Assignment 15 sep

Perform Data preprocessing on Titanic dataset 1.Data Collection. Please download the dataset from https://www.kaggle.com/datasets/yasserh/titanic-dataset

2.Data Preprocessing o Import the Libraries. o Importing the dataset. o Checking for Null Values. o Data Visualization. o Outlier Detection o Splitting Dependent and Independent variables o Perform Encoding o Feature Scaling. o Splitting Data into Train and Test

1.Data Collection :

Data Set is collected from the kaggle website

2.Data Preprocessing :

Importing the Libraries

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

Importing the DataSet

```
df=pd.read_csv("Titanic-Dataset.csv")
df.head()
```

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	
0	1	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	A/5 21171	
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th	female	38.0	1	0	PC 17599	7

```
df.info()
```

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

```
df.describe()
```

	PassengerId	Survived	Pclass	Age	SibSp	Parch	
count	891.000000	891.000000	891.000000	714.000000	891.000000	891.000000	891.(
mean	446.000000	0.383838	2.308642	29.699118	0.523008	0.381594	32.2
std	257.353842	0.486592	0.836071	14.526497	1.102743	0.806057	49.6
min	1.000000	0.000000	1.000000	0.420000	0.000000	0.000000	0.(
50%	446.000000	0.000000	3.000000	28.000000	0.000000	0.000000	14.4

Checking for Null Values

```
df.isnull().any()
```

```
PassengerId    False
Survived       False
Pclass         False
Name           False
Sex            False
Age             True
SibSp          False
Parch          False
Ticket         False
Fare           False
Cabin           True
Embarked        True
dtype: bool
```

```
df.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
```

```
print("Null percentage in columns : ")
for i in df.columns:
    c=df[i].count()
    n=df[i].isnull().sum()
    print(i," : ",(n/(n+c)) * 100)
```

```
Null percentage in columns :
PassengerId  :  0.0
Survived  :  0.0
Pclass  :  0.0
Name  :  0.0
Sex  :  0.0
Age  :  19.865319865319865
SibSp  :  0.0
Parch  :  0.0
Ticket  :  0.0
Fare  :  0.0
Cabin  :  77.10437710437711
Embarked  :  0.22446689113355783
```

```
df.shape
```

```
(891, 12)
```

```
df["Age"].fillna(df["Age"].median(),inplace=True)
df["Embarked"].fillna(df["Embarked"].mode()[0],inplace=True)
```

```
print(df["Age"].isnull().any())
print(df["Embarked"].isnull().any())
```

```
False
False
```

```
df.head()
```

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket
0	1	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	A/5 21171
				Cumings, Mrs. John					

```
print(df.shape)
```

```
(891, 12)
```

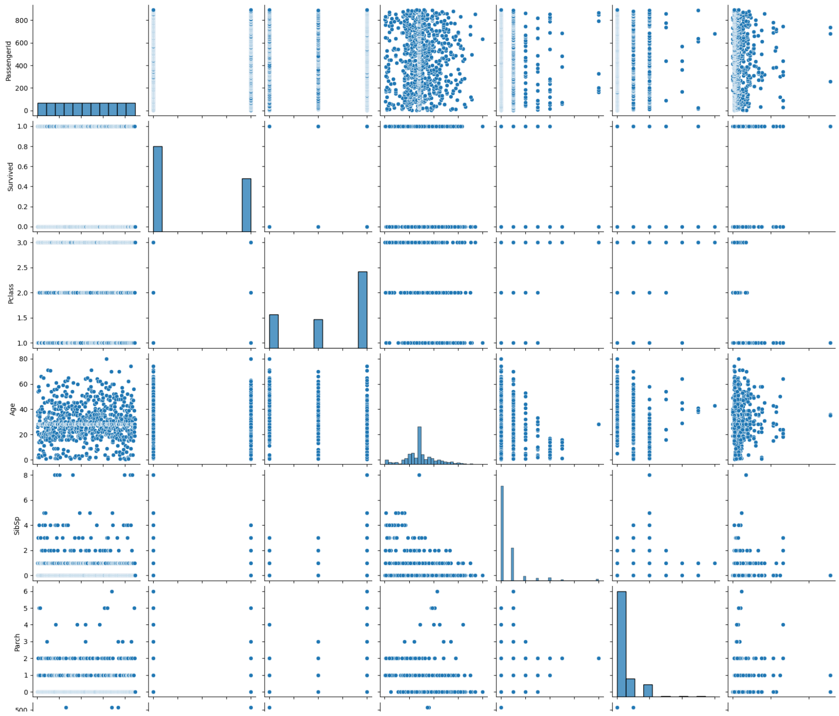
```
df.isnull().any()
```

```
PassengerId    False
Survived       False
Pclass         False
Name           False
Sex            False
Age            False
SibSp          False
Parch          False
Ticket         False
Fare           False
Cabin           True
Embarked       False
dtype: bool
```

Data Visualization

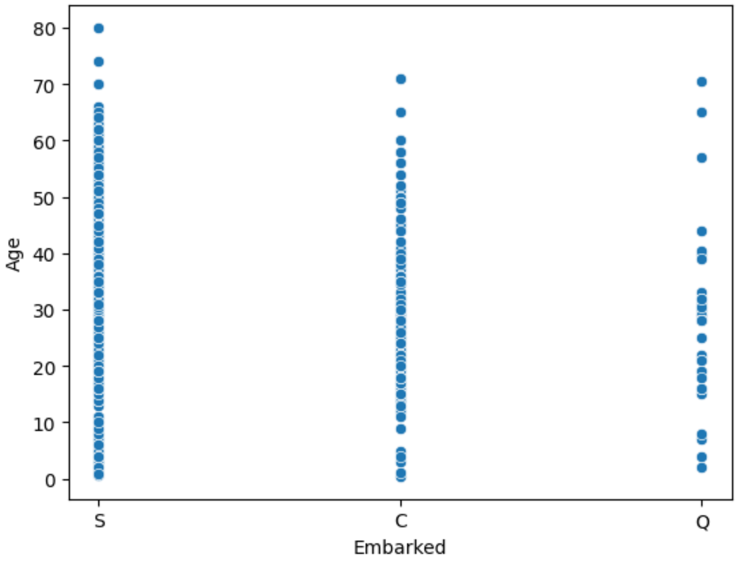
```
sns.pairplot(df)
```

```
<seaborn.axisgrid.PairGrid at 0x7c24a402e9e0>
```



```
sns.scatterplot(x="Embarked",y="Age",data=df)
```

```
<Axes: xlabel='Embarked', ylabel='Age'>
```

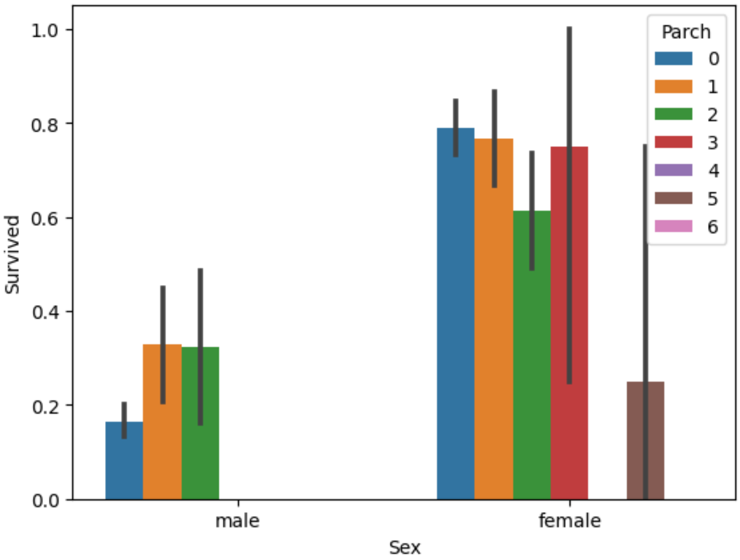


```
sns.barplot(x="Sex",y="Survived",data=df,hue="Pclass")
```

```
<Axes: xlabel='Sex', ylabel='Survived'>
```

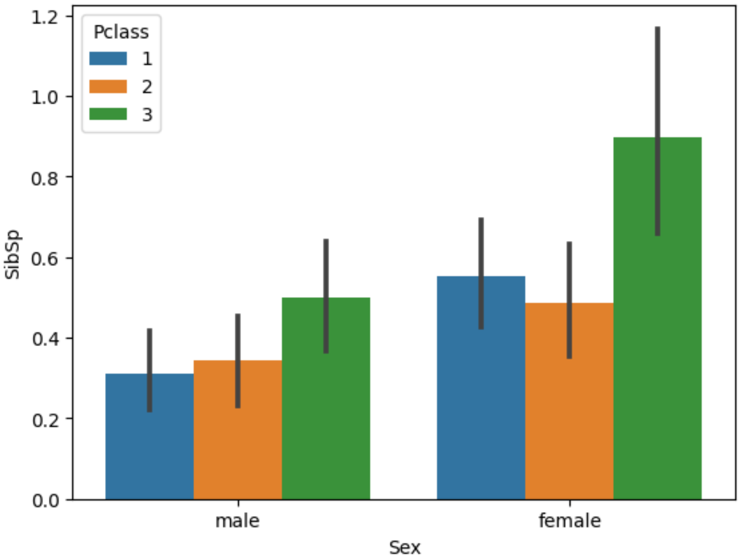
```
sns.barplot(x="Sex",y="Survived",data=df,hue="Parch")
```

```
<Axes: xlabel='Sex', ylabel='Survived'>
```



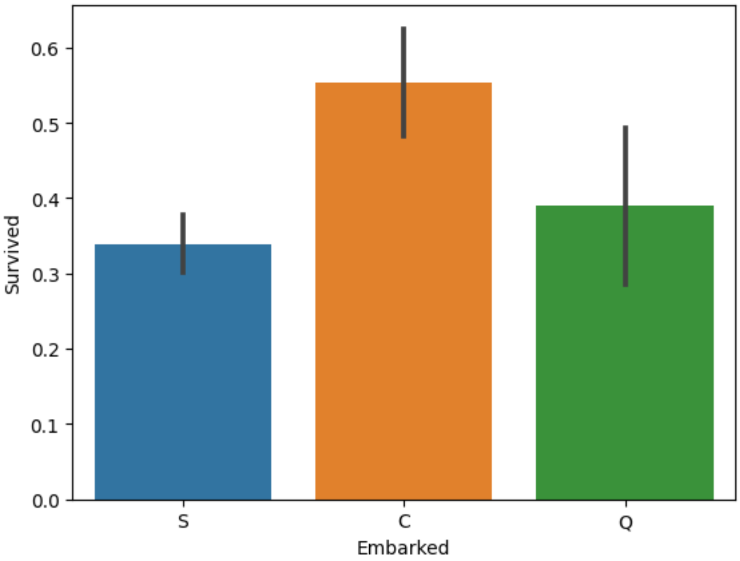
```
sns.barplot(x="Sex",y="SibSp",data=df,hue="Pclass")
```

```
<Axes: xlabel='Sex', ylabel='SibSp'>
```



```
sns.barplot(x="Embarked",y="Survived",data=df)
```

```
<Axes: xlabel='Embarked', ylabel='Survived'>
```



```
sns.distplot(df["Survived"])
```

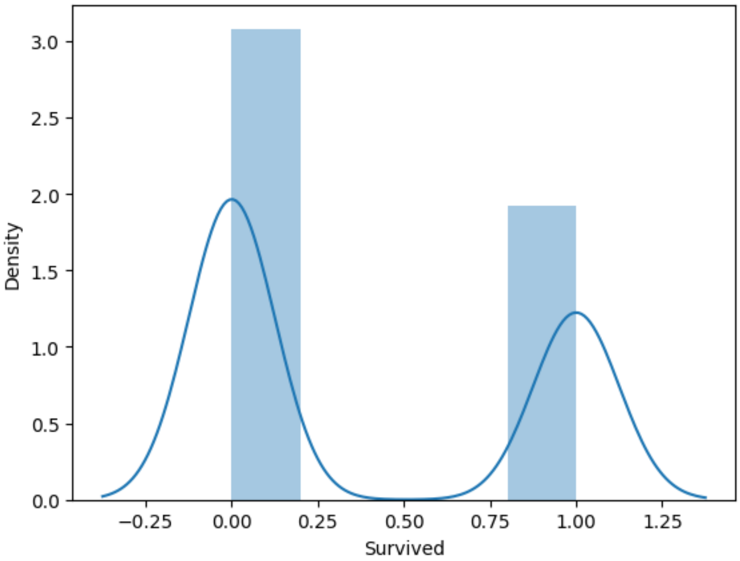
```
<ipython-input-22-6525837c6049>:1: UserWarning:

`distplot` is a deprecated function and will be removed in seaborn v0.14.0.

Please adapt your code to use either `displot` (a figure-level function with
similar flexibility) or `histplot` (an axes-level function for histograms).

For a guide to updating your code to use the new functions, please see
https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751

  sns.distplot(df["Survived"])
<Axes: xlabel='Survived', ylabel='Density'>
```



```
corr=df.corr(numeric_only=True)
corr
```

	PassengerId	Survived	Pclass	Age	SibSp	Parch	F
PassengerId	1.000000	-0.005007	-0.035144	0.034212	-0.057527	-0.001652	0.012
Survived	-0.005007	1.000000	-0.338481	-0.064910	-0.035322	0.081629	0.257
Pclass	-0.035144	-0.338481	1.000000	-0.339898	0.083081	0.018443	-0.549
Age	0.034212	-0.064910	-0.339898	1.000000	-0.233296	-0.172482	0.096
SibSp	-0.057527	-0.035322	0.083081	-0.233296	1.000000	0.414838	0.159
Parch	-0.001652	0.081629	0.018443	-0.172482	0.414838	1.000000	0.216
Fare	0.012658	0.257307	-0.549500	0.096688	0.159651	0.216225	1.000

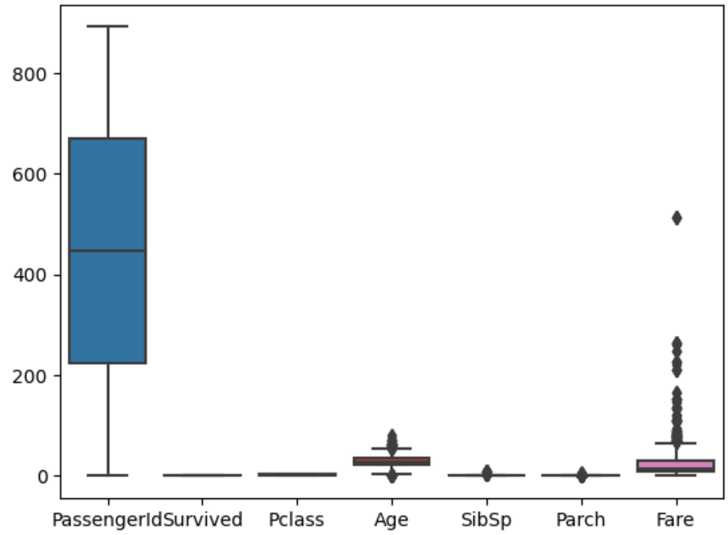
```
sns.heatmap(corr,annot=True)
```

```
<Axes: >
```

Outlier Detection

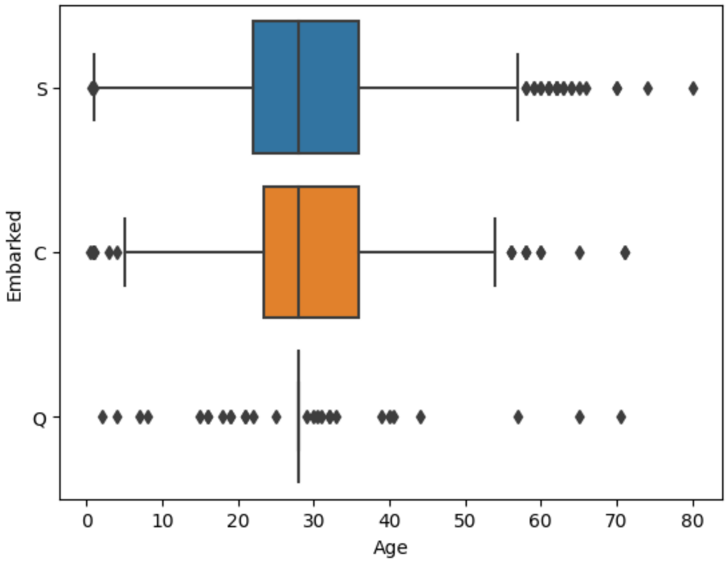
```
sns.boxplot(df)
```

```
<Axes: >
```



```
sns.boxplot(data=df,x="Age",y="Embarked")
```

```
<Axes: xlabel='Age', ylabel='Embarked'>
```

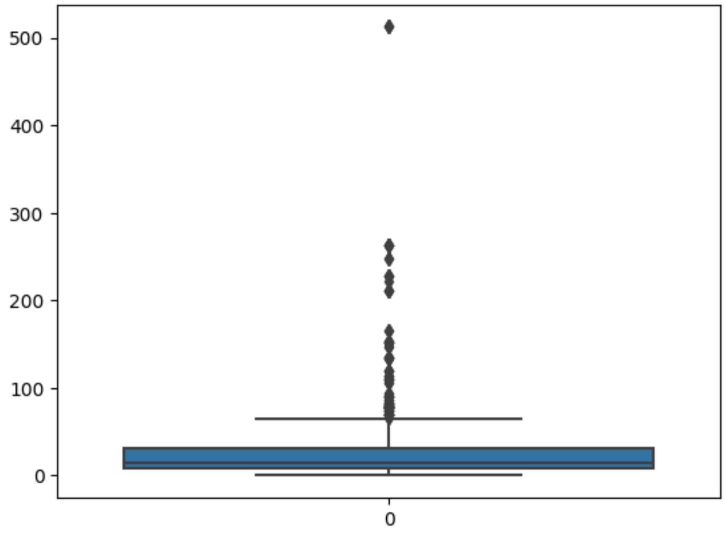


```
sns.boxplot(data=df,x="Fare",y="Embarked")
```

```
<Axes: xlabel='Fare', ylabel='Embarked'>
```

```
sns.boxplot(df["Fare"])
```

```
<Axes: >
```



```
df["Age"].skew()
```

```
0.5102446555756495
```

```
df["Fare"].skew() # as skewnwss should be -1 to +1 is normal range but here we are having so much outliers and should be treated first
```

```
4.787316519674893
```

