Test

July 5, 2024

[ ]:

```
#Importing All Required Libaries
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt

from warnings import filterwarnings
filterwarnings(action='ignore')
```

[ ]:

```
#Loading Datasets
pd.set_option('display.max_columns',10,'display.width',1000)
train = pd.read_csv('train.csv')
test = pd.read_csv('test.csv')
train.head()
```

[ ]:

```
   PassengerId  Survived  Pclass
Name     Sex  …  Parch            Ticket     Fare Cabin  Embarked
0            1         0       3                            Braund, Mr. Owen
Harris    male  …      0         A/5 21171   7.2500   NaN         S
1            2         1       1  Cumings, Mrs. John Bradley (Florence Briggs
Th…  female  …     0           PC 17599  71.2833   C85          C
2            3         1       3                             Heikkinen, Miss.
Laina  female  …      0  STON/O2. 3101282   7.9250   NaN          S
3            4         1       1       Futrelle, Mrs. Jacques Heath (Lily May
Peel)  female  …      0            113803  53.1000  C123          S
4            5         0       3                           Allen, Mr. William
Henry     male  …      0            373450   8.0500   NaN          S

[5 rows x 12 columns]
```

[ ]:

```
#Display shape
train.shape
```

[ ]:

```
(891, 12)
```

[ ]:

```
test.shape
```

[ ]:

```
(418, 11)
```

```
[ ]: #Checking for Null values
     train.isnull().sum()
```

```
[ ]: 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
```

```
[ ]: test.isnull().sum()
```

```
[ ]: PassengerId      0
     Pclass           0
     Name             0
     Sex              0
     Age             86
     SibSp            0
     Parch            0
     Ticket           0
     Fare             1
     Cabin          327
     Embarked         0
     dtype: int64
```

```
[ ]: #Description of dataset
     train.describe(include="all")
```

```
[ ]:         PassengerId    Survived      Pclass                     Name   Sex  …
     Parch  Ticket        Fare    Cabin  Embarked
     count     891.000000  891.000000  891.000000                      891   891  …
     891.000000     891  891.000000      204       889
     unique           NaN         NaN         NaN                      891     2  …
     NaN     681         NaN      147         3
     top              NaN         NaN         NaN  Braund, Mr. Owen Harris  male  …
     NaN  347082         NaN  B96 B98         S
     freq             NaN         NaN         NaN                        1   577  …
     NaN       7         NaN        4       644
     mean      446.000000    0.383838    2.308642                      NaN   NaN  …
     0.381594     NaN   32.204208      NaN       NaN
```

```
std      257.353842    0.486592    0.836071                      NaN    NaN  …
0.806057      NaN   49.693429      NaN        NaN
min        1.000000    0.000000    1.000000                      NaN    NaN  …
0.000000      NaN    0.000000      NaN        NaN
25%      223.500000    0.000000    2.000000                      NaN    NaN  …
0.000000      NaN    7.910400      NaN        NaN
50%      446.000000    0.000000    3.000000                      NaN    NaN  …
0.000000      NaN   14.454200      NaN        NaN
75%      668.500000    1.000000    3.000000                      NaN    NaN  …
0.000000      NaN   31.000000      NaN        NaN
max      891.000000    1.000000    3.000000                      NaN    NaN  …
6.000000      NaN  512.329200      NaN        NaN

[11 rows x 12 columns]
```

[ ]:
```
numeric_columns = train.select_dtypes(include=['number']).columns
train.groupby('Survived')[numeric_columns].mean()
```

[ ]:
```
          PassengerId  Survived    Pclass        Age     SibSp     Parch
Fare
Survived
0          447.016393       0.0  2.531876  30.626179  0.553734  0.329690
22.117887
1          444.368421       1.0  1.950292  28.343690  0.473684  0.464912
48.395408
```

[ ]:
```
numeric_columns = train.select_dtypes(include=['number'])
numeric_columns.corr()
```

[ ]:
```
             PassengerId  Survived    Pclass        Age     SibSp     Parch
Fare
PassengerId     1.000000 -0.005007 -0.035144  0.036847 -0.057527 -0.001652
0.012658
Survived       -0.005007  1.000000 -0.338481 -0.077221 -0.035322  0.081629
0.257307
Pclass         -0.035144 -0.338481  1.000000 -0.369226  0.083081  0.018443
-0.549500
Age             0.036847 -0.077221 -0.369226  1.000000 -0.308247 -0.189119
0.096067
SibSp          -0.057527 -0.035322  0.083081 -0.308247  1.000000  0.414838
0.159651
Parch          -0.001652  0.081629  0.018443 -0.189119  0.414838  1.000000
0.216225
Fare            0.012658  0.257307 -0.549500  0.096067  0.159651  0.216225
1.000000
```

