okjtza2pc

February 6, 2023

[1]:
```
import pandas as pd
import numpy as np
from sklearn.preprocessing import StandardScaler
from sklearn.linear_model import LogisticRegression
from sklearn.model_selection import train_test_split
from statsmodels.stats.outliers_influence import variance_inflation_factor
from sklearn.metrics import accuracy_score, confusion_matrix , roc_curve,␣
 ↪roc_auc_score
from sklearn.metrics import classification_report
from sklearn.model_selection import KFold , cross_val_score
from sklearn.model_selection import GridSearchCV
from sklearn.metrics import confusion_matrix, classification_report
from sklearn.feature_selection import SelectKBest , f_classif
import matplotlib.pyplot as plt
import seaborn as sns
import warnings
warnings.filterwarnings('ignore')
```

[2]:
```
data = pd.read_csv('titanic_train.csv')

data.head()
```

[2]:

	Unnamed: 0	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embarked
0	0	1	0	3	Braund, Mr. Owen Harris	male	22.0	1					
1	1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th…	female	38.0	1					
2	2	3	1	3	Heikkinen, Miss. Laina	female	26.0	0					
3	3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1					
4	4	5	0	3	Allen, Mr. William Henry	male	35.0	0					

```
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
```

[3]:
```
data = data.drop(['Unnamed: 0'], axis =1)
```

[4]:
```
data.shape
```

[4]:
```
(891, 12)
```

[5]:
```
data.isna().sum()
```

[5]:
```
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
```

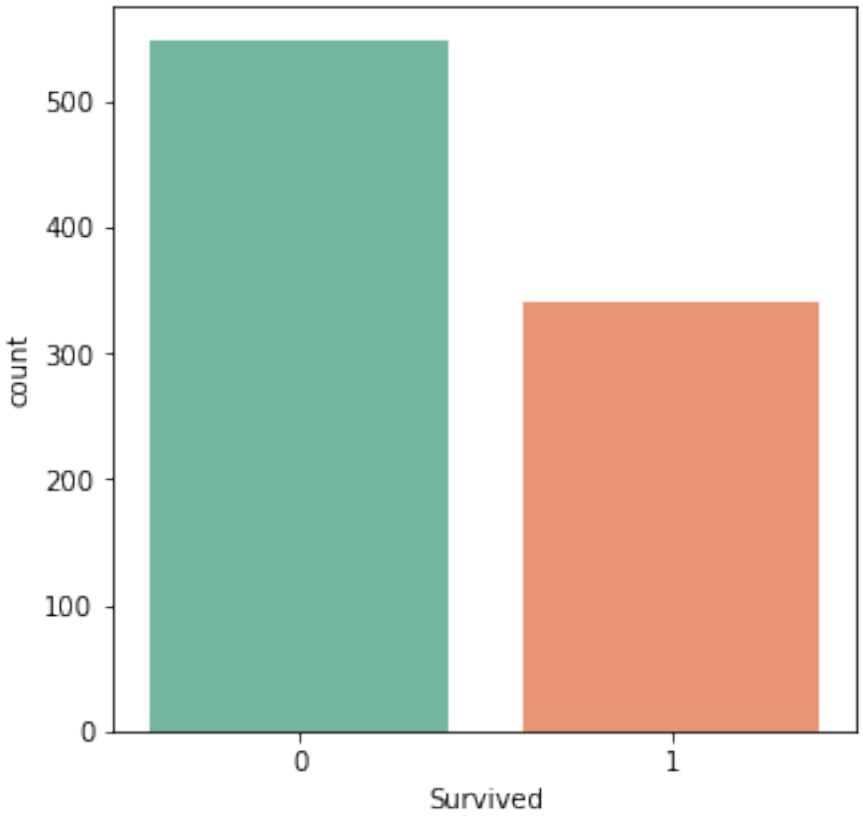
[6]:
```
data = data.drop(['Cabin'], axis =1)
```

