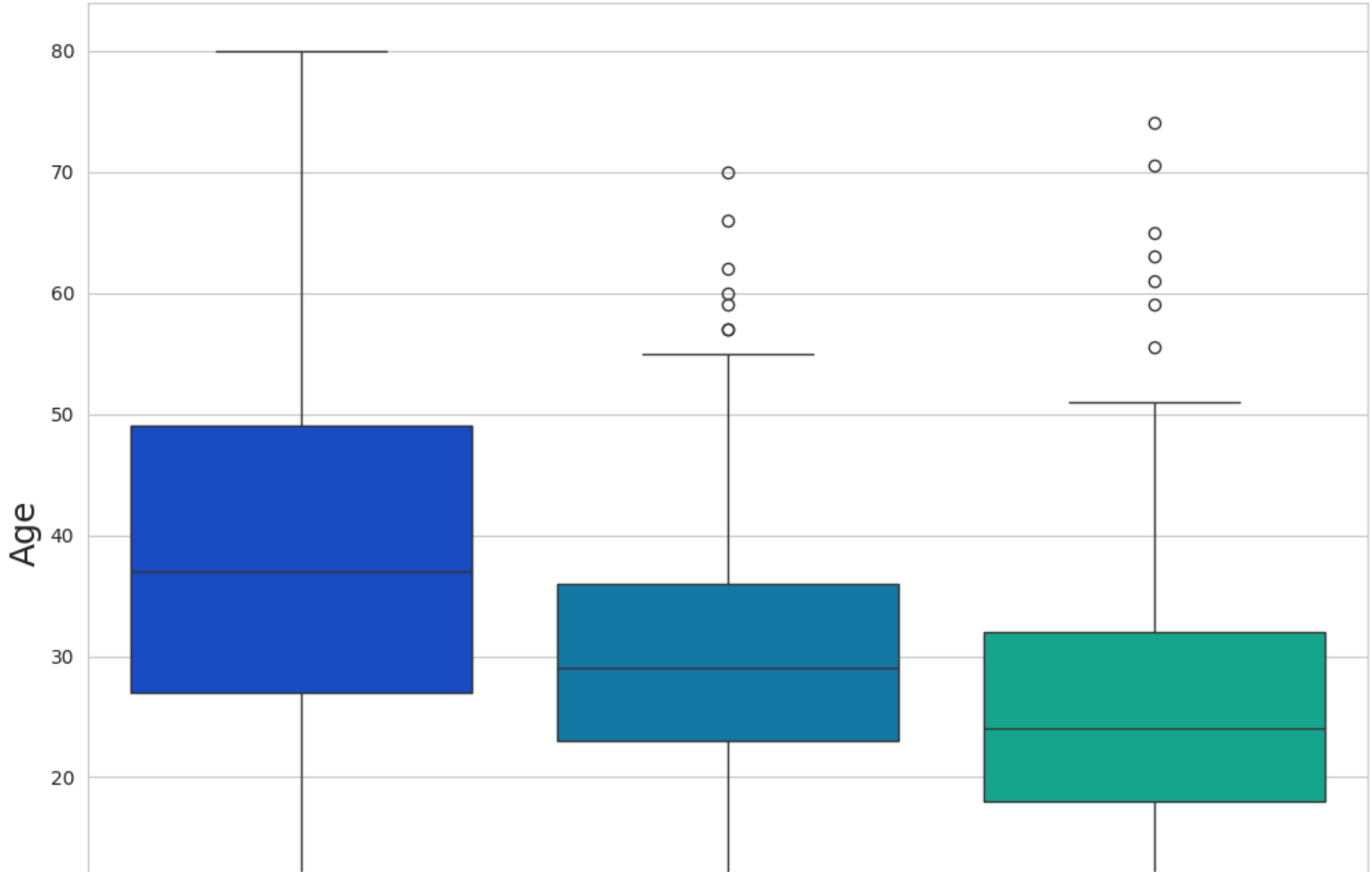

```
plt.xlabel("Age of the passengers",fontsize=18)
plt.ylabel("Count",fontsize=18)
plt.title("Age histogram of the passengers",fontsize=22)
#train['Age'].hist(bins=30,color='darkred',alpha=0.7,figsize=(10,6))
train['Age'].hist()
```