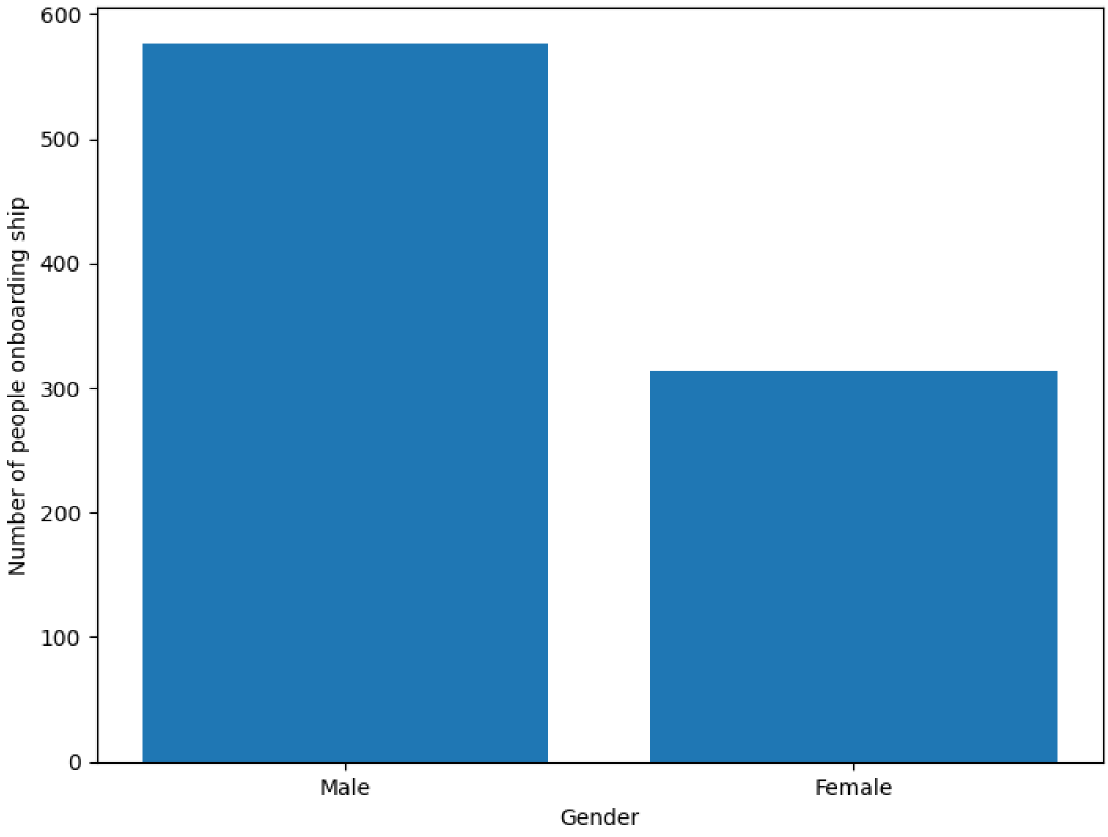
```
[ ]: male_ind = len(train[train['Sex'] == 'male'])
     print("Number of Males in Titanic:",male_ind)
```

```
Number of Males in Titanic: 577
```

```
[ ]: female_ind = len(train[train['Sex'] == 'female'])
     print("Number of Females in Titanic:",female_ind)
```

```
Number of Females in Titanic: 314
```

```
[ ]: #Plotting
     fig = plt.figure()
     ax = fig.add_axes([0,0,1,1])
     gender = ['Male','Female']
     index = [577,314]
     ax.bar(gender,index)
     plt.xlabel("Gender")
     plt.ylabel("Number of people onboarding ship")
     plt.show()
```



[ ]:

```
alive = len(train[train['Survived'] == 1])
dead = len(train[train['Survived'] == 0])
```

[ ]:

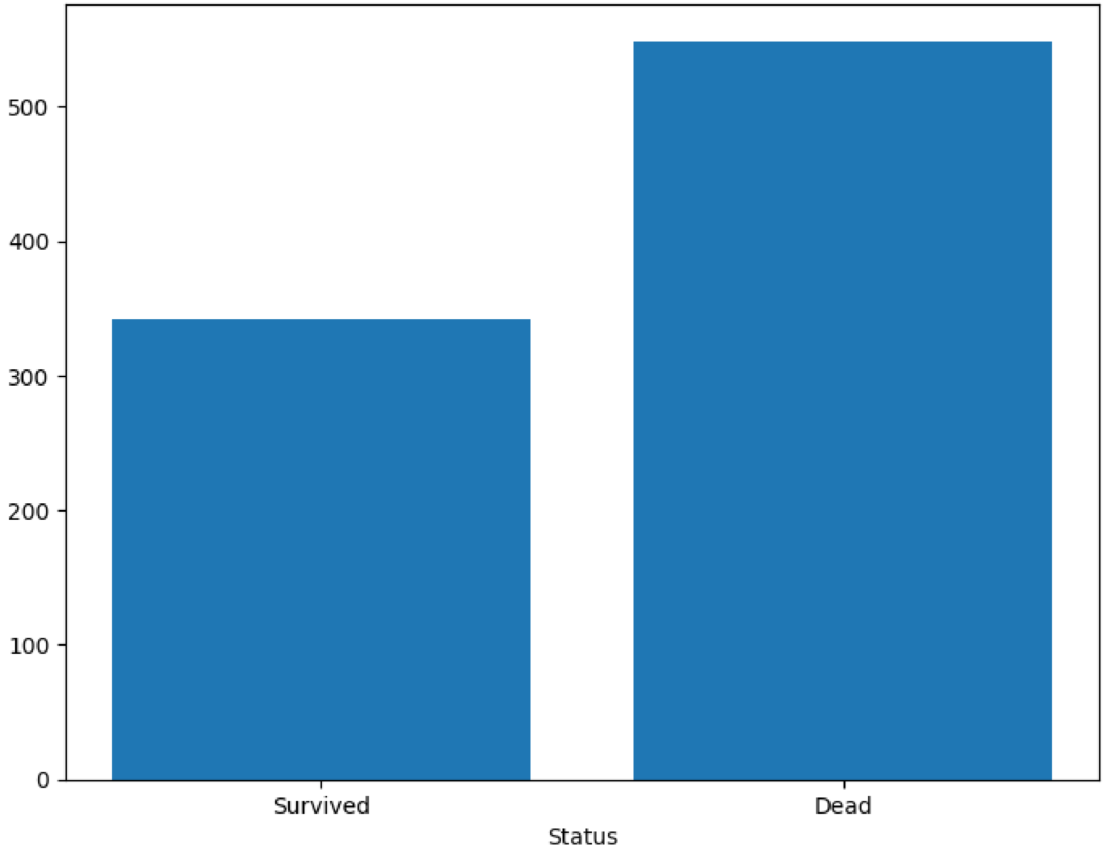
```
train.groupby('Sex')[['Survived']].mean()
```

[ ]:

```
        Survived
Sex
female  0.742038
male    0.188908
```

[ ]:

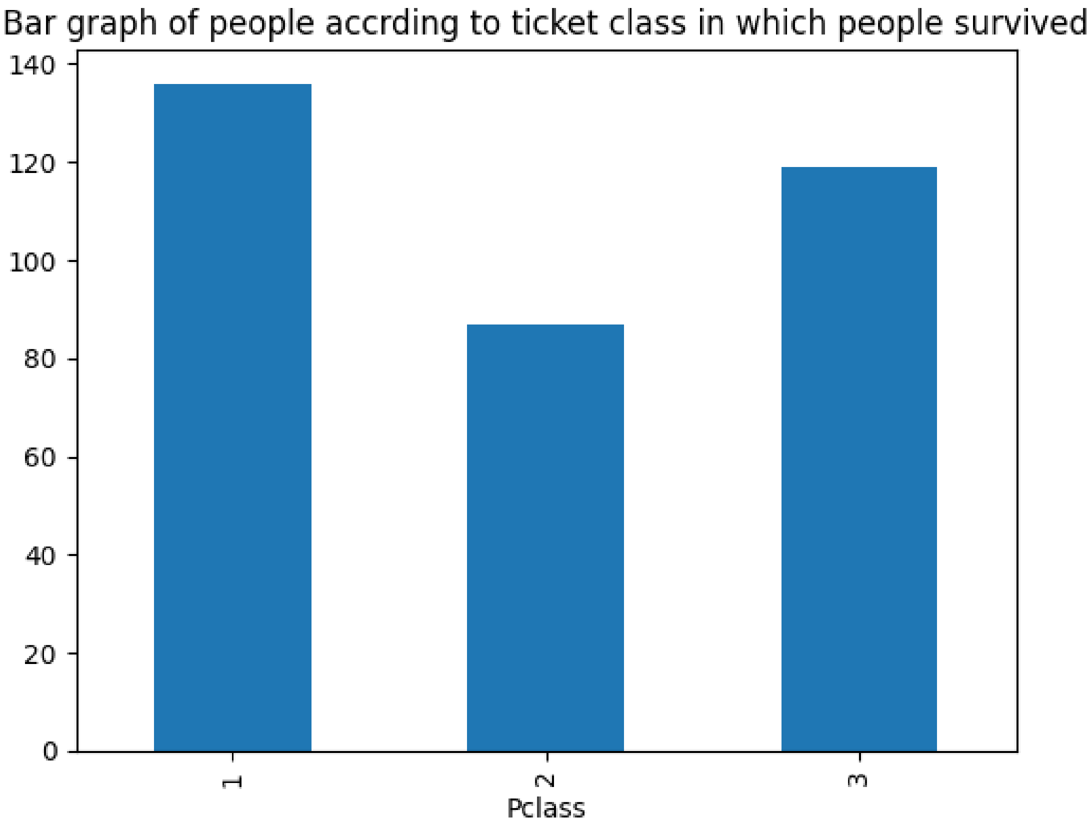
```
fig = plt.figure()
ax = fig.add_axes([0,0,1,1])
status = ['Survived','Dead']
ind = [alive,dead]
ax.bar(status,ind)
plt.xlabel("Status")
plt.show()
```

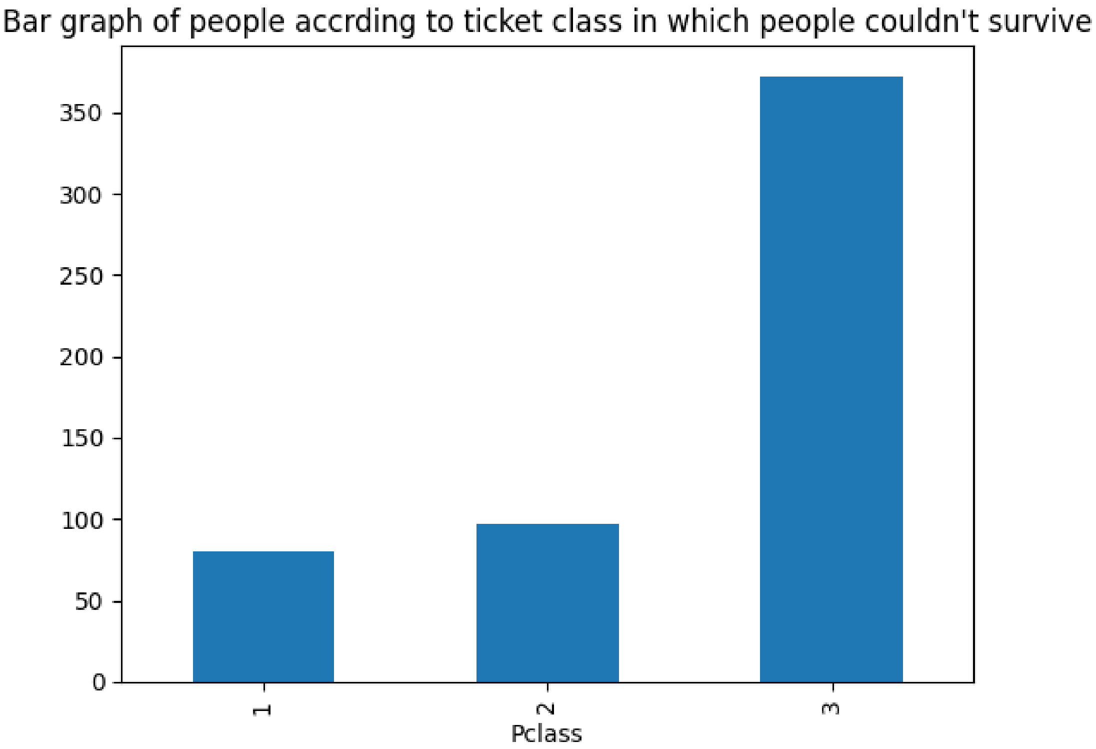


```
[ ]: plt.figure(1)
     train.loc[train['Survived'] == 1, 'Pclass'].value_counts().sort_index().plot.
      ↪bar()
     plt.title('Bar graph of people accrding to ticket class in which people␣
      ↪survived')


     plt.figure(2)
     train.loc[train['Survived'] == 0, 'Pclass'].value_counts().sort_index().plot.
      ↪bar()
     plt.title('Bar graph of people accrding to ticket class in which people␣
      ↪couldn\'t survive')
```

```
[ ]: Text(0.5, 1.0, "Bar graph of people accrding to ticket class in which people
     couldn't survive")
```

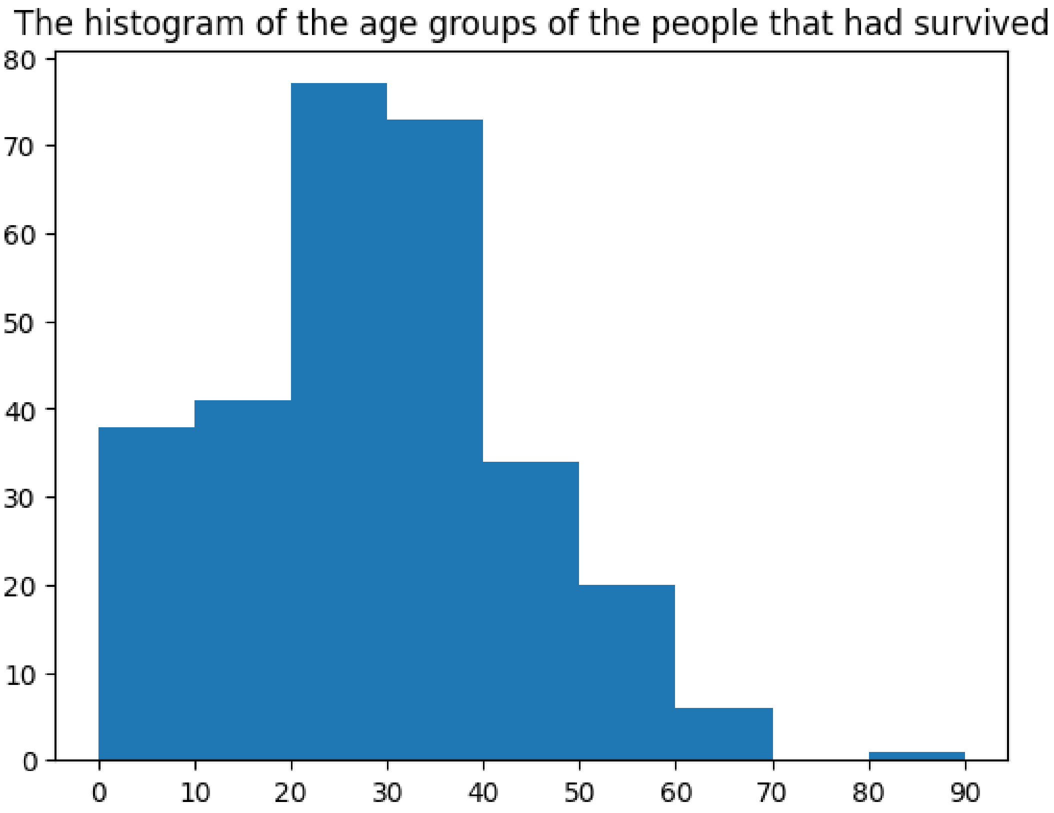


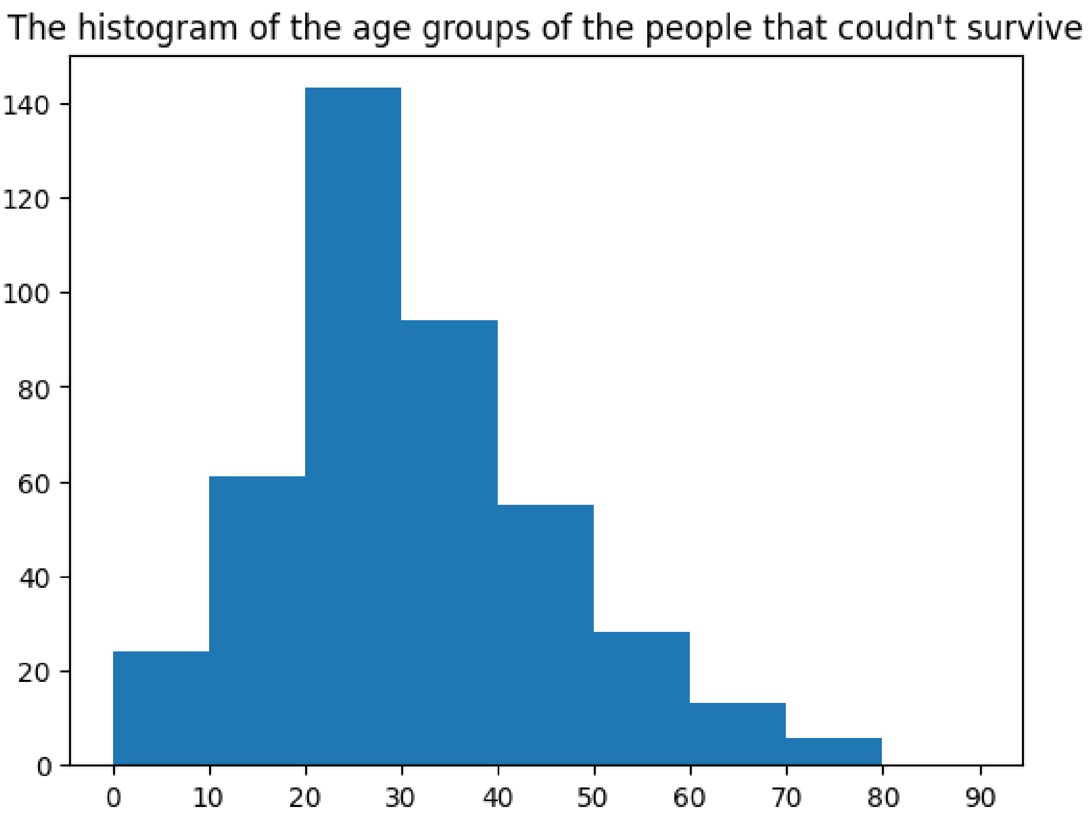


```
[ ]: plt.figure(1)
     age  = train.loc[train.Survived == 1, 'Age']
     plt.title('The histogram of the age groups of the people that had survived')
     plt.hist(age, np.arange(0,100,10))
     plt.xticks(np.arange(0,100,10))


     plt.figure(2)
     age  = train.loc[train.Survived == 0, 'Age']
     plt.title('The histogram of the age groups of the people that coudn\'t survive')
     plt.hist(age, np.arange(0,100,10))
     plt.xticks(np.arange(0,100,10))
```

```
[ ]: ([<matplotlib.axis.XTick at 0x185e0b3aa10>,
       <matplotlib.axis.XTick at 0x185e3148cd0>,
       <matplotlib.axis.XTick at 0x185e313be10>,
       <matplotlib.axis.XTick at 0x185e3187010>,
       <matplotlib.axis.XTick at 0x185e3189350>,
       <matplotlib.axis.XTick at 0x185e318b6d0>,
       <matplotlib.axis.XTick at 0x185e31919d0>,
       <matplotlib.axis.XTick at 0x185e3193a90>,
       <matplotlib.axis.XTick at 0x185e318add0>,
       <matplotlib.axis.XTick at 0x185e319a810>],
      [Text(0, 0, '0'),
       Text(10, 0, '10'),
       Text(20, 0, '20'),
       Text(30, 0, '30'),
       Text(40, 0, '40'),
       Text(50, 0, '50'),
       Text(60, 0, '60'),
       Text(70, 0, '70'),
       Text(80, 0, '80'),
       Text(90, 0, '90')])
```





```
[ ]: train[["SibSp", "Survived"]].groupby(['SibSp'], as_index=False).mean().
       ↪sort_values(by='Survived', ascending=False)
```

```
[ ]:    SibSp  Survived
     1      1  0.535885
     2      2  0.464286
     0      0  0.345395
     3      3  0.250000
     4      4  0.166667
     5      5  0.000000
     6      8  0.000000
```

```
[ ]: train[["Pclass", "Survived"]].groupby(['Pclass'], as_index=False).mean().
       ↪sort_values(by='Survived', ascending=False)
```

```
[ ]:    Pclass  Survived
     0       1  0.629630
     1       2  0.472826
     2       3  0.242363
```

```
[ ]: train[["Age", "Survived"]].groupby(['Age'], as_index=False).mean().
      ↪sort_values(by='Age', ascending=True)
```

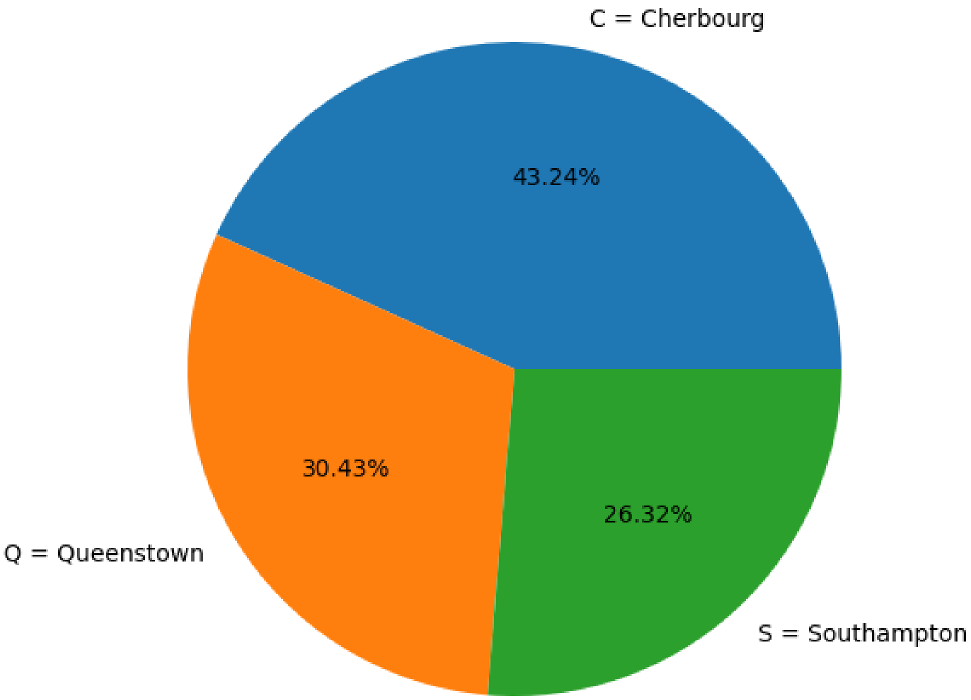
```
[ ]:       Age  Survived
     0    0.42       1.0
     1    0.67       1.0
     2    0.75       1.0
     3    0.83       1.0
     4    0.92       1.0
     ..    …        …
     83  70.00       0.0
     84  70.50       0.0
     85  71.00       0.0
     86  74.00       0.0
     87  80.00       1.0

     [88 rows x 2 columns]
```

```
[ ]: train[["Embarked", "Survived"]].groupby(['Embarked'], as_index=False).mean().
      ↪sort_values(by='Survived', ascending=False)
```

```
[ ]:   Embarked  Survived
     0        C  0.553571
     1        Q  0.389610
     2        S  0.336957
```

```
[ ]: fig = plt.figure()
     ax = fig.add_axes([0,0,1,1])
     ax.axis('equal')
     l = ['C = Cherbourg', 'Q = Queenstown', 'S = Southampton']
     s = [0.553571,0.389610,0.336957]
     ax.pie(s, labels = l,autopct='%1.2f%%')
     plt.show()
```



```
[ ]: test.describe(include="all")
```

```
[ ]:
        PassengerId      Pclass              Name   Sex         Age  …
Parch    Ticket        Fare            Cabin Embarked
count    418.000000  418.000000               418   418  332.000000  …
418.000000       418  417.000000               91      418
unique          NaN         NaN               418     2         NaN  …
NaN       363         NaN               76        3
top             NaN         NaN  Kelly, Mr. James  male         NaN  …
NaN  PC 17608         NaN  B57 B59 B63 B66        S
freq            NaN         NaN                 1   266         NaN  …
NaN         5         NaN                3      270
mean    1100.500000    2.265550               NaN   NaN   30.272590  …
0.392344       NaN   35.627188              NaN      NaN
std      120.810458    0.841838               NaN   NaN   14.181209  …
0.981429       NaN   55.907576              NaN      NaN
min      892.000000    1.000000               NaN   NaN    0.170000  …
0.000000       NaN    0.000000              NaN      NaN
25%      996.250000    1.000000               NaN   NaN   21.000000  …
0.000000       NaN    7.895800              NaN      NaN
```

```
50%      1100.500000    3.000000               NaN   NaN   27.000000  …
0.000000       NaN   14.454200              NaN      NaN
75%      1204.750000    3.000000               NaN   NaN   39.000000  …
0.000000       NaN   31.500000              NaN      NaN
max      1309.000000    3.000000               NaN   NaN   76.000000  …
9.000000       NaN  512.329200              NaN      NaN

[11 rows x 11 columns]
```

