Import Libraries ¶

In [1]:
```
import numpy as np # linear algebra
import pandas as pd # data processing, CSV file I/O (e.g. pd.read_csv)
import matplotlib.pyplot as plt
import seaborn as sns #count plot

import chart_studio.plotly as py #plotly library
import plotly.graph_objs as go
from plotly.offline import init_notebook_mode, iplot
init_notebook_mode(connected=True)


import os
print(os.listdir("../input"))
```

```
['gender_submission.csv', 'test.csv', 'train.csv']
```

Load data

In [2]:
```
data_train = pd.read_csv('../input/train.csv')
data_test = pd.read_csv('../input/test.csv')
```

Analysis of the data

In [3]:
```
data_train.info()

print()

data_test.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 891 entries, 0 to 890
Data columns (total 12 columns):
PassengerId    891 non-null int64
Survived       891 non-null int64
Pclass         891 non-null int64
Name           891 non-null object
Sex            891 non-null object
Age            714 non-null float64
SibSp          891 non-null int64
Parch          891 non-null int64
Ticket         891 non-null object
Fare           891 non-null float64
Cabin          204 non-null object
Embarked       889 non-null object
dtypes: float64(2), int64(5), object(5)
memory usage: 83.7+ KB

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 418 entries, 0 to 417
Data columns (total 11 columns):
PassengerId    418 non-null int64
Pclass         418 non-null int64
Name           418 non-null object
Sex            418 non-null object
Age            332 non-null float64
SibSp          418 non-null int64
Parch          418 non-null int64
Ticket         418 non-null object
Fare           417 non-null float64
Cabin          91 non-null object
Embarked       418 non-null object
dtypes: float64(2), int64(4), object(5)
memory usage: 36.0+ KB
```

In [4]:
```
data_train.head()
```

Out[4]:

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

In [5]:
```
data_test.head()
```

Out[5]:

	PassengerId	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embar
0	892	3	Kelly, Mr. James	male	34.5	0	0	330911	7.8292	NaN	
1	893	3	Wilkes, Mrs. James (Ellen Needs)	female	47.0	1	0	363272	7.0000	NaN	
2	894	2	Myles, Mr. Thomas Francis	male	62.0	0	0	240276	9.6875	NaN	
3	895	3	Wirz, Mr. Albert	male	27.0	0	0	315154	8.6625	NaN	
4	896	3	Hirvonen, Mrs. Alexander (Helga E Lindqvist)	female	22.0	1	1	3101298	12.2875	NaN	

Cleaning of the data

In [6]:
```
#Drop unneed columns and save

data_train.drop(["Name","Cabin","Ticket","Embarked"],axis = 1,inplace = True)

data_test.drop(["Name","Cabin","Ticket","Embarked"],axis = 1,inplace = True)
```

In [7]:
```
#Split dataframe into 'survived' and 'not survived' so we will use these easil
y at data visualization

data_survived = data_train[data_train['Survived'] == 1].sort_values('Age') #da
taframe that only has datas from survived peoples

data_not_survived = data_train[data_train['Survived'] == 0].sort_values('Age')

#We will use this serie at line plot

survived_age_number = data_survived.Age.value_counts(sort = False,dropna = Tru
e)#How many survived people are from which age

not_survived_age_number = data_not_survived.Age.value_counts(sort = False,drop
na = True)

display(survived_age_number)

not_survived_age_number
```

```
0.75     2
1.00     5
2.00     3
3.00     5
4.00     7
        ..
80.00    1
0.42     1
0.67     1
0.83     2
0.92     1
Name: Age, Length: 65, dtype: int64
```

Out[7]:
```
1.0     2
2.0     7
3.0     1
4.0     3
6.0     1
       ..
66.0    1
70.0    2
71.0    2
74.0    1
70.5    1
Name: Age, Length: 77, dtype: int64
```

In [8]:
```
#0.42,0.67 .. values at tail of serie and this is a wrong sort.Lets fix it.

a = survived_age_number.tail(4)#put values into a.

survived_age_number.drop([0.42,0.67,0.83,0.92],inplace = True)#delete these va
lues from tail of serie

survived_age_number = pd.concat([a,survived_age_number],axis=0)#attach a to he
ad of serie

survived_age_number #Done
```

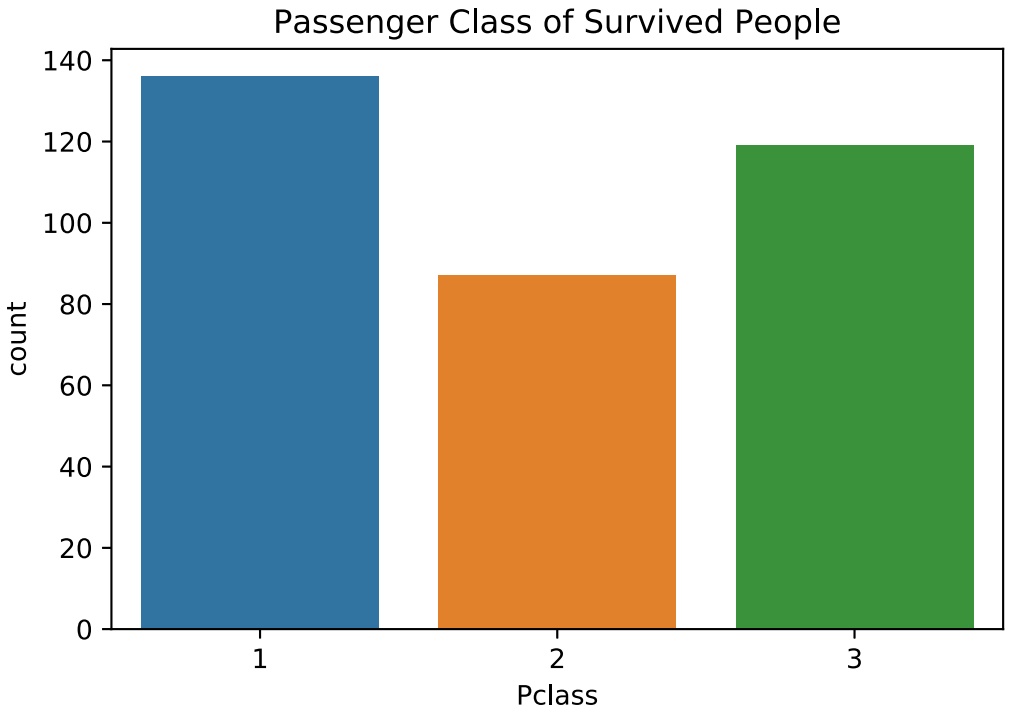
Out[8]:
```
0.42     1
0.67     1
0.83     2
0.92     1
0.75     2
        ..
58.00    3
60.00    2
62.00    2
63.00    2
80.00    1
Name: Age, Length: 65, dtype: int64
```

Data visulaization

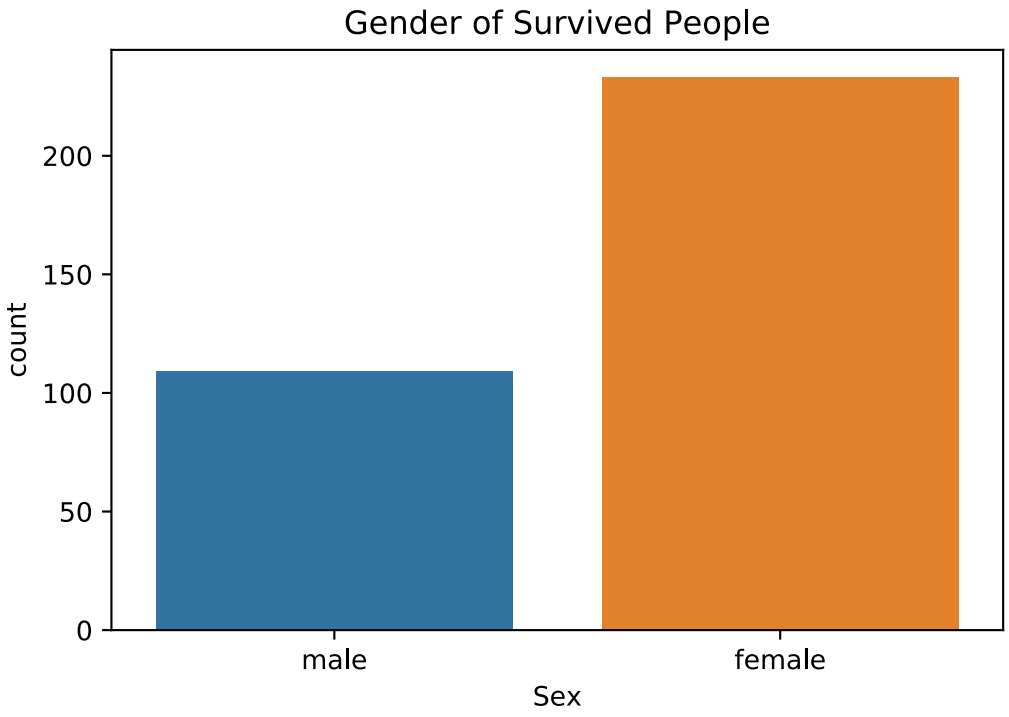
In [9]:
```
#trace1 is green line and trace2 is red line.

trace1 = go.Scatter(
    x = survived_age_number.index,
    y = survived_age_number,
    opacity = 0.75,
    name = "Survived",
    mode = "lines",
    marker=dict(color = 'rgba(0, 230, 0, 0.6)'))

trace2 = go.Scatter(
    x = not_survived_age_number.index,
    y = not_survived_age_number,
    opacity=0.75,
    name = "Not Survived",
    mode = "lines",
    marker=dict(color = 'rgba(230, 0, 0, 0.6)'))

data = [trace1,trace2]
layout = go.Layout(title = 'Age of Survived and not-Survived People in Titani
c',
                   xaxis=dict(title='Age'),
                   yaxis=dict( title='Count'),)

fig = go.Figure(data=data, layout=layout)
iplot(fig)
```


Age of Survived and not-Survived People in Titanic
Count
20
15
10

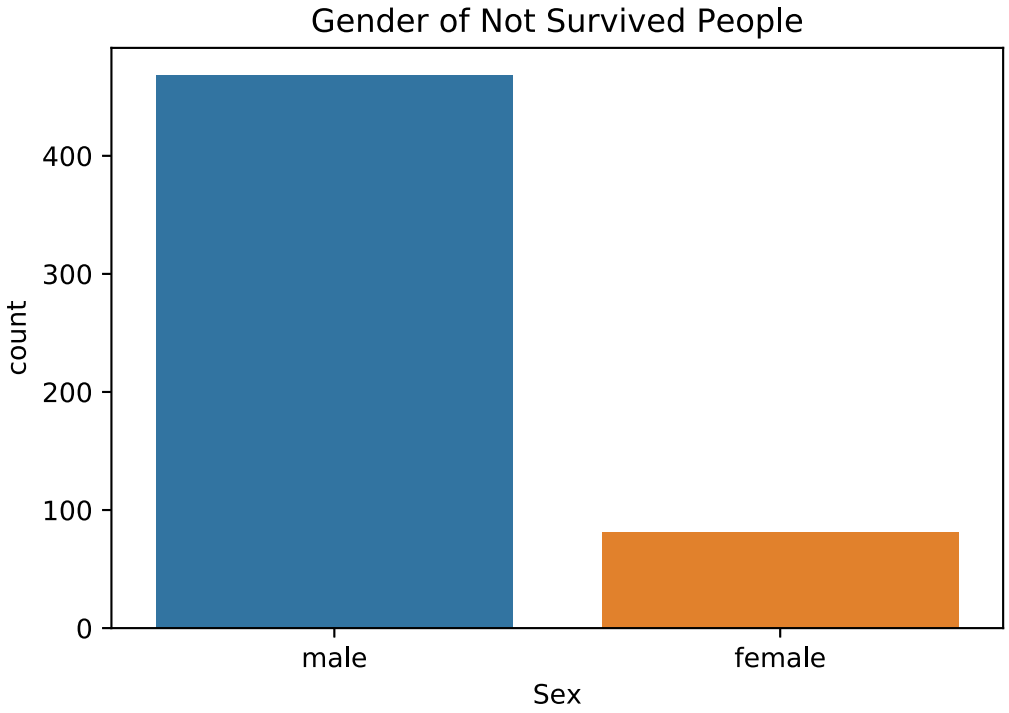
In [10]:
```
sns.countplot(data_survived.Pclass)
plt.title('Passenger Class of Survived People')
plt.show()
```



In [11]:
```
sns.countplot(data_survived.Sex)
plt.title('Gender of Survived People')
plt.show()
```



In [12]:
```
sns.countplot(data_not_survived.Sex)
plt.title('Gender of Not Survived People')
plt.show()
```



Classification

In [13]:
```
data_train.head()
```

Out[13]:

	PassengerId	Survived	Pclass	Sex	Age	SibSp	Parch	Fare
0	1	0	3	male	22.0	1	0	7.2500
1	2	1	1	female	38.0	1	0	71.2833
2	3	1	3	female	26.0	0	0	7.9250
3	4	1	1	female	35.0	1	0	53.1000
4	5	0	3	male	35.0	0	0	8.0500

In [14]:
```
data_train_x = data_train #We should prepare x and y data for train classification

data_train_x.Sex = [1 if i == 'male' else 0 for i in data_train_x.Sex] #Transform strings to integers

data_train_y = data_train_x.Survived #y is our output

data_train_x.drop(['PassengerId','Survived'], axis = 1,inplace = True)#drop passengerıd and survived because they will not use while training

data_train_x.fillna(0.0,inplace = True) #fill NaN values with zero.We write
 '0.0' because we want to fill with float values

#normalization :  i encountered 'to make conform to or reduce to a norm or standard' definition when i search normalization on google.
#But if you ask simply definition i say that : 'to fit values between 0 and 1'
#Normalization formula : (data - min)/(max-min)

data_train_x = (data_train_x - np.min(data_train_x))/(np.max(data_train_x) - np.min(data_train_x)).values
```

In [15]:
```
#We repeat same process to test dataset

data_test.Sex = [1 if i == 'male' else 0 for i in data_test.Sex]

PassengerId = data_test['PassengerId'].values

data_test.drop(['PassengerId'], axis = 1,inplace = True)

data_test.fillna(0.0,inplace = True)

data_test = (data_test - np.min(data_test))/(np.max(data_test) - np.min(data_test)).values
```

In [16]:
```
#Split train data in order to reserve %80 of train data for test .You don't confuse this test data is for check.

from sklearn.model_selection import train_test_split

x_train, x_test, y_train, y_test = train_test_split(data_train_x,data_train_y,
test_size = 0.2,random_state=1)

score_list = [] #to keep scores of algorithms
```

K-Nearest Neighbours

In [19]:
```
from sklearn.neighbors import KNeighborsClassifier

knn = KNeighborsClassifier(n_neighbors = 3)

knn.fit(x_train,y_train)

print('K-Nearest Neighbors Score : ',knn.score(x_test,y_test))

score_list.append(knn.score(x_test,y_test))
```

```
K-Nearest Neighbors Score :  0.7932960893854749
```

In [20]:
```
knn.fit(data_train_x,data_train_y)

knn_prediction = knn.predict(data_test)
```

Naive Bayes Algorithm

In [25]:
```
from sklearn.naive_bayes import GaussianNB

nb = GaussianNB()

nb.fit(x_train,y_train)

print('Naive Bayes Score : ',nb.score(x_test,y_test))

score_list.append(nb.score(x_test,y_test))
```

```
Naive Bayes Score :  0.7541899441340782
```

In [26]:
```
nb.fit(data_train_x,data_train_y)

nb_prediction = nb.predict(data_test)
```

Decision Tree Algorithm

In [27]:
```
from sklearn.tree import DecisionTreeClassifier

dt = DecisionTreeClassifier()

dt.fit(x_train,y_train)

print('Decision Tree Score : ',dt.score(x_test,y_test))

score_list.append(dt.score(x_test,y_test))
```

```
Decision Tree Score :  0.7486033519553073
```

In [28]:
```
dt.fit(data_train_x,data_train_y)

dt_prediction = dt.predict(data_test)
```

Random Forest Algorithm

In [29]:
```
from sklearn.ensemble import RandomForestClassifier

rf = RandomForestClassifier(n_estimators = 22,random_state = 40)

rf.fit(x_train,y_train)

print('Random Forest Score : ',rf.score(x_test,y_test))

score_list.append(rf.score(x_test,y_test))
```

```
Random Forest Score :  0.7821229050279329
```

In [30]:
```
rf.fit(data_train_x,data_train_y)

rf_prediction = rf.predict(data_test)
```

Comparing the algorithms to find the most optimised one

In [31]:
```
pr_dict = {'Logistic Regression' : lr_prediction,'KNN' : knn_prediction,'SVM'
: svm_prediction,
           'Naive Bayes' : nb_prediction,'Decision Tree' : dt_prediction, 'Ran
dom Forest' : rf_prediction}

all_predictions = pd.DataFrame(pr_dict)

all_predictions
```

Out[31]:

	Logistic Regression	KNN	SVM	Naive Bayes	Decision Tree	Random Forest
0	0	0	0	0	0	0
1	0	0	1	1	0	0
2	0	0	0	0	0	0
3	0	0	0	0	1	0
4	1	0	1	1	0	0
...	...	...	...	...	...	...
413	0	0	0	0	0	0
414	1	1	1	1	1	1
415	0	0	0	0	0	0
416	0	0	0	0	0	0
417	0	1	0	0	0	0

418 rows × 6 columns

In [32]:
```
final_prediction = [] #final prediction list

#i : range columns , j : range rows

for i in all_predictions.values:
    sum_zero_score = 0 #summary of zero scores

    sum_one_score = 0 #summary of one scores

    for j in range(5):
        if i[j]==0:
            sum_zero_score += score_list[j]
        else:
            sum_one_score += score_list[j]

    if sum_zero_score >= sum_one_score:
        final_prediction.append(0)
    else:
        final_prediction.append(1)
```

In [33]:
```
output = {'PassengerId' : PassengerId,'Survived' : final_prediction}

submission = pd.DataFrame(output)

submission.to_csv('output.csv', index = False)
```