[7]:
```
data.describe()
```

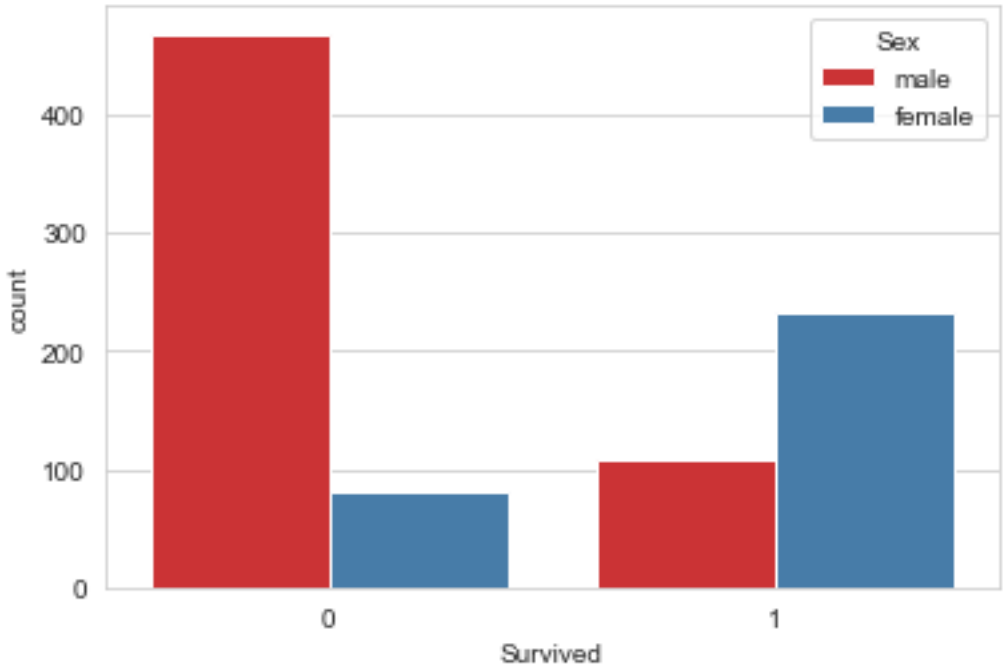
[7]:
```
       PassengerId    Survived      Pclass         Age       SibSp  \
count   891.000000  891.000000  891.000000  714.000000  891.000000
mean    446.000000    0.383838    2.308642   29.699118    0.523008
std     257.353842    0.486592    0.836071   14.526497    1.102743
min       1.000000    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
```

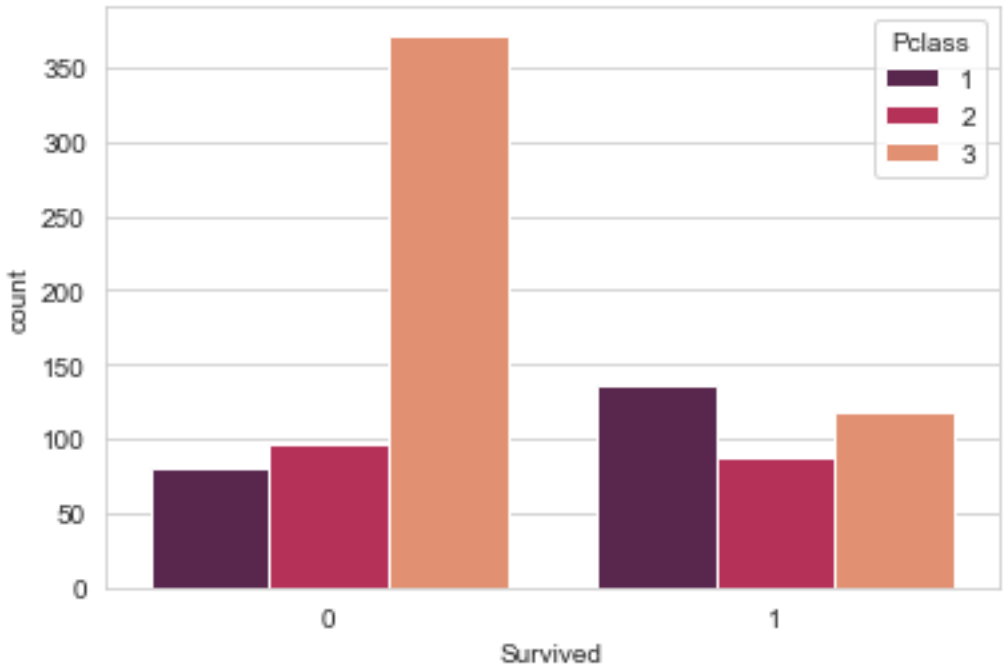
[9]:
```
plt.figure(figsize=(5,5))
sns.countplot(x='Survived', data=data , palette='Set2')
plt.show()
```



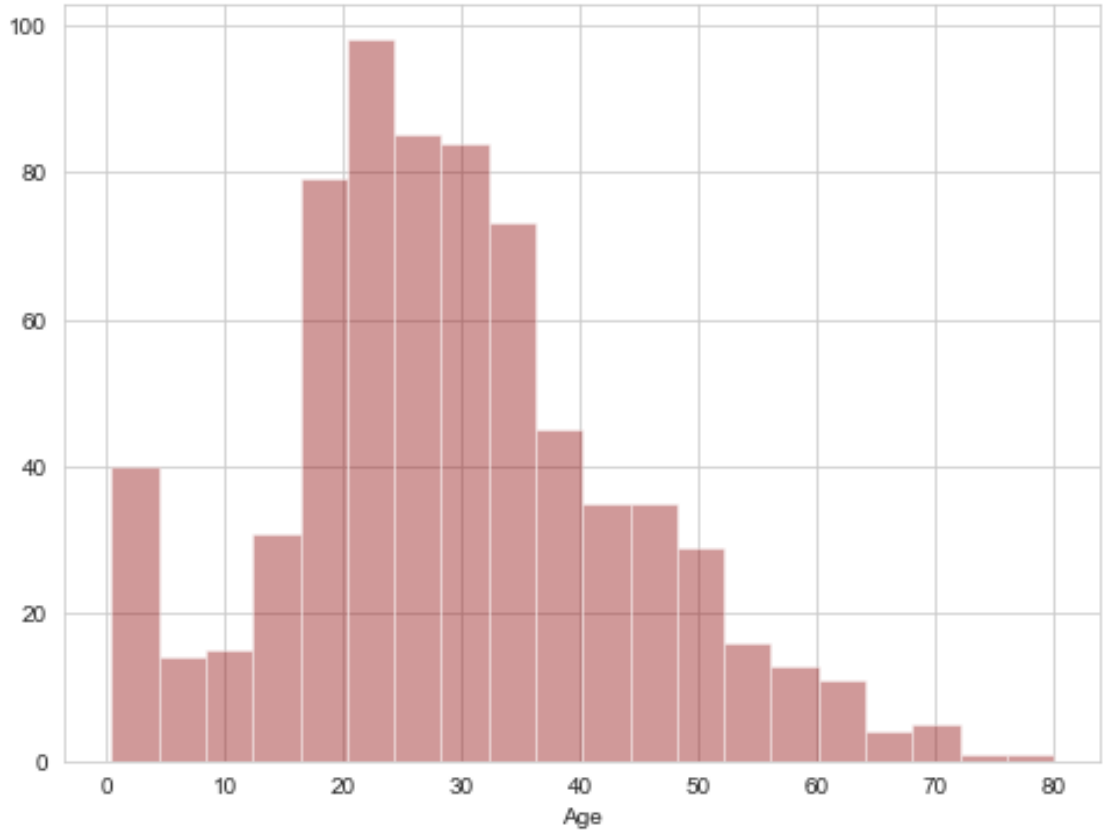
[16]:
```
sns.set_style('whitegrid')
sns.countplot(x='Survived', hue='Sex', data=data , palette='Set1')
plt.show()
```



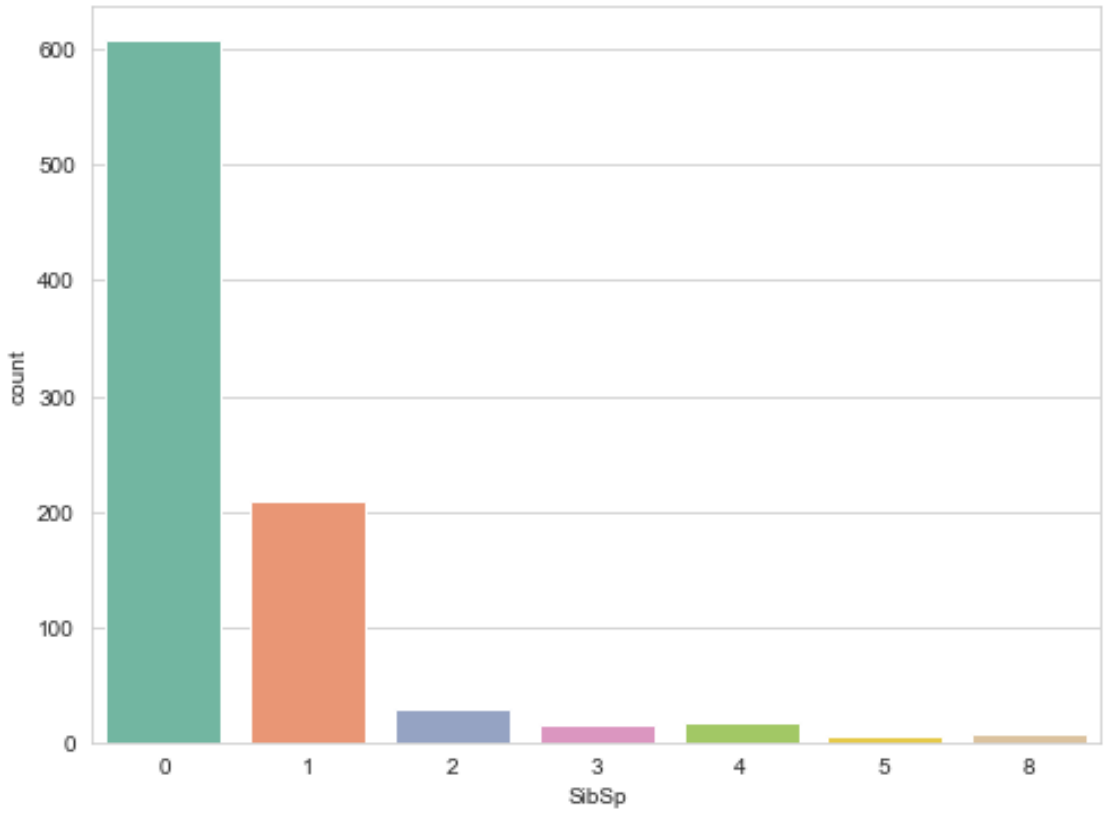
[17]:
```
sns.set_style('whitegrid')
sns.countplot(x='Survived', hue='Pclass', data=data , palette='rocket')
plt.show()
```



[21]:
```
plt.figure(figsize=(8,6))
sns.distplot(data['Age'].dropna(),kde = False ,color ='darkred')
plt.show()
```