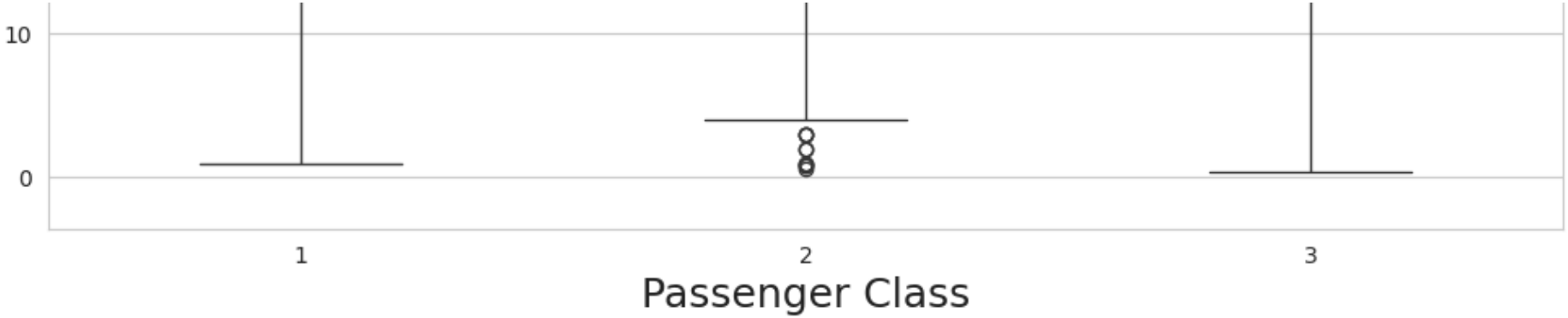
```
<Axes: title={'center': 'Age histogram of the passengers'}, xlabel='Age of the passengers', ylabel='Count'>
```




```
plt.figure(figsize=(12, 10))
plt.xlabel("Passenger Class",fontsize=18)
plt.ylabel("Age",fontsize=18)
sns.boxplot(x='Pclass',y='Age',data=train,palette='winter')
```

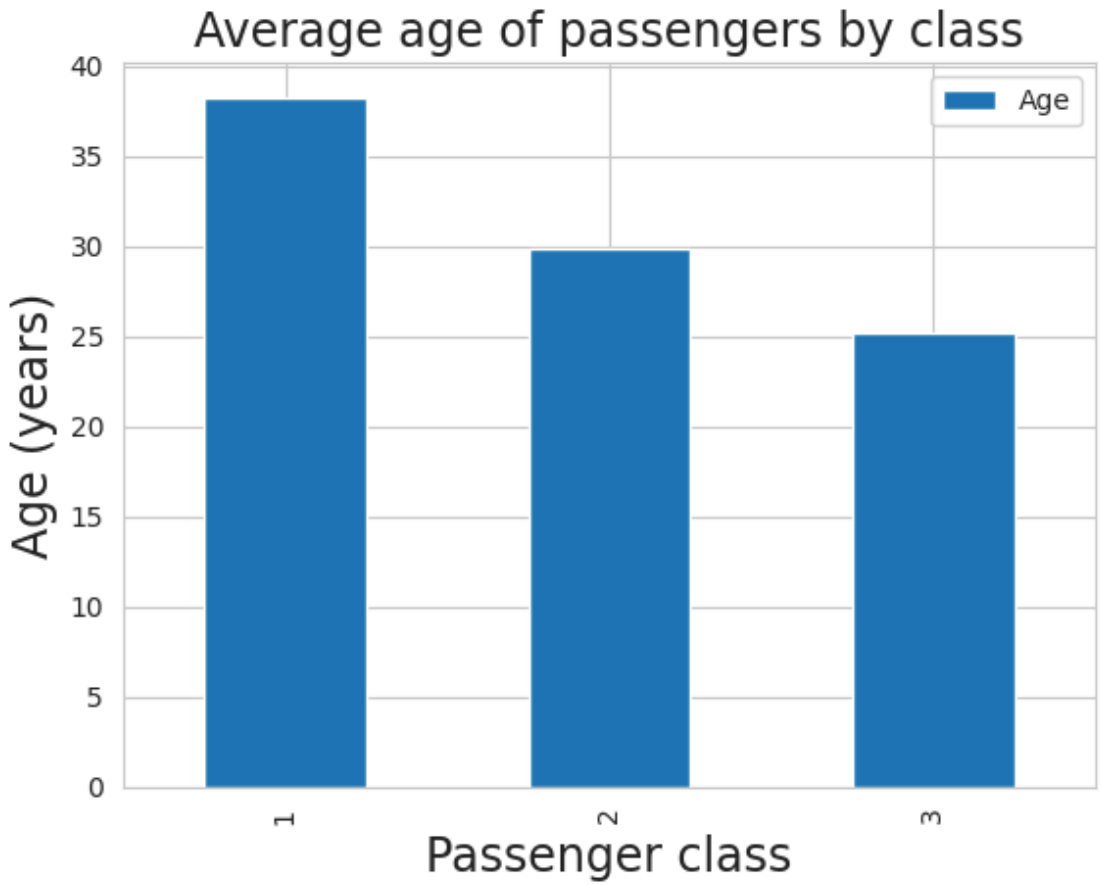
```
<ipython-input-12-2a1e3ee6c4a4>:4: FutureWarning:

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

  sns.boxplot(x='Pclass',y='Age',data=train,palette='winter')
<Axes: xlabel='Passenger Class', ylabel='Age'>
```





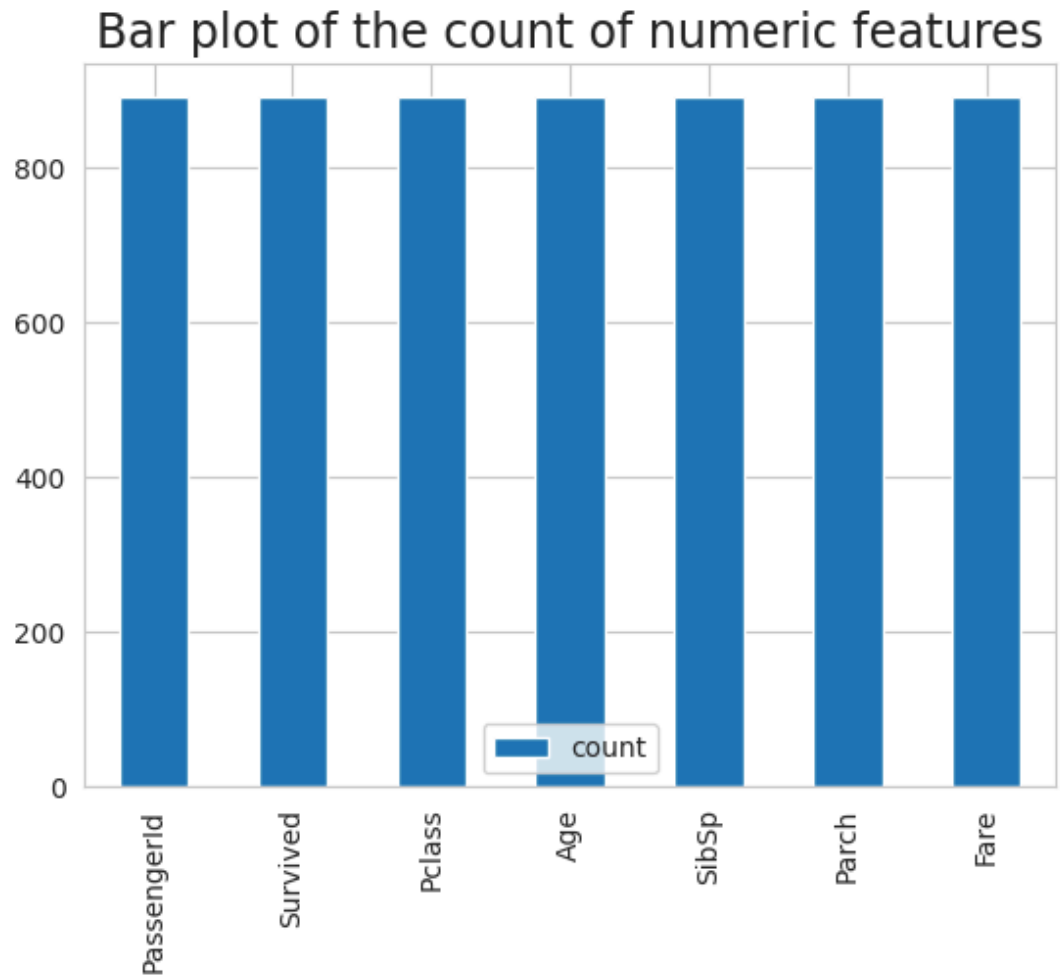

```
f_class_Age=train.groupby('Pclass')['Age'].mean()
f_class_Age = pd.DataFrame(f_class_Age)

f_class_Age.plot.bar(y='Age')
plt.title("Average age of passengers by class",fontsize=17)
plt.ylabel("Age (years)", fontsize=17)
plt.xlabel("Passenger class", fontsize=17)
```

```
Text(0.5, 0, 'Passenger class')
```



```
a=list(f_class_Age['Age'])

def impute_age(cols):
    Age = cols[0]
    Pclass = cols[1]

    if pd.isnull(Age):

        if Pclass == 1:
            return a[0]

        elif Pclass == 2:
            return a[1]

        else:
            return a[2]

    else:
        return Age


train['Age'] = train[['Age','Pclass']].apply(impute_age,axis=1)
d=train.describe()

dT=d.T
dT.plot.bar(y='count')
plt.title("Bar plot of the count of numeric features",fontsize=17)
```

```
Text(0.5, 1.0, 'Bar plot of the count of numeric features')
```




```
train.drop('Cabin',axis=1,inplace=True)
train.dropna(inplace=True)
train.head()
```

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

Next steps: View recommended plots

```
train.drop(['PassengerId','Name','Ticket'],axis=1,
           inplace=True)
train.dropna(inplace=True)
train.head()
```

| | Survived | Pclass | Sex | Age | SibSp | Parch | Fare | Embarked |
|---|---|---|---|---|---|---|---|---|
| **0** | 0 | 3 | male | 22.0 | 1 | 0 | 7.2500 | S |
| **1** | 1 | 1 | female | 38.0 | 1 | 0 | 71.2833 | C |
| **2** | 1 | 3 | female | 26.0 | 0 | 0 | 7.9250 | S |
| **3** | 1 | 1 | female | 35.0 | 1 | 0 | 53.1000 | S |
| **4** | 0 | 3 | male | 35.0 | 0 | 0 | 8.0500 | S |

Next steps: View recommended plots

```
sex = pd.get_dummies(train['Sex'],drop_first=True)
embark = pd.get_dummies(train['Embarked'],drop_first=True)
```

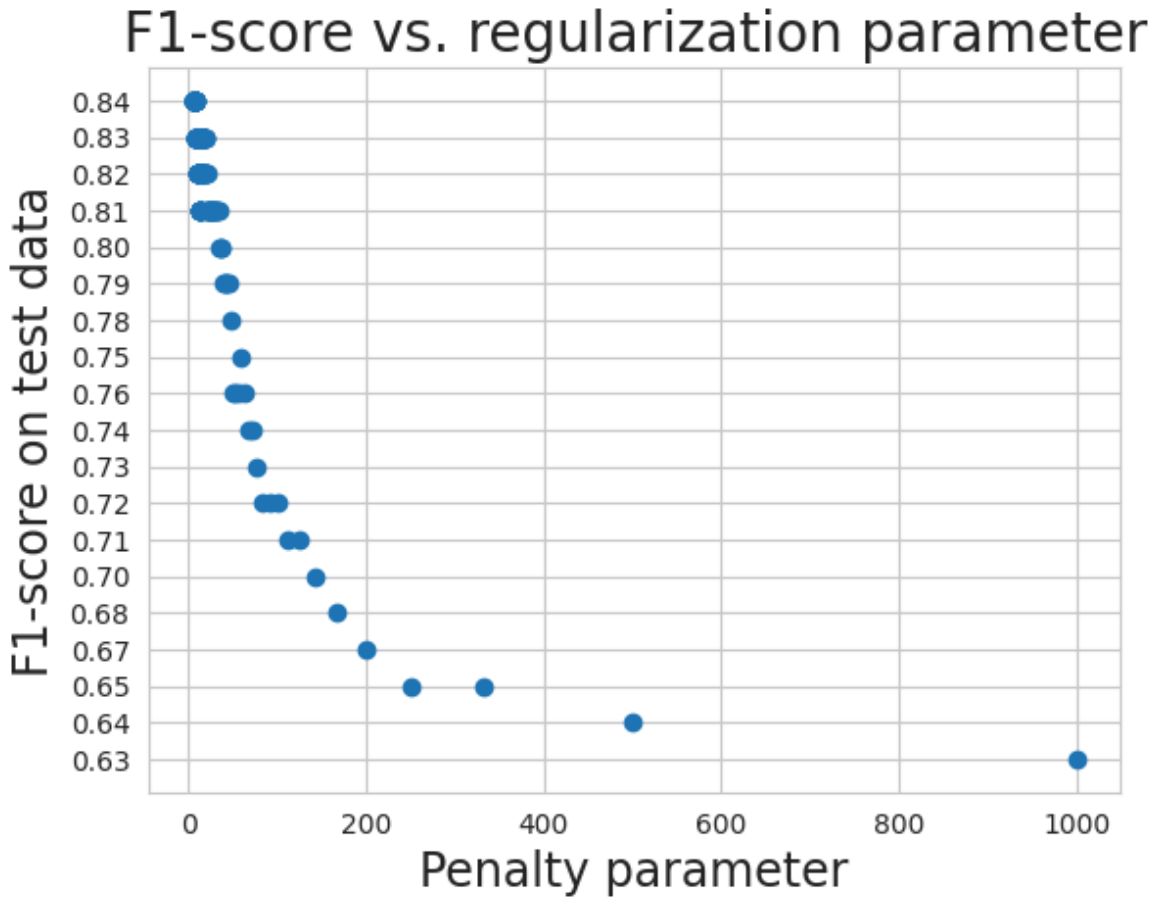
```
train.drop(['Sex','Embarked'],axis=1,inplace=True)
train = pd.concat([train,sex,embark],axis=1)
train.head()
```

| | Survived | Pclass | Age | SibSp | Parch | Fare | male | Q | S |
|---|---|---|---|---|---|---|---|---|---|
| **0** | 0 | 3 | 22.0 | 1 | 0 | 7.2500 | 1 | 0 | 1 |
| **1** | 1 | 1 | 38.0 | 1 | 0 | 71.2833 | 0 | 0 | 0 |
| **2** | 1 | 3 | 26.0 | 0 | 0 | 7.9250 | 0 | 0 | 1 |
| **3** | 1 | 1 | 35.0 | 1 | 0 | 53.1000 | 0 | 0 | 1 |
| **4** | 0 | 3 | 35.0 | 0 | 0 | 8.0500 | 1 | 0 | 1 |

Next steps: View recommended plots

```
from sklearn.model_selection import train_test_split

X_train, X_test, y_train, y_test = train_test_split(
    train.drop('Survived',axis=1),train['Survived'],
    test_size=0.30,random_state=111)
```

```
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import classification_report
nsimu=201
penalty=[0]*nsimu
logmodel=[0]*nsimu
predictions =[0]*nsimu
class_report = [0]*nsimu
f1=[0]*nsimu

for i in range(1,nsimu):
        logmodel[i] =(LogisticRegression(C=i/1000,tol=1e-4, max_iter=int(1e6),
                                         n_jobs=4))
        logmodel[i].fit(X_train,y_train)
        predictions[i] = logmodel[i].predict(X_test)
        class_report[i] = classification_report(y_test,predictions[i])
        l=class_report[i].split()
        f1[i] = l[len(l)-2]
        penalty[i]=1000/i

plt.scatter(penalty[1:len(penalty)-2],f1[1:len(f1)-2])
plt.title("F1-score vs. regularization parameter",fontsize=20)
plt.xlabel("Penalty parameter",fontsize=17)
plt.ylabel("F1-score on test data",fontsize=17)
plt.show()
```




```
nsimu=101
class_report = [0]*nsimu
f1=[0]*nsimu
test_fraction =[0]*nsimu
for i in range(1,nsimu):
        X_train, X_test, y_train, y_test = train_test_split(train.drop('Survived',axis=1),
                                                    train['Survived'], test_size=0.1+(i-1)*0.007,
                                                    random_state=111)
        logmodel =(LogisticRegression(C=1,tol=1e-4, max_iter=1000,n_jobs=4))
        logmodel.fit(X_train,y_train)
        predictions = logmodel.predict(X_test)
        class_report[i] = classification_report(y_test,predictions)
```