[ ]:

```python
#Droping Useless Columns
train = train.drop(['Ticket'], axis = 1)
test = test.drop(['Ticket'], axis = 1)
```

[ ]:

```python
train = train.drop(['Cabin'], axis = 1)
test = test.drop(['Cabin'], axis = 1)
```

[ ]:

```python
train = train.drop(['Name'], axis = 1)
test = test.drop(['Name'], axis = 1)
```

[ ]:

```python
#Feature Selection
column_train=['Age','Pclass','SibSp','Parch','Fare','Sex','Embarked']
#training values
X=train[column_train]
#target value
Y=train['Survived']
```

[ ]:

```python
X['Age'].isnull().sum()
X['Pclass'].isnull().sum()
X['SibSp'].isnull().sum()
X['Parch'].isnull().sum()
X['Fare'].isnull().sum()
X['Sex'].isnull().sum()
X['Embarked'].isnull().sum()
```

[ ]:

```
2
```

[ ]:

```python
X['Age']=X['Age'].fillna(X['Age'].median())
X['Age'].isnull().sum()
```

[ ]:

```
0
```

[ ]:

```python
X['Embarked'] = train['Embarked'].fillna(method ='pad')
X['Embarked'].isnull().sum()
```

[ ]:

```
0
```

[ ]:

```python
d={'male':0, 'female':1}
X['Sex']=X['Sex'].apply(lambda x:d[x])
```

```
X['Sex'].head()
```

```
[ ]: 0    0
     1    1
     2    1
     3    1
     4    0
     Name: Sex, dtype: int64
```

```
[ ]: e={'C':0, 'Q':1 ,'S':2}
     X['Embarked']=X['Embarked'].apply(lambda x:e[x])
     X['Embarked'].head()
```

```
[ ]: 0    2
     1    0
     2    2
     3    2
     4    2
     Name: Embarked, dtype: int64
```

```
[ ]: from sklearn.model_selection import train_test_split
     X_train, X_test, Y_train, Y_test = train_test_split(X,Y,test_size=0.
      ↪3,random_state=7)
```

```
[ ]: from sklearn.linear_model import LogisticRegression
     model = LogisticRegression()
     model.fit(X_train,Y_train)
     Y_pred = model.predict(X_test)

     from sklearn.metrics import accuracy_score
     print("Accuracy Score:",accuracy_score(Y_test,Y_pred))
```

```
Accuracy Score: 0.7574626865671642
```

```
[ ]: from sklearn.metrics import accuracy_score,confusion_matrix
     confusion_mat = confusion_matrix(Y_test,Y_pred)
     print(confusion_mat)
```

```
[[130  26]
 [ 39  73]]
```

```
[ ]: from sklearn.svm import SVC
     model1 = SVC()
     model1.fit(X_train,Y_train)

     pred_y = model1.predict(X_test)

     from sklearn.metrics import accuracy_score
```

```
print("Acc=",accuracy_score(Y_test,pred_y))
```

```
Acc= 0.6604477611940298
```

[ ]:
```
from sklearn.metrics import␣
 ↪accuracy_score,confusion_matrix,classification_report
confusion_mat = confusion_matrix(Y_test,pred_y)
print(confusion_mat)
print(classification_report(Y_test,pred_y))
```

```
[[149   7]
 [ 84  28]]
              precision    recall  f1-score   support

           0       0.64      0.96      0.77       156
           1       0.80      0.25      0.38       112

    accuracy                           0.66       268
   macro avg       0.72      0.60      0.57       268
weighted avg       0.71      0.66      0.61       268
```

[ ]:
```
from sklearn.neighbors import KNeighborsClassifier
model2 = KNeighborsClassifier(n_neighbors=5)
model2.fit(X_train,Y_train)
y_pred2 = model2.predict(X_test)

from sklearn.metrics import accuracy_score
print("Accuracy Score:",accuracy_score(Y_test,y_pred2))
```

```
Accuracy Score: 0.6604477611940298
```

[ ]:
```
from sklearn.metrics import␣
 ↪accuracy_score,confusion_matrix,classification_report
confusion_mat = confusion_matrix(Y_test,y_pred2)
print(confusion_mat)
print(classification_report(Y_test,y_pred2))
```

```
[[127  29]
 [ 62  50]]
              precision    recall  f1-score   support

           0       0.67      0.81      0.74       156
           1       0.63      0.45      0.52       112

    accuracy                           0.66       268
   macro avg       0.65      0.63      0.63       268
weighted avg       0.66      0.66      0.65       268
```

[ ]:

```
from sklearn.naive_bayes import GaussianNB
model3 = GaussianNB()
model3.fit(X_train,Y_train)
y_pred3 = model3.predict(X_test)

from sklearn.metrics import accuracy_score
print("Accuracy Score:",accuracy_score(Y_test,y_pred3))
```

```
Accuracy Score: 0.7686567164179104
```

[ ]:

```
from sklearn.metrics import␣
 ↪accuracy_score,confusion_matrix,classification_report
confusion_mat = confusion_matrix(Y_test,y_pred3)
print(confusion_mat)
print(classification_report(Y_test,y_pred3))
```

```
[[129  27]
 [ 35  77]]
              precision    recall  f1-score   support

           0       0.79      0.83      0.81       156
           1       0.74      0.69      0.71       112

    accuracy                           0.77       268
   macro avg       0.76      0.76      0.76       268
weighted avg       0.77      0.77      0.77       268
```

[ ]:

```
from sklearn.tree import DecisionTreeClassifier
model4 = DecisionTreeClassifier(criterion='entropy',random_state=7)
model4.fit(X_train,Y_train)
y_pred4 = model4.predict(X_test)

from sklearn.metrics import accuracy_score
print("Accuracy Score:",accuracy_score(Y_test,y_pred4))
```

```
Accuracy Score: 0.7425373134328358
```

[ ]:

```
from sklearn.metrics import␣
 ↪accuracy_score,confusion_matrix,classification_report
confusion_mat = confusion_matrix(Y_test,y_pred4)
print(confusion_mat)
print(classification_report(Y_test,y_pred4))
```

```
[[132  24]
 [ 45  67]]
              precision    recall  f1-score   support

           0       0.75      0.85      0.79       156
           1       0.74      0.60      0.66       112

    accuracy                           0.74       268
   macro avg       0.74      0.72      0.73       268
weighted avg       0.74      0.74      0.74       268
```

[ ]:

```
results = pd.DataFrame({
    'Model': ['Logistic Regression','Support Vector Machines', 'Naive␣
 ↪Bayes','KNN' ,'Decision Tree'],
    'Score': [0.75,0.66,0.76,0.66,0.74]})

result_df = results.sort_values(by='Score', ascending=False)
result_df = result_df.set_index('Score')
result_df.head(9)
```

[ ]:

```
                         Model
Score
0.76               Naive Bayes
0.75       Logistic Regression
0.74             Decision Tree
0.66   Support Vector Machines
0.66                       KNN
```

[ ]:

```

```