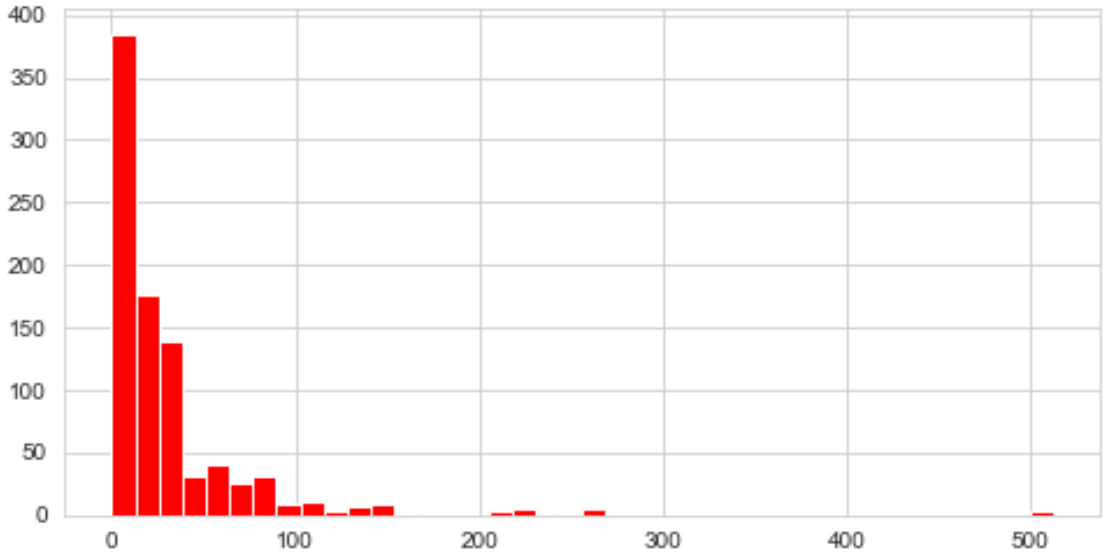


[28]:
```
# Checking the total siblings / spouse size
plt.figure(figsize=(8,6))
sns.countplot(x='SibSp', data=data, palette='Set2')
plt.show()
```



[29]:
```
data['Fare'].hist(color ='red',bins=40,figsize=(8,4))
```

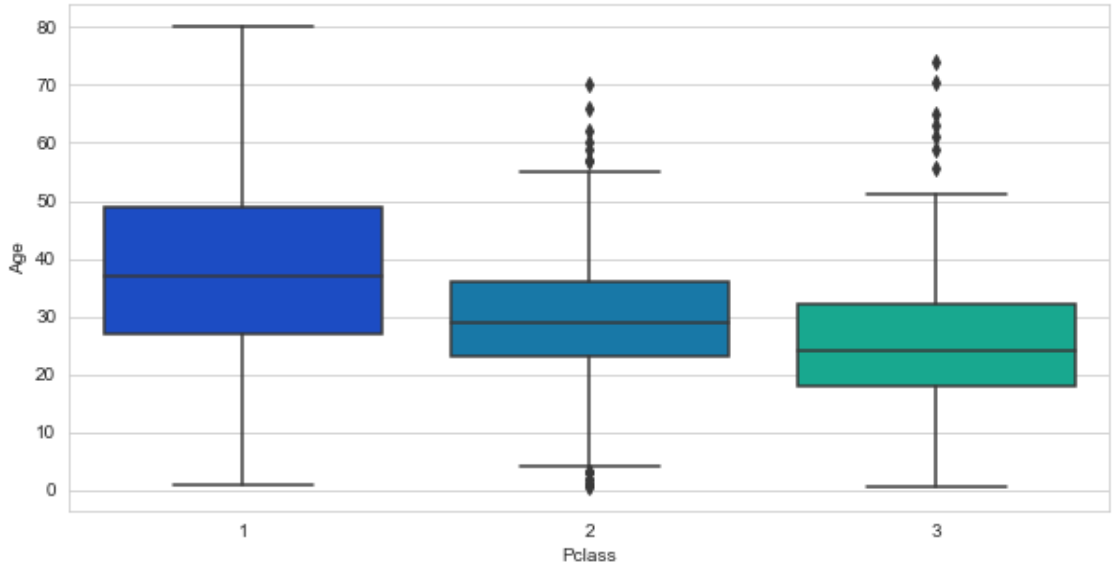
[29]: <AxesSubplot:>



1 Data Cleaning

We want to fill in missing age data instead of just dropping the missing age data rews.One way to do this is by filling in the mean age of all the passengers (imputation).However we can be smarter about this and check the average age by passanger class

[31]:
```
plt.figure(figsize=(10,5))
sns.boxplot(x='Pclass',y='Age', data = data, palette ='winter')
plt.show()
```



We can see the wealthier passengers in the higher classes tend to be older,which makes sence. We'll use these average age values to impute based on Pclass for age

[32]:
```
def impute_age(cols):
    Age = cols[0]
    Pclass = cols[1]

    if pd.isnull(Age):

        if Pclass == 1:
            return 37

        elif Pclass == 2:
            return 29

        else:
```

```
            return 24

    else:
        return Age
```

[34]:
```
data['Age'] = data[['Age','Pclass']].apply(impute_age , axis =1)
```

[35]:
```
# Fill the Null values present in Embarked column
data['Embarked'] = data['Embarked'].fillna (data['Embarked'].mode()[0])
```

[36]:
```
data.isna().sum()
```

[36]:
```
PassengerId    0
Survived       0
Pclass         0
Name           0
Sex            0
Age            0
SibSp          0
Parch          0
Ticket         0
Fare           0
Embarked       0
dtype: int64
```

[37]:
```
data.describe()
```

[37]:
```
       PassengerId    Survived      Pclass         Age       SibSp  \
count   891.000000  891.000000  891.000000  891.000000  891.000000
mean    446.000000    0.383838    2.308642   29.066409    0.523008
std     257.353842    0.486592    0.836071   13.244532    1.102743
min       1.000000    0.000000    1.000000    0.420000    0.000000
25%     223.500000    0.000000    2.000000   22.000000    0.000000
50%     446.000000    0.000000    3.000000   26.000000    0.000000
75%     668.500000    1.000000    3.000000   37.000000    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
```

[38]:
```
data.head()
```

[38]:
```
   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 Embarked
0      0         A/5 21171   7.2500        S
1      0          PC 17599  71.2833        C
2      0  STON/O2. 3101282   7.9250        S
3      0            113803  53.1000        S
4      0            373450   8.0500        S
```

[39]:
```
data.Embarked.value_counts()
```

[39]:
```
S    646
C    168
Q     77
Name: Embarked, dtype: int64
```

[40]:
```
data['Embarked'] = data['Embarked'].replace({'S':1,'C':0,'Q':2})

data['Sex'] = data['Sex'].replace({'male':1,'female':0})
```

[41]:
```
data.head()
```

[41]:
```
   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  Parch  \
0                            Braund, Mr. Owen Harris    1  22.0      1      0
1  Cumings, Mrs. John Bradley (Florence Briggs Th…    0  38.0      1      0
2                             Heikkinen, Miss. Laina    0  26.0      0      0
```

```
3       Futrelle, Mrs. Jacques Heath (Lily May Peel)    0  35.0      1      0
4                            Allen, Mr. William Henry    1  35.0      0      0

             Ticket     Fare  Embarked
0         A/5 21171   7.2500         1
1          PC 17599  71.2833         0
2  STON/O2. 3101282   7.9250         1
3            113803  53.1000         1
4            373450   8.0500         1
```

[50]:
```
data.drop(columns=['PassengerId'],axis=1, inplace=True)
data.head()
```

[50]:
```
   Survived  Pclass  Sex   Age  SibSp  Parch     Fare  Embarked
0         0       3    1  22.0      1      0   7.2500         1
1         1       1    0  38.0      1      0  71.2833         0
2         1       3    0  26.0      0      0   7.9250         1
3         1       1    0  35.0      1      0  53.1000         1
4         0       3    1  35.0      0      0   8.0500         1
```

[51]:
```
x = data.drop(columns = ['Survived']) # Features
y = data['Survived']
```

[52]:
```
scaler = StandardScaler()
x_scaled = scaler.fit_transform(x)
```

[53]:
```
x_train,x_test,y_train,y_test = train_test_split(x_scaled,y, test_size =0.25 ,␣
↪random_state = 50)
```

[54]:
```
log = LogisticRegression()

log.fit(x_train,y_train)
```

[54]:
```
LogisticRegression()
```

[55]:
```
y_pred = log.predict(x_test)

accuracy = accuracy_score(y_test,y_pred)
accuracy
```

[55]:
```
0.8026905829596412
```

[56]:
```
c_mat = confusion_matrix(y_test,y_pred)

c_mat
```

[56]:
```
array([[116,  14],
       [ 30,  63]], dtype=int64)
```

[57]:
```
print(classification_report(y_test,y_pred))
```

```
              precision    recall  f1-score   support

           0       0.79      0.89      0.84       130
           1       0.82      0.68      0.74        93

    accuracy                           0.80       223
   macro avg       0.81      0.78      0.79       223
weighted avg       0.80      0.80      0.80       223
```

[ ]:

[ ]: