Import Library

In [387…
```python
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from glob import glob
from sklearn.metrics import mean_absolute_error
from sklearn.linear_model import LinearRegression
from sklearn.linear_model import LogisticRegression
from sklearn.neighbors import KNeighborsClassifier
from sklearn.tree import DecisionTreeClassifier
from sklearn.ensemble import RandomForestClassifier
from sklearn.naive_bayes import GaussianNB
from sklearn.pipeline import make_pipeline
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import OneHotEncoder
from sklearn.metrics import accuracy_score , classification_report
import pandas_profiling
from category_encoders import OneHotEncoder
from sklearn.metrics import mean_squared_error
from sklearn.model_selection import cross_validate
```

In [388…
```python
t=pd.read_csv("test.csv")
t.info()
```

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

Import Data

In [389…
```python
def wrangel(path):
    # read data
    df=pd.read_csv(path)
    #extract the social name
    df["title"]=df["Name"].str.extract("([A-Za-z]+)\.",expand=False)
    #convert title categorcal data
    df.loc[df["title"]=="Mr"   , "title"]   = 0
    df.loc[df["title"]=="Miss"   , "title"]   = 1
    df.loc[df["title"]=="Mrs"   , "title"]   = 2
    df.loc[df["title"]=="Master"   , "title"]   = 3
    conditions = (df["title"] == 'Ms') | (df["title"] == 'Col') | (df["title"] == 'Rev') | (df["title"] == 'Dr') | (df["title"] == 'Dona')
    df.loc[conditions, "title"] = 4
    #fill NAN Value of Fare Accorging to Social Name
    df["Fare"].fillna(df.groupby("Pclass")["Fare"].transform("median"),inplace=True)
    #fill NAN Value of Age Accorging to Social Name
    df["Age"].fillna(df.groupby("title")["Age"].transform("median"),inplace=True)
    #fill NAN Value of Embarked Accorging to Median
    df["Embarked"]=df["Embarked"].fillna("S")
    #remove nan columns
    drop=[]
    drop.append("Cabin")
    drop.append("Name")
    drop.append("Ticket")
    drop.append("title")
    df.drop(columns=drop,inplace=True)
    #convert Sex categorcal data
    df.loc[df["Sex"]=="male"     , "Sex"]   = 0         # Male   ---> 0
    df.loc[df["Sex"]=="female"   , "Sex"]   = 1         # Female ---> 1
    #convert Embarked categorcal data
    df.loc[df["Embarked"]=="S"   , "Embarked"]   = 0    # S ---> 1
    df.loc[df["Embarked"]=="C"   , "Embarked"]   = 1    # C ---> 2
    df.loc[df["Embarked"]=="Q"   , "Embarked"]   = 2    # Q ---> 3

    return df
```

In [390…
```python
test  =  wrangel("test.csv")
df    =  wrangel("train.csv")
```

In [340…
```python
df.head()
```

Out[340]:

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

In [341…
```python
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 891 entries, 0 to 890
Data columns (total 9 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   Sex          891 non-null    object
 4   Age          891 non-null    float64
 5   SibSp        891 non-null    int64
 6   Parch        891 non-null    int64
 7   Fare         891 non-null    float64
 8   Embarked     891 non-null    object
dtypes: float64(2), int64(5), object(2)
memory usage: 62.8+ KB
```

In [391…
```python
pandas_profiling.ProfileReport(df)
```

```
Summarize dataset:   0%|          | 0/5 [00:00<?, ?it/s]
Generate report structure:   0%|          | 0/1 [00:00<?, ?it/s]
Render HTML:   0%|          | 0/1 [00:00<?, ?it/s]
```

Pandas Profiling Report — Overview | Variables | Interactions | Correlations | Missing values | Sample

Overview

Overview | Alerts 7 | Reproduction

Dataset statistics

Number of variables	9
Number of observations	891
Missing cells	0
Missing cells (%)	0.0%
Duplicate rows	0
Duplicate rows (%)	0.0%
Total size in memory	62.8 KiB
Average record size in memory	72.1 B

Variable types

Numeric	5
Categorical	4

Variables

Select Columns

PassengerId

Out[391]:

In [343…
```python
df["Embarked"].value_counts()
```

Out[343]:
```
0    646
1    168
2     77
Name: Embarked, dtype: int64
```

In [344…
```python
test.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 418 entries, 0 to 417
Data columns (total 8 columns):
 #   Column       Non-Null Count  Dtype
---  ------       --------------  -----
 0   PassengerId  418 non-null    int64
 1   Pclass       418 non-null    int64
 2   Sex          418 non-null    object
 3   Age          418 non-null    float64
 4   SibSp        418 non-null    int64
 5   Parch        418 non-null    int64
 6   Fare         418 non-null    float64
 7   Embarked     418 non-null    object
dtypes: float64(2), int64(4), object(2)
memory usage: 26.2+ KB
```

In [352…
```python
test.isnull().sum()
```

Out[352]:
```
PassengerId    0
Pclass         0
Sex            0
Age            0
SibSp          0
Parch          0
Fare           0
Embarked       0
dtype: int64
```

Exploer Data

In [353…
```python
print("Survive :",(df["Survived"]==1).sum())
print("Deceased :",(df["Survived"]==0).sum())
```

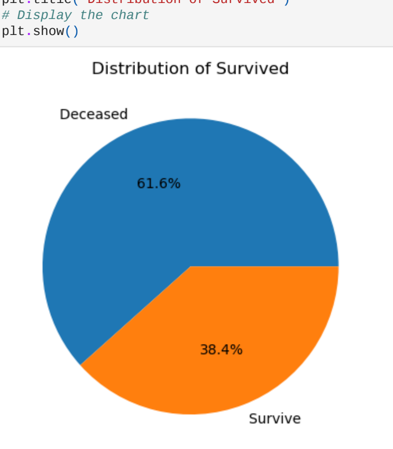
```
Survive : 342
Deceased : 549
```

In [354…
```python
df.describe()
```

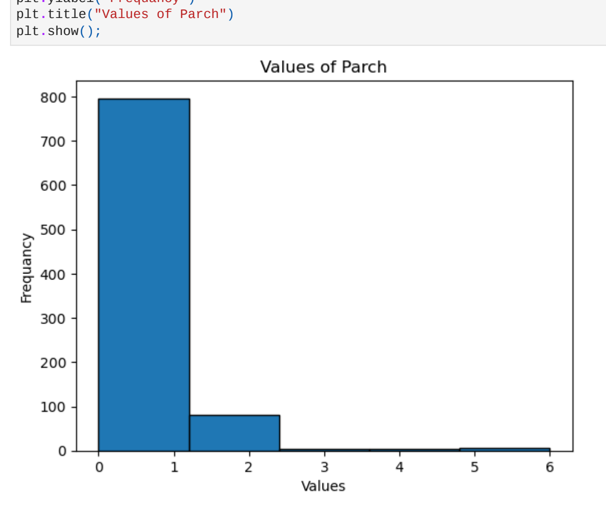
Out[354]:

	PassengerId	Survived	Pclass	Age	SibSp	Parch	Fare
count	891.000000	891.000000	891.000000	891.000000	891.000000	891.000000	891.000000
mean	446.000000	0.383838	2.308642	29.393008	0.523008	0.381594	32.204208
std	257.353842	0.486592	0.836071	13.269209	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	21.000000	0.000000	0.000000	7.910400
50%	446.000000	0.000000	3.000000	30.000000	0.000000	0.000000	14.454200
75%	668.500000	1.000000	3.000000	35.000000	1.000000	0.000000	31.000000
max	891.000000	1.000000	3.000000	80.000000	8.000000	6.000000	512.329200

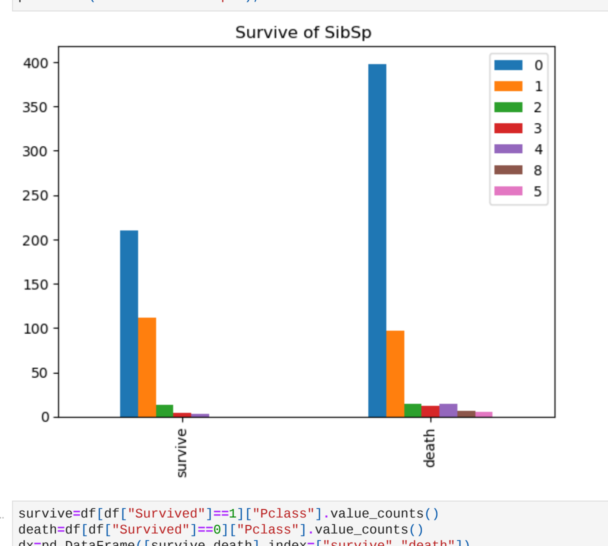
In [355…
```python
# Create the pie chart
values=df["Survived"].value_counts()
label=["Deceased ","Survive "]
plt.pie(values, labels=label,autopct='%1.1f%%')
# Add a title
plt.title('Distribution of Survived')
# Display the chart
plt.show()
```



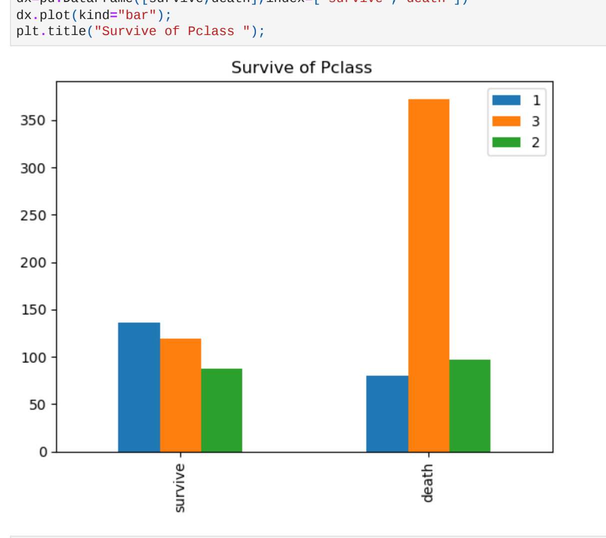
In [356…
```python
plt.hist(df["Parch"],bins=5, edgecolor='black');
plt.xlabel('Values')
plt.ylabel('Frequancy')
plt.title("Values of Parch")
plt.show();
```



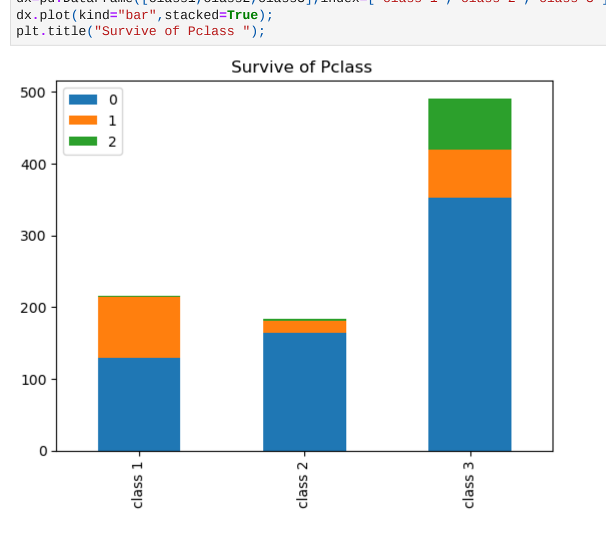
In [357…
```python
survive=df[df["Survived"]==1]["SibSp"].value_counts()
death=df[df["Survived"]==0]["SibSp"].value_counts()
dx=pd.DataFrame([survive,death],index=["survive","death"])
dx.plot(kind="bar");
plt.title("Survive of SibSp ");
```



In [358…
```python
survive=df[df["Survived"]==1]["Pclass"].value_counts()
death=df[df["Survived"]==0]["Pclass"].value_counts()
dx=pd.DataFrame([survive,death],index=["survive","death"])
dx.plot(kind="bar");
plt.title("Survive of Pclass ");
```

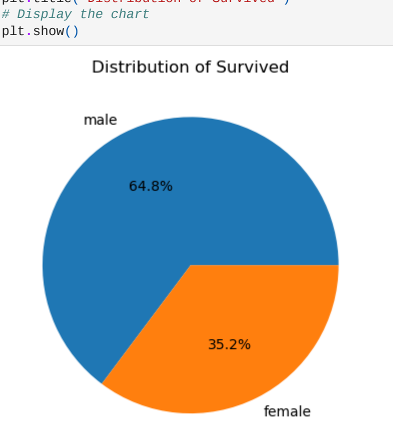


In [359…
```python
class1=df[df["Pclass"]==1]["Embarked"].value_counts()
class2=df[df["Pclass"]==2]["Embarked"].value_counts()
class3=df[df["Pclass"]==3]["Embarked"].value_counts()
dx=pd.DataFrame([class1,class2,class3],index=["class 1","class 2","class 3"])
dx.plot(kind="bar",stacked=True);
plt.title("Survive of Pclass ");
```

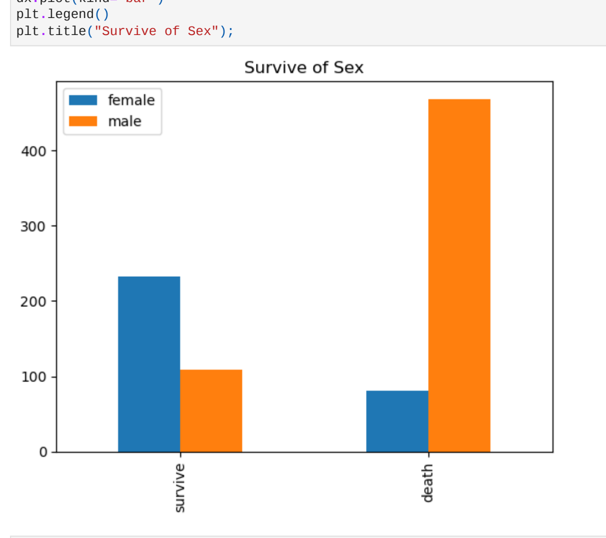


We Found that Embarked from S in 1st & 2nd & 3rd Class

In [360…
```python
# Create the pie chart
values=df["Sex"].value_counts()
label=["male","female"]
plt.pie(values, labels=label,autopct='%1.1f%%')
# Add a title
plt.title('Distribution of Survived')
# Display the chart
plt.show()
```



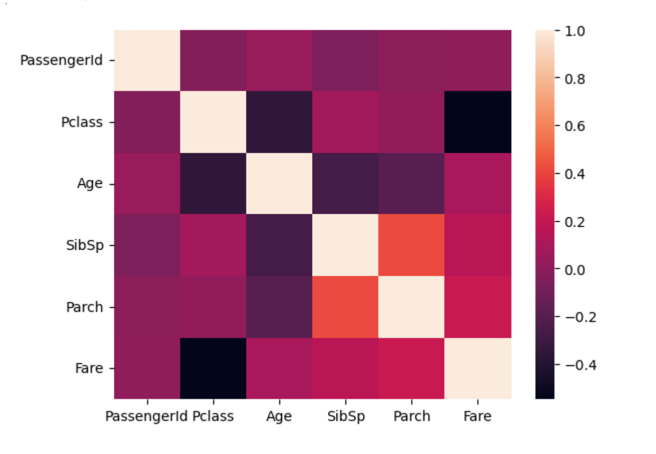
In [361…
```python
survive = df[df["Survived"]==1]["Sex"].value_counts()
death   = df[df["Survived"]==0]["Sex"].value_counts()
dx      = pd.DataFrame([survive,death],index=["survive","death"])
dx=dx.rename(columns={0:"male",1:"female"})
dx.plot(kind="bar")
plt.legend()
plt.title("Survive of Sex");
```



In [ ]:

In [362…
```python
corrleation = df.drop(columns="Survived").corr()
sns.heatmap(corrleation)
```

Out[362]: <AxesSubplot:>



Split Data

In [ ]:

In [363…
```python
df
```

Out[363]:

	PassengerId	Survived	Pclass	Sex	Age	SibSp	Parch	Fare	Embarked
0	1	0	3	0	22.0	1	0	7.2500	0
1	2	1	1	1	38.0	1	0	71.2833	1
2	3	1	3	1	26.0	0	0	7.9250	0
3	4	1	1	1	35.0	1	0	53.1000	0
4	5	0	3	0	35.0	0	0	8.0500	0
...	...	...	...	...	...	...	...	...	...
886	887	0	2	0	27.0	0	0	13.0000	0
887	888	1	1	1	19.0	0	0	30.0000	0
888	889	0	3	1	21.0	1	2	23.4500	0
889	890	1	1	0	26.0	0	0	30.0000	1
890	891	0	3	0	32.0	0	0	7.7500	2

891 rows × 9 columns

In [364…
```python
target="Survived"
y = df[target]
X = df.drop(columns=target)
x_train , x_test , y_train , y_test = train_test_split(X,y,test_size=0.2,random_state=42)
print("X_train shape:", x_train.shape)
print("y_train shape:", y_train.shape)
print("X_test shape:", x_test.shape)
print("y_test shape:", y_test.shape)
```

```
X_train shape: (712, 8)
y_train shape: (712,)
X_test shape: (179, 8)
y_test shape: (179,)
```

Baseline

In [365…
```python
y_train_mean = y_train.mean()
print ("Baseline :",round(y_train_mean,2))
```

```
Baseline : 0.38
```

Logestic Regression

Itrate

In [366…
```python
log_model = LogisticRegression(max_iter=10000)
```

In [367…
```python
log_model.fit(x_train,y_train)
```

Out[367]:
```
LogisticRegression
LogisticRegression(max_iter=10000)
```

Evaluate

In [368…
```python
accuracy=classification_report(y_test,log_model.predict(x_test))
print(accuracy)
```

```
              precision    recall  f1-score   support

           0       0.82      0.85      0.83       105
           1       0.77      0.73      0.75        74

    accuracy                           0.80       179
   macro avg       0.79      0.79      0.79       179
weighted avg       0.80      0.80      0.80       179
```

In [369…
```python
acc_test = accuracy_score(y_test,log_model.predict(x_test))
acc_test = accuracy_score(y_test,log_model.predict(x_test))
acc_train= accuracy_score(y_train,log_model.predict(x_train))
print("Accuracy test:",round(acc_test,2))
print("Accuracy train:",round(acc_train,2))
```

```
Accuracy test: 0.8
Accuracy train: 0.8
```

KNN Classfier

In [370…
```python
knn= KNeighborsClassifier(n_neighbors=13)
knn.fit(x_train,y_train)
```

Out[370]:
```
KNeighborsClassifier
KNeighborsClassifier(n_neighbors=13)
```

In [371…
```python
accuracy=classification_report(y_test,knn.predict(x_test))
print(accuracy)
```

```
              precision    recall  f1-score   support

           0       0.63      0.90      0.75       105
           1       0.66      0.26      0.37        74

    accuracy                           0.64       179
   macro avg       0.64      0.58      0.56       179
weighted avg       0.64      0.64      0.59       179
```

In [372…
```python
scoring="accuracy"
score = cross_validate(knn , x_train.drop(columns=["PassengerId"],axis=1),y_train,cv=k_fold, n_jobs=1,scoring=scoring)
print(score['test_score'])
```

```
[0.72222222 0.69444444 0.71830986 0.63380282 0.70422535 0.78873239
 0.71830986 0.69014085 0.74647887 0.66197183]
```

In [373…
```python
print("Accuracy :",round(np.mean(score['test_score']),2))
```

```
Accuracy : 0.71
```

Descion Tree

In [374…
```python
# Create a decision tree classifier
dec_tree=  DecisionTreeClassifier()
# Train the classifier
dec_tree.fit(x_train, y_train)
```

Out[374]:
```
DecisionTreeClassifier
DecisionTreeClassifier()
```

In [375…
```python
accuracy=classification_report(y_test,dec_tree.predict(x_test))
print(accuracy)
```

```
              precision    recall  f1-score   support

           0       0.79      0.76      0.78       105
           1       0.68      0.72      0.70        74

    accuracy                           0.74       179
   macro avg       0.74      0.74      0.74       179
weighted avg       0.75      0.74      0.74       179
```

In [376…
```python
acc_test = accuracy_score(y_test,dec_tree.predict(x_test))
print("Accuracy test:",round(acc_test,2))
```

```
Accuracy test: 0.74
```

In [377…
```python
scoring="accuracy"
score = cross_validate(dec_tree , x_train.drop(columns=["PassengerId"],axis=1),y_train,cv=k_fold, n_jobs=1,scoring=scoring)
print("Accuracy :",round(np.mean(score['test_score']),2))
```

```
Accuracy : 0.78
```

Random Forest

In [378…
```python
# Create a Random Forest classifier
rf_classifier = RandomForestClassifier()
# Train the classifier
rf_classifier.fit(x_train, y_train)
```

Out[378]:
```
RandomForestClassifier
RandomForestClassifier()
```

In [379…
```python
# Calculate the accuracy
accuracy = accuracy_score(y_test, rf_classifier.predict(x_test))
print("Accuracy:", round(accuracy,2))
```

```
Accuracy: 0.84
```

In [380…
```python
scoring="accuracy"
score = cross_validate(rf_classifier , x_train.drop(columns=["PassengerId"],axis=1),y_train, n_jobs=1,scoring=scoring)
print("Accuracy :",round(np.mean(score['test_score']),1))
```

```
Accuracy : 0.8
```

Naive Bayes

In [381…
```python
nav= GaussianNB()
# Train the classifier
nav.fit(x_train, y_train)
```

Out[381]:
```
GaussianNB
GaussianNB()
```

In [382…
```python
# Calculate the accuracy
accuracy = accuracy_score(y_test, nav.predict(x_test))
print("Accuracy:", round(accuracy,2))
```

```
Accuracy: 0.78
```

In [383…
```python
scoring="accuracy"
score = cross_validate(nav , x_train.drop(columns=["PassengerId"],axis=1),y_train, n_jobs=1,scoring=scoring)
print("Accuracy :",round(np.mean(score['test_score']),2))
```

```
Accuracy : 0.8
```

Communicat

The best model is Random Forest with Accuracy : 82

In [384…
```python
pred_test=rf_classifier.predict(test)

data = pd.DataFrame({'PassengerId': test["PassengerId"], 'Survived': pred_test})
```

In [385…
```python
data.head()
```

Out[385]:

	PassengerId	Survived
0	892	0
1	893	0
2	894	0
3	895	0
4	896	0

In [386…
```python
data.to_csv(r'D:\projects\gender_submission.csv', index=False)
```

In [ ]: