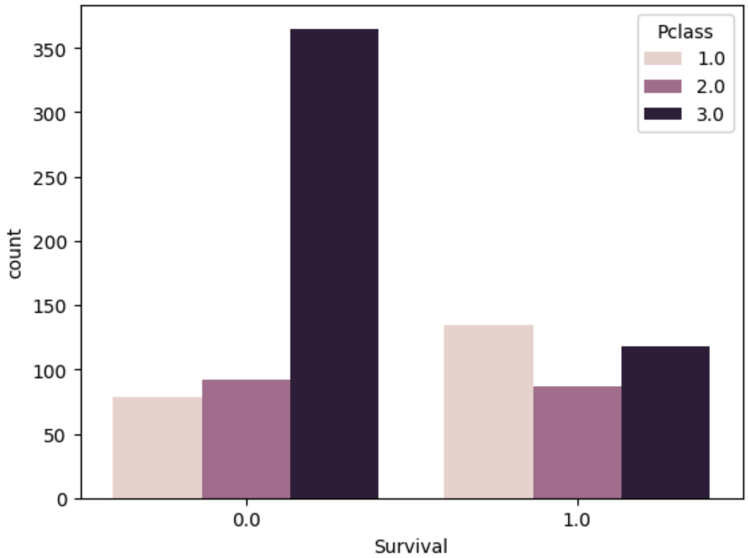
```
import matplotlib.pyplot as plt
import seaborn as sns
```

```
# prompt: /content/drive/MyDrive/COMP1816_Titanic_Dataset_Classification.csv this is my file read the csv file with pytthon

import pandas as pd
# Load the dataset
df = pd.read_csv('/content/drive/MyDrive/COMP1816_Titanic_Dataset_Classification.csv')

# Display the first few rows of the dataframe
print(df.head())
```

```
   PassengerId  Pclass                                          Name     Sex  \
0            1     3.0                       Braund, Mr. Owen Harris    male
1            2     1.0                                           NaN  female
2            3     3.0                        Heikkinen, Miss. Laina  female
3            4     1.0  Futrelle, Mrs. Jacques Heath (Lily May Peel)  female
4            5     3.0                      Allen, Mr. William Henry    male

    Age  SibSp  Parch        Ticket No.     Fare Embarked  Survival
0  22.0    1.0    0.0         A/5 21171   7.2500        S       0.0
1  38.0    1.0    0.0          PC 17599  71.2833        C       1.0
2  26.0    0.0    0.0  STON/O2. 3101282   7.9250        S       1.0
3  35.0    1.0    0.0            113803  53.1000        S       1.0
4  35.0    0.0    0.0            373450   8.0500        S       0.0
```

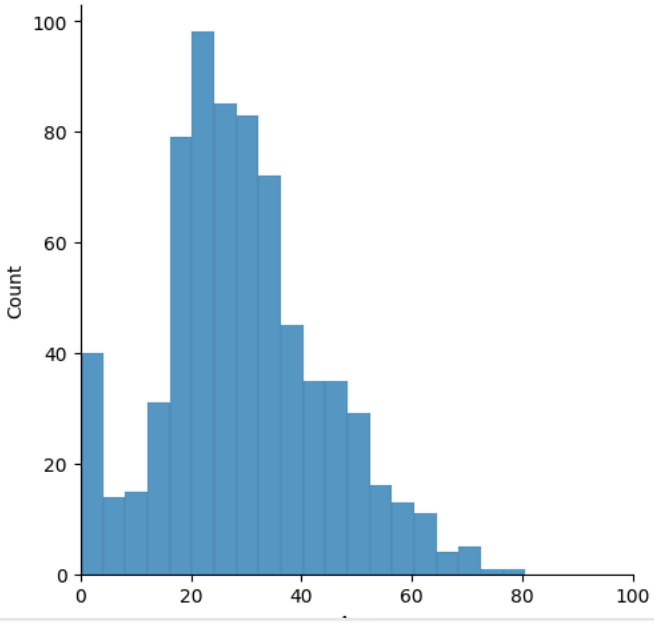
```
sns.countplot(x='Survival', data= df, hue ='Pclass')
```

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



so here it is clear that majority of the people did not survived from the ticketclass 3

```
sns.displot(df['Age'], kde=False)
plt.xlim(0, 100)  # Set the x-axis limits
plt.show()
```



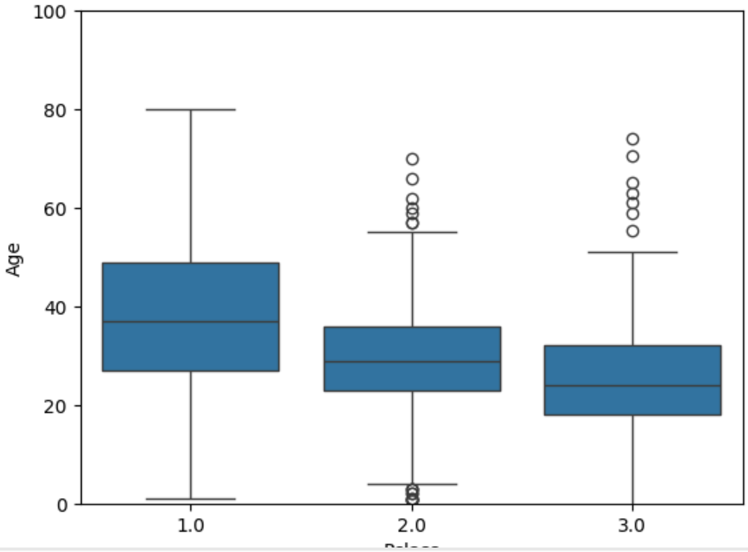

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 890 entries, 0 to 889
Data columns (total 11 columns):
 #   Column       Non-Null Count  Dtype
---  ------       --------------  -----
 0   PassengerId  890 non-null    int64
 1   Pclass       880 non-null    float64
 2   Name         885 non-null    object
 3   Sex          890 non-null    object
 4   Age          715 non-null    float64
 5   SibSp        888 non-null    float64
 6   Parch        888 non-null    float64
 7   Ticket No.   888 non-null    object
 8   Fare         888 non-null    float64
 9   Embarked     884 non-null    object
 10  Survival     886 non-null    float64
dtypes: float64(6), int64(1), object(4)
memory usage: 76.6+ KB
```

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

	0
PassengerId	0
Pclass	10
Name	5
Sex	0
Age	175
SibSp	2
Parch	2
Ticket No.	2
Fare	2
Embarked	6
Survival	4

```
sns.boxplot(x='Pclass', y='Age', data=df)
plt.ylim(0, 100)  # Set the y-axis limits to 0-100
plt.show()
```




```
# Calculate the mean age for each passenger class
mean_age_by_pclass = df.groupby('Pclass')['Age'].mean()

mean_age_by_pclass
```

	Age
Pclass	
1.0	38.149022
2.0	29.793118
3.0	33.489801

```
print(df[df['Pclass']==1]['Age'].mean())
print(df[df['Pclass']==2]['Age'].mean())
print(df[df['Pclass']==3]['Age'].mean())
```

```
38.14902173913043
29.793117647058825
33.48980056980057
```

```
import matplotlib.pyplot as plt
import seaborn as sns
import pandas as pd



def fill_in_na_values(cols):
  age = cols[0]
  pclass = cols[1]

  if pd.isnull(age):
    if pclass == 1:
      return round(df[df['Pclass']==1]['Age'].mean())
    elif pclass == 2:
      return round(df[df['Pclass']==2]['Age'].mean())
    else:
      return round(df[df['Pclass']==3]['Age'].mean())
  else:
                   return age
df['Age']=df[['Age', 'Pclass']].apply(fill_in_na_values, axis=1)
```

```
<ipython-input-24-fe67a078db9b>:2: FutureWarning: Series.__getitem__ treating keys as positions is deprecated. In a futu
  age = cols[0]
<ipython-input-24-fe67a078db9b>:3: FutureWarning: Series.__getitem__ treating keys as positions is deprecated. In a futu
  pclass = cols[1]
```

```
# Fill missing Pclass values (if any)
df['Pclass'].fillna(df['Pclass'].mode()[0], inplace=True)

# Function to fill missing Age values
def fill_in_na_values(cols, df):
    age, pclass = cols
    if pd.isnull(age):
        return round(df[df['Pclass'] == pclass]['Age'].mean())
    return age

# Apply function to fill missing Age values
df['Age'] = df[['Age', 'Pclass']].apply(lambda row: fill_in_na_values(row, df), axis=1)

print(df)
```

```
     PassengerId  Pclass                                          Name  \
0              1     3.0                       Braund, Mr. Owen Harris
1              2     1.0                                           NaN
2              3     3.0                        Heikkinen, Miss. Laina
3              4     1.0  Futrelle, Mrs. Jacques Heath (Lily May Peel)
4              5     3.0                      Allen, Mr. William Henry
..           ...     ...                                           ...
885          886     2.0                         Montvila, Rev. Juozas
886          887     1.0                  Graham, Miss. Margaret Edith
887          888     3.0      Johnston, Miss. Catherine Helen "Carrie"
888          889     1.0                         Behr, Mr. Karl Howell
889          890     3.0                           Dooley, Mr. Patrick

        Sex   Age  SibSp  Parch        Ticket No.     Fare Embarked  Survival
0      male  22.0    1.0    0.0         A/5 21171   7.2500        S       0.0
1    female  38.0    1.0    0.0          PC 17599  71.2833        C       1.0
2    female  26.0    0.0    0.0  STON/O2. 3101282   7.9250        S       1.0
3    female  35.0    1.0    0.0            113803  53.1000        S       1.0
4      male  35.0    0.0    0.0            373450   8.0500        S       0.0
..      ...   ...    ...    ...               ...      ...      ...       ...
885    male  27.0    0.0    0.0            211536  13.0000        S       0.0
886  female  19.0    0.0    0.0            112053  30.0000        S       1.0
887  female  33.0    1.0    2.0        W./C. 6607  23.4500        S       0.0
888    male  26.0    0.0    0.0            111369  30.0000        C       1.0
889    male  32.0    0.0    0.0            370376   7.7500        Q       0.0

[890 rows x 11 columns]
<ipython-input-25-8fcf2ce5818d>:2: FutureWarning: A value is trying to be set on a copy of a DataFrame or Series through
The behavior will change in pandas 3.0. This inplace method will never work because the intermediate object on which we

For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method({col: value}, inplace=True)' or df[c


  df['Pclass'].fillna(df['Pclass'].mode()[0], inplace=True)
```

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

	0
PassengerId	0
Pclass	0
Name	5
Sex	0
Age	0
SibSp	2
Parch	2
Ticket No.	2
Fare	2
Embarked	6
Survival	4

```
def fill_in_na_values(cols):
  age = cols[0]
  pclass = cols[1]

  if pd.isnull(age):
    if pclass == 1:
      return round(df[df['Pclass']==1]['Age'].mean())
    elif pclass == 2:
```

```
        return round(df[df['Pclass']==2]['Age'].mean())
    elif pclass == 3:
        return round(df[df['Pclass']==3]['Age'].mean())
  else:
      return age
df['Age']=df[['Age', 'Pclass']].apply(fill_in_na_values, axis=1)
```

```
<ipython-input-27-d9409739061d>:2: FutureWarning: Series.__getitem__ treating keys as positions is deprecated. In a futu
  age = cols[0]
<ipython-input-27-d9409739061d>:3: FutureWarning: Series.__getitem__ treating keys as positions is deprecated. In a futu
  pclass = cols[1]
```

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

	0
PassengerId	0
Pclass	0
Name	5
Sex	0
Age	0
SibSp	2
Parch	2
Ticket No.	2
Fare	2
Embarked	6
Survival	4

```
df.dropna(inplace=True)
```

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

	0
PassengerId	0
Pclass	0
Name	0
Sex	0
Age	0
SibSp	0
Parch	0
Ticket No.	0
Fare	0
Embarked	0
Survival	0

```
df.head()
```

	PassengerId	Pclass	Name	Sex	Age	SibSp	Parch	Ticket No.	Fare	Embarked	Survival
0	1	3.0	Braund, Mr. Owen Harris	male	22.0	1.0	0.0	A/5 21171	7.2500	S	0.0
2	3	3.0	Heikkinen, Miss. Laina	female	26.0	0.0	0.0	STON/O2. 3101282	7.9250	S	1.0
3	4	1.0	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1.0	0.0	113803	53.1000	S	1.0

```
df.drop(['PassengerId', 'Name', 'Ticket No.'], axis=1, inplace=True)
```

```
df.head()
```

	Pclass	Sex	Age	SibSp	Parch	Fare	Embarked	Survival
0	3.0	male	22.0	1.0	0.0	7.2500	S	0.0
2	3.0	female	26.0	0.0	0.0	7.9250	S	1.0
3	1.0	female	35.0	1.0	0.0	53.1000	S	1.0
4	3.0	male	35.0	0.0	0.0	8.0500	S	0.0

```
df['Embarked'].unique()
```

```
array(['S', 'C', 'Q'], dtype=object)
```

```
sex = pd.get_dummies(df['Sex'], drop_first=True).astype(int)
embarked = pd.get_dummies(df['Embarked'], drop_first=True).astype(int)
```

```
print(sex)
print(embarked)
```

```
     male
0       1
2       0
3       0
4       1
6       1
..    ...
885     1
886     0
887     0
888     1
889     1

[878 rows x 1 columns]
     Q  S
0    0  1
2    0  1
3    0  1
4    0  1
6    0  1
..  .. ..
885  0  1
886  0  1
887  0  1
888  0  0
889  1  0

[878 rows x 2 columns]
```

Double-click (or enter) to edit

```
df = pd.concat([df, sex, embarked], axis=1)
```

Double-click (or enter) to edit

```
df.head()
```

	Pclass	Sex	Age	SibSp	Parch	Fare	Embarked	Survival	male	Q	S	male	Q	S
0	3.0	male	22.0	1.0	0.0	7.2500	S	0.0	True	False	True	1	0	1
2	3.0	female	26.0	0.0	0.0	7.9250	S	1.0	False	False	True	0	0	1
3	1.0	female	35.0	1.0	0.0	53.1000	S	1.0	False	False	True	0	0	1
4	3.0	male	35.0	0.0	0.0	8.0500	S	0.0	True	False	True	1	0	1

```
# Drop the first occurrences of 'male', 'Q', 'S' but keep the last three
df = df.drop(df.columns[list(df.columns).index('male'):list(df.columns).index('male')+3], axis=1)
```

```
df.head()
```

	Pclass	Sex	Age	SibSp	Parch	Fare	Embarked	Survival
0	3.0	male	22.0	1.0	0.0	7.2500	S	0.0
2	3.0	female	26.0	0.0	0.0	7.9250	S	1.0
3	1.0	female	35.0	1.0	0.0	53.1000	S	1.0
4	3.0	male	35.0	0.0	0.0	8.0500	S	0.0

```
sex = pd.get_dummies(df['Sex'], drop_first=True).astype(int)
embarked = pd.get_dummies(df['Embarked'], drop_first=True).astype(int)
```

```
df = pd.concat([df, sex, embarked], axis=1)
```

```
df.head()
```

	Pclass	Sex	Age	SibSp	Parch	Fare	Embarked	Survival	male	Q	S
0	3.0	male	22.0	1.0	0.0	7.2500	S	0.0	1	0	1
2	3.0	female	26.0	0.0	0.0	7.9250	S	1.0	0	0	1
3	1.0	female	35.0	1.0	0.0	53.1000	S	1.0	0	0	1
4	3.0	male	35.0	0.0	0.0	8.0500	S	0.0	1	0	1

```
df.drop(['Sex', 'Embarked'], axis=1, inplace=True)
```

```
df.head()
```

	Pclass	Age	SibSp	Parch	Fare	Survival	male	Q	S
0	3.0	22.0	1.0	0.0	7.2500	0.0	1	0	1
2	3.0	26.0	0.0	0.0	7.9250	1.0	0	0	1
3	1.0	35.0	1.0	0.0	53.1000	1.0	0	0	1
4	3.0	35.0	0.0	0.0	8.0500	0.0	1	0	1

```
from sklearn.preprocessing import MinMaxScaler
from sklearn.model_selection import train_test_split

x = df.drop('Survival', axis=1)
y = df['Survival']


X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.1)

scaler = MinMaxScaler()
X_train = scaler.fit_transform(X_train)
X_test = scaler.transform(X_test)
```

```
from sklearn.preprocessing import MinMaxScaler
from sklearn.model_selection import train_test_split

# Define X (features) and y (target)
X = df.drop('Survival', axis=1)
y = df['Survival']

# Split the last 140 rows as test set, and the rest as training set
X_train, X_test = X.iloc[:-140], X.iloc[-140:]  # Last 140 rows for testing
y_train, y_test = y.iloc[:-140], y.iloc[-140:]

# Normalize features using MinMaxScaler
scaler = MinMaxScaler()
X_train = scaler.fit_transform(X_train)
X_test = scaler.transform(X_test)  # Use same scaler for test data
```

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

```
svm.fit(X_train, y_train)
prediction = svm.predict(X_test)
```

```
from sklearn.metrics import classification_report, confusion_matrix
print(classification_report(y_test, prediction))
print(confusion_matrix(y_test, prediction))
```

```
              precision    recall  f1-score   support

         0.0       0.80      0.96      0.87        90
         1.0       0.88      0.58      0.70        50

    accuracy                           0.82       140
   macro avg       0.84      0.77      0.79       140
weighted avg       0.83      0.82      0.81       140

[[86  4]
 [21 29]]
```

```
from sklearn.model_selection import GridSearchCV
param_grid = {'C': [0.5, 1, 10, 100, 1000], 'gamma': [1, 0.1, 0.01, 0.001, 0.0001]}
grid = GridSearchCV(SVC(), param_grid, verbose=2)
grid.fit(X_train, y_train)
grid_predictions = grid.predict(X_test)
```

```
Fitting 5 folds for each of 25 candidates, totalling 125 fits
[CV] END .....................................C=0.5, gamma=1; total time=   0.0s
[CV] END .....................................C=0.5, gamma=1; total time=   0.0s
[CV] END .....................................C=0.5, gamma=1; total time=   0.0s
[CV] END .....................................C=0.5, gamma=1; total time=   0.0s
[CV] END .....................................C=0.5, gamma=1; total time=   0.0s
[CV] END ...................................C=0.5, gamma=0.1; total time=   0.0s
[CV] END ...................................C=0.5, gamma=0.1; total time=   0.0s
[CV] END ...................................C=0.5, gamma=0.1; total time=   0.0s
[CV] END ...................................C=0.5, gamma=0.1; total time=   0.0s
[CV] END ...................................C=0.5, gamma=0.1; total time=   0.0s
[CV] END ..................................C=0.5, gamma=0.01; total time=   0.0s
[CV] END ..................................C=0.5, gamma=0.01; total time=   0.0s
[CV] END ..................................C=0.5, gamma=0.01; total time=   0.0s
[CV] END ..................................C=0.5, gamma=0.01; total time=   0.0s
[CV] END ..................................C=0.5, gamma=0.01; total time=   0.0s
[CV] END .................................C=0.5, gamma=0.001; total time=   0.0s
[CV] END .................................C=0.5, gamma=0.001; total time=   0.0s
[CV] END .................................C=0.5, gamma=0.001; total time=   0.0s
[CV] END .................................C=0.5, gamma=0.001; total time=   0.0s
[CV] END .................................C=0.5, gamma=0.001; total time=   0.0s
[CV] END ................................C=0.5, gamma=0.0001; total time=   0.0s
[CV] END ................................C=0.5, gamma=0.0001; total time=   0.0s
[CV] END ................................C=0.5, gamma=0.0001; total time=   0.0s
[CV] END ................................C=0.5, gamma=0.0001; total time=   0.0s
[CV] END ................................C=0.5, gamma=0.0001; total time=   0.0s
[CV] END .......................................C=1, gamma=1; total time=   0.0s
[CV] END .......................................C=1, gamma=1; total time=   0.0s
[CV] END .......................................C=1, gamma=1; total time=   0.0s
[CV] END .......................................C=1, gamma=1; total time=   0.0s
[CV] END .......................................C=1, gamma=1; total time=   0.0s
[CV] END .....................................C=1, gamma=0.1; total time=   0.0s
[CV] END .....................................C=1, gamma=0.1; total time=   0.0s
[CV] END .....................................C=1, gamma=0.1; total time=   0.0s
[CV] END .....................................C=1, gamma=0.1; total time=   0.0s
[CV] END .....................................C=1, gamma=0.1; total time=   0.0s
[CV] END ....................................C=1, gamma=0.01; total time=   0.0s
[CV] END ....................................C=1, gamma=0.01; total time=   0.0s
[CV] END ....................................C=1, gamma=0.01; total time=   0.0s
[CV] END ....................................C=1, gamma=0.01; total time=   0.0s
[CV] END ....................................C=1, gamma=0.01; total time=   0.0s
[CV] END ...................................C=1, gamma=0.001; total time=   0.0s
[CV] END ...................................C=1, gamma=0.001; total time=   0.0s
[CV] END ...................................C=1, gamma=0.001; total time=   0.0s
[CV] END ...................................C=1, gamma=0.001; total time=   0.0s
[CV] END ...................................C=1, gamma=0.001; total time=   0.0s
[CV] END ..................................C=1, gamma=0.0001; total time=   0.0s
[CV] END ..................................C=1, gamma=0.0001; total time=   0.0s
[CV] END ..................................C=1, gamma=0.0001; total time=   0.0s
[CV] END ..................................C=1, gamma=0.0001; total time=   0.0s
[CV] END ..................................C=1, gamma=0.0001; total time=   0.0s
[CV] END ......................................C=10, gamma=1; total time=   0.0s
[CV] END ......................................C=10, gamma=1; total time=   0.0s
[CV] END ......................................C=10, gamma=1; total time=   0.0s
[CV] END ......................................C=10, gamma=1; total time=   0.0s
[CV] END ......................................C=10, gamma=1; total time=   0.0s
[CV] END ....................................C=10, gamma=0.1; total time=   0.0s
[CV] END ....................................C=10, gamma=0.1; total time=   0.0s
```

```
print(classification_report(y_test, grid_predictions))
print(confusion_matrix(y_test, grid_predictions))
```

```
              precision    recall  f1-score   support

         0.0       0.81      0.97      0.88        90
         1.0       0.91      0.58      0.71        50

    accuracy                           0.83       140
   macro avg       0.86      0.77      0.79       140
weighted avg       0.84      0.83      0.82       140

[[87  3]
 [21 29]]
```

Start coding or generate with AI.

```
from sklearn.linear_model import LogisticRegression
lm = LogisticRegression()
lm.fit(X_train, y_train)
lm_prediction = lm.predict(X_test)

print(classification_report(y_test, lm_prediction))
print(confusion_matrix(y_test, lm_prediction))
```

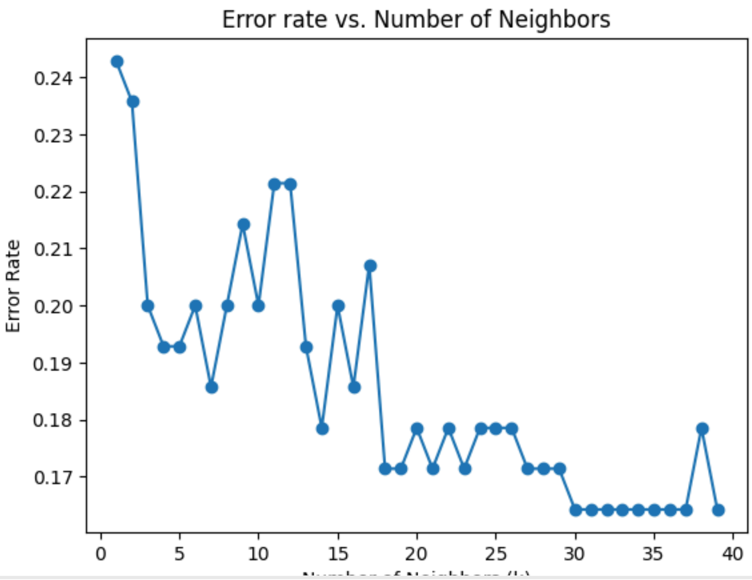
```
              precision    recall  f1-score   support

         0.0       0.83      0.89      0.86        90
         1.0       0.77      0.68      0.72        50

    accuracy                           0.81       140
   macro avg       0.80      0.78      0.79       140
weighted avg       0.81      0.81      0.81       140

[[80 10]
 [16 34]]
```

```
from sklearn.neighbors import KNeighborsClassifier
knn = KNeighborsClassifier()
knn.fit(X_train, y_train)
knn_prediction = knn.predict(X_test)


print(classification_report(y_test, knn_prediction))
print(confusion_matrix(y_test, knn_prediction))
```

```
              precision    recall  f1-score   support

         0.0       0.83      0.88      0.85        90
         1.0       0.76      0.68      0.72        50

    accuracy                           0.81       140
   macro avg       0.79      0.78      0.78       140
weighted avg       0.80      0.81      0.80       140

[[79 11]
 [16 34]]
```

```
import numpy as np
```

```
from sklearn.neighbors import KNeighborsClassifier
import numpy as np

error_list = []

# Loop over different values of k (from 1 to 39)
for i in range(1, 40):
    knn = KNeighborsClassifier(n_neighbors=i)
    knn.fit(X_train, y_train)
    prediction_i = knn.predict(X_test)

    # Append the error rate for the current k (n_neighbors=i)
    error_list.append(np.mean(prediction_i != y_test))

# Optionally, you could plot or analyze the error_list to see the optimal kprint(error_list)
import matplotlib.pyplot as plt

# Plotting the error rate vs. number of neighbors
plt.plot(range(1, 40), error_list, marker='o')
plt.title('Error rate vs. Number of Neighbors')
plt.xlabel('Number of Neighbors (k)')
plt.ylabel('Error Rate')
plt.show()
```




```
np.argmin(error_list)
```

```
29
```

```
error_list[6]
```

```
0.18571428571428572
```

```
knn = KNeighborsClassifier()
knn.fit(X_train, y_train)
knn_prediction = knn.predict(X_test)
print(classification_report(y_test, knn_prediction))
print(confusion_matrix(y_test, knn_prediction))
```

```
              precision    recall  f1-score   support

         0.0       0.83      0.88      0.85        90
         1.0       0.76      0.68      0.72        50

    accuracy                           0.81       140
   macro avg       0.79      0.78      0.78       140
weighted avg       0.80      0.81      0.80       140

[[79 11]
 [16 34]]
```

```
from sklearn.tree import DecisionTreeClassifier
dtree = DecisionTreeClassifier()
dtree.fit(X_train, y_train)
dtree_prediction = dtree.predict(X_test)
print(classification_report(y_test, dtree_prediction))
print(confusion_matrix(y_test, dtree_prediction))
```

```
              precision    recall  f1-score   support

         0.0       0.90      0.87      0.88        90
         1.0       0.77      0.82      0.80        50

    accuracy                           0.85       140
   macro avg       0.84      0.84      0.84       140
weighted avg       0.85      0.85      0.85       140

[[78 12]
 [ 9 41]]
```

```
from sklearn.ensemble import RandomForestClassifier
rfc = RandomForestClassifier()
rfc.fit(X_train, y_train)
rfc_prediction = rfc.predict(X_test)
print(classification_report(y_test, rfc_prediction))
```

```
              precision    recall  f1-score   support

         0.0       0.90      0.90      0.90        90
```