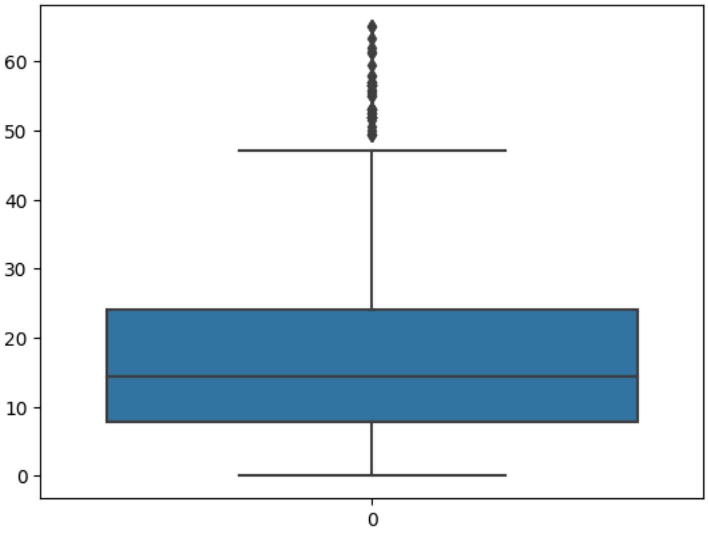
```
df["Fare"].median()
```

```
14.4542
```

```
Q1 = df['Fare'].quantile(0.25)
Q3 = df['Fare'].quantile(0.75)
IQR = Q3 - Q1
width = 1.5
lower_limit = Q1 -(width*IQR)
upper_limit = Q3 + (width*IQR)
df['Fare']=np.where(df['Fare']>upper_limit,14.4542,np.where(df['Fare']<lower_limit,14.4542,df["Fare"]))
```

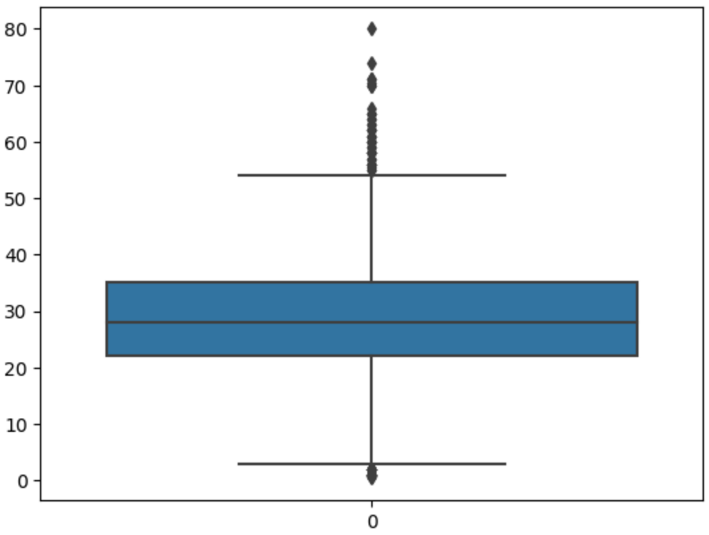
```
sns.boxplot(df["Fare"])
```

```
<Axes: >
```



```
sns.boxplot(df.Age)
```

```
<Axes: >
```



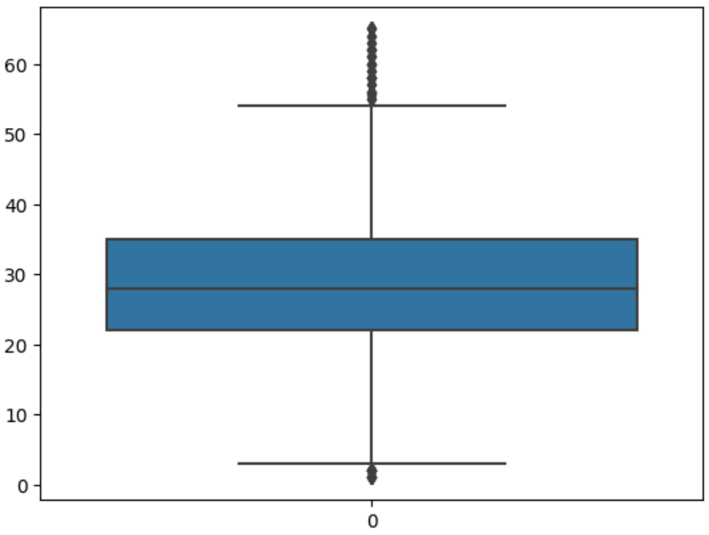
```
print(df.Age.median())
print(df.Age.shape)
```

```
28.0
(891,)
```

```
p=df["Age"].quantile(0.99)
p1=df['Age'].quantile(0.01)
df=df[df['Age']<=p]
df=df[df['Age']>=p1]
```

```
sns.boxplot(df.Age)
```

```
<Axes: >
```



```
sns.boxplot(df)
```

```
<Axes: >
```

```
df.head()
```

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	
0	1	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	A/5 21171	
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th	female	38.0	1	0	PC 17599	1

```
df.shape
```

```
(876, 12)
```

Splitting Dependent and Independent variables

```
df.drop(["PassengerId","Name","Ticket","Cabin"],axis=1,inplace=True)
df.head()
```

	Survived	Pclass	Sex	Age	SibSp	Parch	Fare	Embarked
0	0	3	male	22.0	1	0	7.2500	S
1	1	1	female	38.0	1	0	14.4542	C
2	1	3	female	26.0	0	0	7.9250	S
3	1	1	female	35.0	1	0	53.1000	S
4	0	3	male	35.0	0	0	8.0500	S

```
X=df.iloc[:,1:]
y=df.iloc[:,:1]
```

```
X.head()
```

	Pclass	Sex	Age	SibSp	Parch	Fare	Embarked
0	3	male	22.0	1	0	7.2500	S
1	1	female	38.0	1	0	14.4542	C
2	3	female	26.0	0	0	7.9250	S
3	1	female	35.0	1	0	53.1000	S
4	3	male	35.0	0	0	8.0500	S

```
y.head()
```

	Survived
0	0
1	1
2	1
3	1
4	0

```
y=y.squeeze()
```

```
type(X)
```

```
pandas.core.frame.DataFrame
```

```
type(y)
```

```
    pandas.core.series.Series
```

```
y.head()
```

```
    0    0
    1    1
    2    1
    3    1
    4    0
    Name: Survived, dtype: int64
```

Perform Encoding

```
from sklearn.preprocessing import LabelEncoder
le=LabelEncoder()
X["Sex"]=le.fit_transform(X["Sex"])
mapping1=dict(zip(le.classes_,range(len(le.classes_))))
X["Embarked"]=le.fit_transform(X["Embarked"])
mapping2=dict(zip(le.classes_,range(len(le.classes_))))
```

```
print("For Sex Column :",mapping1)
print("For Embarked Column :",mapping2)
```

```
    For Sex Column : {'female': 0, 'male': 1}
    For Embarked Column : {'C': 0, 'Q': 1, 'S': 2}
```

```
X
```

	Pclass	Sex	Age	SibSp	Parch	Fare	Embarked
0	3	1	22.0	1	0	7.2500	2
1	1	0	38.0	1	0	14.4542	0
2	3	0	26.0	0	0	7.9250	2
3	1	0	35.0	1	0	53.1000	2
4	3	1	35.0	0	0	8.0500	2
...	...	...	...	...	...	...	...
886	2	1	27.0	0	0	13.0000	2
887	1	0	19.0	0	0	30.0000	2
888	3	0	28.0	1	2	23.4500	2
889	1	1	26.0	0	0	30.0000	0
890	3	1	32.0	0	0	7.7500	1

876 rows × 7 columns

```
y
```

```
    0      0
    1      1
    2      1
    3      1
    4      0
          ..
    886    0
    887    1
    888    0
    889    1
    890    0
    Name: Survived, Length: 876, dtype: int64
```

Feature Scaling

```
from sklearn.preprocessing import StandardScaler
ss=StandardScaler()
X_Scale=pd.DataFrame(ss.fit_transform(X),columns=X.columns)
```

```
X_Scale.head()
```

	Pclass	Sex	Age	SibSp	Parch	Fare	Embarked
0	0.821711	0.743768	-0.589744	0.430836	-0.467137	-0.793895	0.582594
1	-1.573693	-1.344504	0.719906	0.430836	-0.467137	-0.227705	-1.956472
2	0.821711	-1.344504	-0.262332	-0.472065	-0.467137	-0.740846	0.582594
3	-1.573693	-1.344504	0.474346	0.430836	-0.467137	2.809531	0.582594

```
y.head()
```

```
0    0
1    1
2    1
3    1
4    0
Name: Survived, dtype: int64
```

```
X_Scale.shape
```

```
(876, 7)
```

```
y.shape
```

```
(876,)
```

Splitting Data into Train and Test

```
from sklearn.model_selection import train_test_split
X_train,X_test,y_train,y_test=train_test_split(X_Scale,y,test_size=0.2,random_state=0)
```

```
print(X_train,"\n",X_test,"\n","\n",y_train,"\n",y_test)
```

```
       Pclass       Sex       Age     SibSp     Parch      Fare  Embarked
45   0.821711  0.743768 -0.098626  0.430836 -0.467137 -0.145514 -0.686939
172  0.821711  0.743768 -0.098626  2.236638  0.772900  0.637785  0.582594
492  0.821711  0.743768 -0.426038 -0.472065 -0.467137 -0.751000  0.582594
820  0.821711  0.743768 -0.917157 -0.472065 -0.467137 -0.711374  0.582594
651 -1.573693  0.743768  1.702144  1.333737 -0.467137 -0.227705  0.582594
..        ...       ...       ...       ...       ...       ...       ...
835 -1.573693 -1.344504 -0.098626  0.430836 -0.467137 -0.227705 -1.956472
192  0.821711  0.743768 -0.098626 -0.472065 -0.467137 -0.754599 -0.686939
629 -0.375991  0.743768  0.146934  0.430836  0.772900  0.699346  0.582594
559  0.821711  0.743768 -0.835304 -0.472065 -0.467137 -0.743141  0.582594
684 -1.573693  0.743768  2.520675 -0.472065 -0.467137  0.722923  0.582594

[700 rows x 7 columns]
        Pclass       Sex       Age     SibSp     Parch      Fare  Embarked
141 -0.375991  0.743768 -0.835304  0.430836  0.772900  1.524558  0.582594
113 -0.375991  0.743768 -0.016772  0.430836 -0.467137  0.286740  0.582594
730 -1.573693  0.743768 -0.098626 -0.472065 -0.467137  0.994065  0.582594
294 -1.573693  0.743768 -0.098626 -0.472065 -0.467137  1.033360  0.582594
261 -0.375991  0.743768  0.556200 -0.472065 -0.467137 -0.538472  0.582594
..        ...       ...       ...       ...       ...       ...       ...
578 -1.573693 -1.344504 -0.917157 -0.472065  2.012937 -0.227705  0.582594
773  0.821711  0.743768 -0.344185 -0.472065 -0.467137 -0.793895  0.582594
522 -0.375991  0.743768 -0.507891  1.333737  0.772900 -0.459881  0.582594
780  0.821711 -1.344504 -0.098626  6.751142  2.012937 -0.227705  0.582594
54  -1.573693  0.743768 -0.098626 -0.472065 -0.467137  1.426319  0.582594

[176 rows x 7 columns]

 46    0
176    0
499    0
834    0
660    1
      ..
849    1
196    0
637    0
566    0
694    0
Name: Survived, Length: 700, dtype: int64
 145    0
117    0
740    1
298    1
265    0
      ..
585    1
785    0
```

```
529    0
792    0
55     1
Name: Survived, Length: 176, dtype: int64
```

```
print(X_train.shape,X_test.shape,y_train.shape,y_test.shape)
```

```
(700, 7) (176, 7) (700,) (176,)
```

Preprocessing Done

Testing for accuracy

```
from sklearn.linear_model import LogisticRegression
lr=LogisticRegression()
lr.fit(X_train,y_train)
```

```
▾ LogisticRegression
LogisticRegression()
```

```
y_predict=lr.predict(X_test)
```

```
from sklearn.metrics import accuracy_score
accuracy = accuracy_score(y_test, y_predict)

print("Accuracy:", accuracy)
```

```
Accuracy: 0.8295454545454546
```