```
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
from sklearn.tree import DecisionTreeClassifier
from sklearn.naive_bayes import BernoulliNB
from sklearn.metrics import confusion_matrix,accuracy_score,classification_report,ConfusionMatrixDisplay
df=pd.read_csv('/content/drive/MyDrive/Titanic-Dataset.csv')
df
```

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embarked
0	1	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	A/5 21171	7.2500	NaN	S
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1	0	PC 17599	71.2833	C85	C
2	3	1	3	Heikkinen, Miss. Laina	female	26.0	0	0	STON/O2. 3101282	7.9250	NaN	S
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1	0	113803	53.1000	C123	S
4	5	0	3	Allen, Mr. William Henry	male	35.0	0	0	373450	8.0500	NaN	S
...	...	...	...	...	...	...	...	...	...	...	...	...
886	887	0	2	Montvila, Rev. Juozas	male	27.0	0	0	211536	13.0000	NaN	S
887	888	1	1	Graham, Miss. Margaret Edith	female	19.0	0	0	112053	30.0000	B42	S
888	889	0	3	Johnston, Miss. Catherine Helen "Carrie"	female	NaN	1	2	W./C. 6607	23.4500	NaN	S
889	890	1	1	Behr, Mr. Karl Howell	male	26.0	0	0	111369	30.0000	C148	C
890	891	0	3	Dooley, Mr. Patrick	male	32.0	0	0	370376	7.7500	NaN	Q

891 rows × 12 columns

```
df.head()
```

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embarked
0	1	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	A/5 21171	7.2500	NaN	S
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1	0	PC 17599	71.2833	C85	C
2	3	1	3	Heikkinen, Miss. Laina	female	26.0	0	0	STON/O2. 3101282	7.9250	NaN	S
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1	0	113803	53.1000	C123	S

```
df.tail()
```

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embarked
886	887	0	2	Montvila, Rev. Juozas	male	27.0	0	0	211536	13.00	NaN	S
887	888	1	1	Graham, Miss. Margaret Edith	female	19.0	0	0	112053	30.00	B42	S
888	889	0	3	Johnston, Miss. Catherine Helen "Carrie"	female	NaN	1	2	W./C. 6607	23.45	NaN	S
889	890	1	1	Behr, Mr. Karl Howell	male	26.0	0	0	111369	30.00	C148	C
890	891	0	3	Dooley, Mr. Patrick	male	32.0	0	0	370376	7.75	NaN	Q

```
df.columns
```

```
Index(['PassengerId', 'Survived', 'Pclass', 'Name', 'Sex', 'Age', 'SibSp',
       'Parch', 'Ticket', 'Fare', 'Cabin', 'Embarked'],
      dtype='object')
```

```
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.shape
```

```
(891, 12)
```

```
df.size
```

```
10692
```

```
df.duplicated().sum()
```

```
0
```

```
df.isna().sum()
```

	0
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

```
plt.figure(figsize=(15,6))
sns.heatmap(df.isnull(),yticklabels=False)
plt.show()
```


```
df=df.drop(['PassengerId','Name','Cabin','Ticket'],axis=1)


df['Age'].fillna(df['Age'].mean(),inplace=True)
df['Embarked'].fillna(df['Embarked'].mode()[0],inplace=True)
df.isna().sum()
```

	0
Survived	0
Pclass	0
Sex	0
Age	0
SibSp	0
Parch	0
Fare	0
Embarked	0

dtype: int64

```
df.dtypes
```

	0
Survived	int64
Pclass	int64
Sex	object
Age	float64
SibSp	int64
Parch	int64
Fare	float64
Embarked	object

dtype: object

```
#encoding
from sklearn.preprocessing import LabelEncoder
lb=LabelEncoder()
df['Sex']=lb.fit_transform(df['Sex'])
```

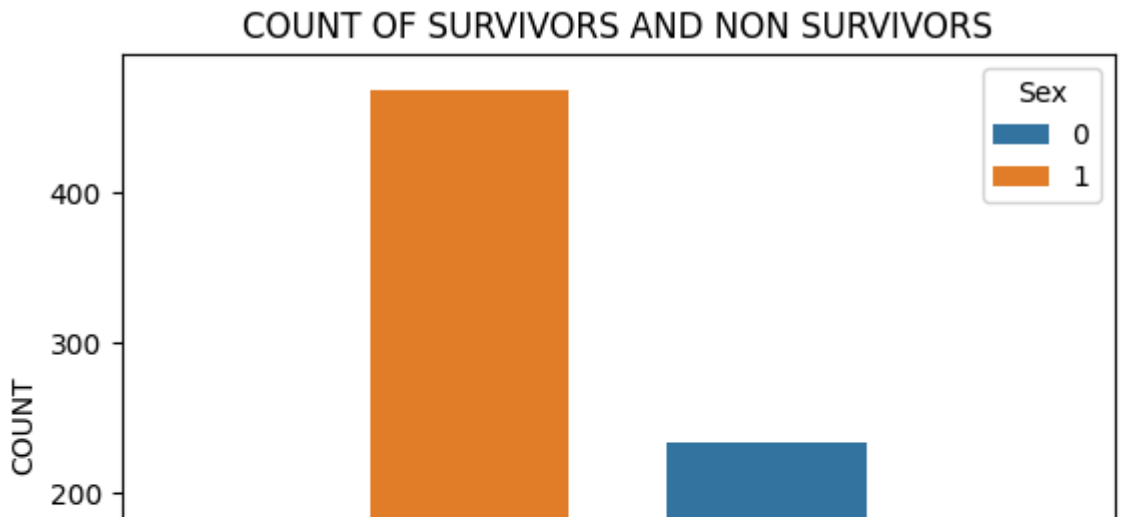
```
df['Embarked']=lb.fit_transform(df['Embarked'])
df.dtypes
```

	0
Survived	int64
Pclass	int64
Sex	int64
Age	float64
SibSp	int64
Parch	int64
Fare	float64
Embarked	int64

dtype: object

```
sns.countplot(data=df,x=df['Survived'],hue=df['Sex'])
plt.title('COUNT OF SURVIVORS AND NON SURVIVORS')
plt.xlabel('SURVIVED OR NOT')
plt.ylabel('COUNT')
plt.gca().set_xticklabels(['Not survived','Survived'])
```

```
<ipython-input-15-c80af7a261dd>:5: UserWarning: FixedFormatter should only be used together with FixedLocator
  plt.gca().set_xticklabels(['Not survived','Survived'])
[Text(0, 0, 'Not survived'), Text(1, 0, 'Survived')]
```



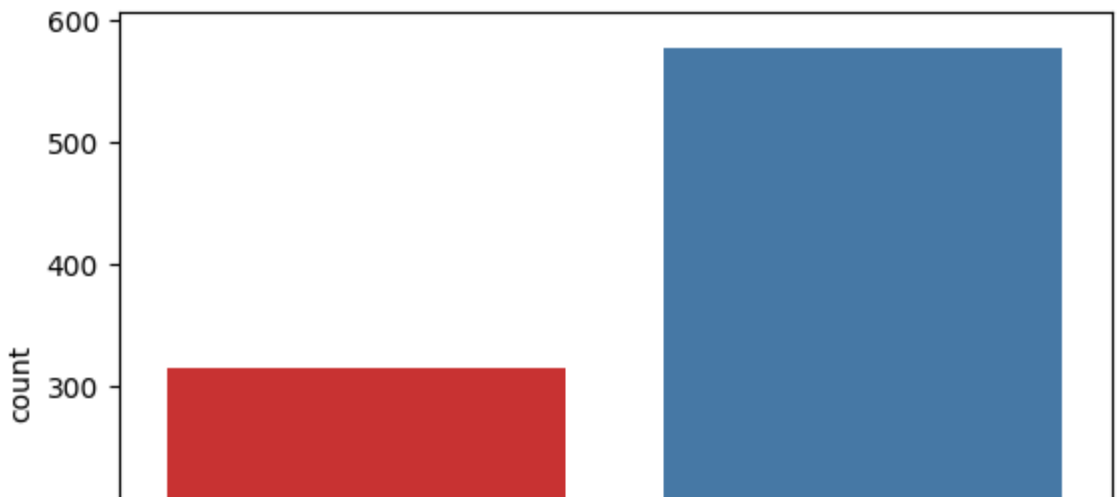

```
count=df['Sex'].value_counts()
count
```

Sex	count
1	577
0	314

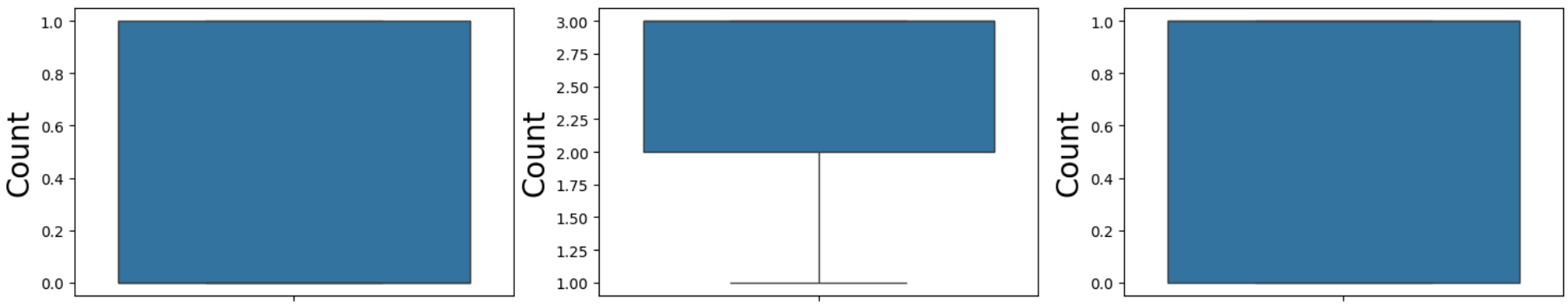
dtype: int64

```
sns.countplot(x=df['Sex'],palette='Set1')
```

```
<ipython-input-17-f967e11ca303>:1: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `

  sns.countplot(x=df['Sex'],palette='Set1')
<Axes: xlabel='Sex', ylabel='count'>
```

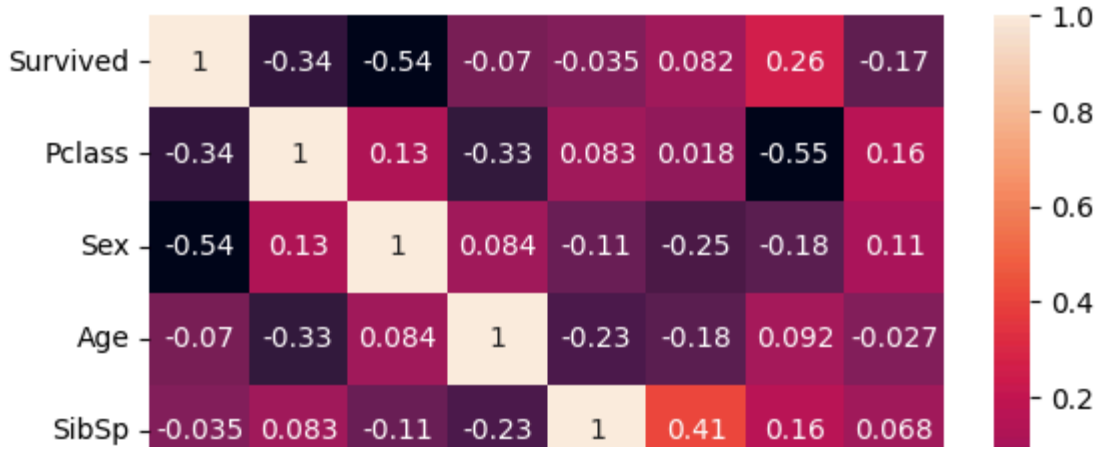



```
plt.figure(figsize=(15,10),facecolor='white')
plotnumber=1

for column in df:
    if plotnumber<=9:
        ax=plt.subplot(3,3,plotnumber)
        sns.boxplot(df[column])
        plt.xlabel(column,fontsize=20)
        plt.ylabel('Count',fontsize=20)
    plotnumber+=1
plt.tight_layout()
```



```
#feature selection
sns.heatmap(df.corr(),annot=True)
```

```
<Axes: >
```




```
x=df.drop(['Survived'],axis=1)
x
```

	Pclass	Sex	Age	SibSp	Parch	Fare	Embarked
0	3	1	22.000000	1	0	7.2500	2
1	1	0	38.000000	1	0	71.2833	0
2	3	0	26.000000	0	0	7.9250	2
3	1	0	35.000000	1	0	53.1000	2
4	3	1	35.000000	0	0	8.0500	2
...	...	...	...	...	...	...	...
886	2	1	27.000000	0	0	13.0000	2
887	1	0	19.000000	0	0	30.0000	2
888	3	0	29.699118	1	2	23.4500	2
889	1	1	26.000000	0	0	30.0000	0
890	3	1	32.000000	0	0	7.7500	1

891 rows × 7 columns

```
y=df['Survived']
y
```

	Survived
0	0
1	1
2	1
3	1
4	0
5	0
6	0
7	0
8	1
9	1
10	1
11	1
12	0
13	0
14	0
15	1
16	0
17	1
18	0
19	1
20	0
21	1
22	1
23	1
24	0
25	1
26	0
27	0
28	1
29	0
30	0
37	0
40	0
45	0

```
from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.30,random_state=42)
x_train.shape
```

```
(623, 7)
```

```
y_train.shape
```

```
(623,)
```

```
x_test.shape
```

```
(268, 7)
```

```
y_test.shape
```

```
(268,)
```

Model creation

Decision Tree Classifier

```
model=DecisionTreeClassifier()
model.fit(x_train,y_train)
```

```
DecisionTreeClassifier()
```

```
y_pred=model.predict(x_test)
y_pred
```

```
array([0, 1, 1, 1, 0, 1, 1, 0, 0, 1, 1, 0, 0, 0, 0, 1, 1, 1, 0, 0, 0, 0,
       0, 0, 0, 0, 1, 1, 1, 1, 0, 1, 1, 1, 0, 0, 0, 1, 1, 0, 0, 0, 0, 0,
       0, 0, 0, 0, 0, 1, 1, 1, 0, 1, 1, 1, 0, 1, 1, 0, 1, 1, 1, 0, 0, 1,
       0, 0, 0, 1, 1, 1, 0, 1, 0, 0, 1, 1, 1, 0, 0, 1, 1, 0, 0, 1, 1, 1,
       0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 1, 0, 0, 1, 1, 0, 0, 0,
       1, 0, 1, 1, 0, 0, 1, 0, 1, 0, 0, 1, 1, 1, 0, 0, 1, 0, 0, 0, 1, 0,
       0, 0, 0, 1, 1, 0, 0, 1, 0, 1, 0, 0, 0, 1, 0, 1, 1, 0, 0, 0, 0, 0,
       0, 0, 0, 1, 1, 1, 0, 0, 0, 1, 1, 1, 0, 1, 0, 0, 1, 1, 1, 1, 0, 0,
       0, 1, 1, 1, 0, 0, 0, 1, 0, 1, 1, 0, 0, 1, 0, 0, 0, 0, 1, 1, 1, 0,
       1, 0, 0, 0, 1, 0, 0, 1, 0, 1, 0, 0, 1, 0, 1, 0, 0, 1, 1, 1, 1, 0,
       0, 1, 0, 1, 0, 1, 0, 1, 1, 1, 0, 1, 0, 1, 1, 0, 1, 0, 1, 0, 1, 1,
       0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 1, 0, 0, 0, 1, 0, 1, 0, 0, 1, 0,
       0, 0, 0, 0])
```

```
cm=confusion_matrix(y_test,y_pred)
cm
```

```
array([[121,  36],
       [ 34,  77]])
```

```
accuracy_score(y_test,y_pred)
```

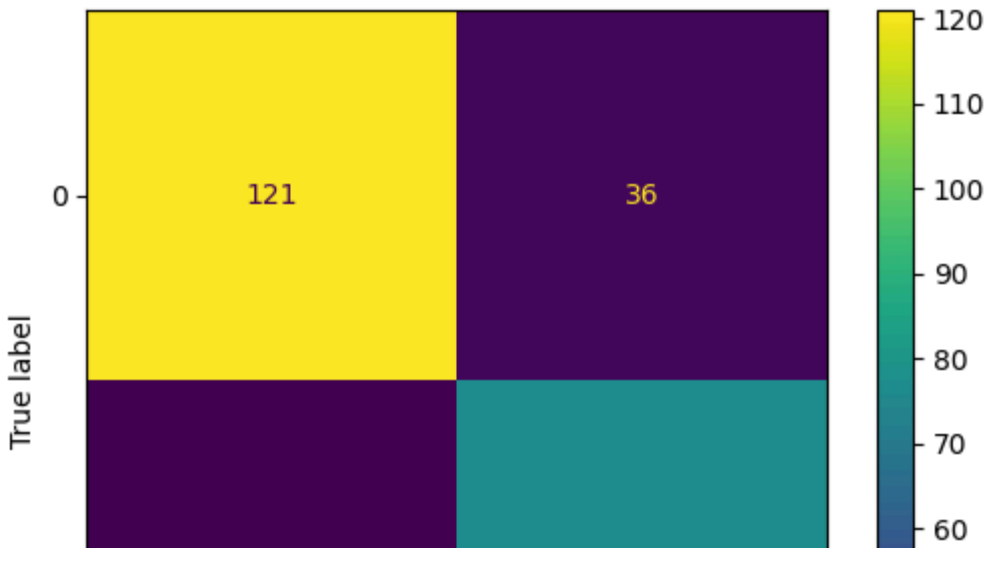
```
0.7388059701492538
```

```
print(classification_report(y_test,y_pred))
```

```
              precision    recall  f1-score   support

           0       0.78      0.77      0.78       157
           1       0.68      0.69      0.69       111

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

```
cmd=ConfusionMatrixDisplay(cm,display_labels=[0,1])
cmd.plot()
```

```
<sklearn.metrics._plot.confusion_matrix.ConfusionMatrixDisplay at 0x7f0a469c9bd0>
```



Naive Bayes

```
nv=BernoulliNB()
nv.fit(x_train,y_train)
```

```
▾ BernoulliNB
BernoulliNB()
```

```
y_pred=nv.predict(x_test)
y_pred
```

```
array([1, 0, 0, 1, 1, 1, 1, 0, 1, 1, 0, 0, 1, 0, 0, 1, 0, 1, 0, 0, 0, 0,
       1, 0, 0, 0, 0, 0, 0, 1, 0, 1, 0, 1, 0, 0, 0, 1, 1, 0, 0, 0, 0, 0,
       1, 0, 0, 0, 0, 0, 1, 1, 0, 0, 0, 1, 0, 1, 1, 1, 0, 1, 1, 0, 0, 1,
       0, 0, 1, 1, 1, 1, 0, 1, 0, 0, 1, 1, 1, 1, 0, 1, 1, 0, 0, 0, 1, 1,
       0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 1, 0, 0, 0, 1, 0, 0, 0,
       1, 0, 1, 0, 0, 0, 0, 0, 1, 1, 0, 1, 1, 0, 0, 0, 1, 0, 1, 0, 1, 1,
       0, 1, 0, 1, 1, 0, 0, 1, 0, 1, 0, 0, 1, 1, 0, 0, 1, 0, 0, 0, 0, 1,
       0, 0, 0, 1, 1, 1, 0, 0, 0, 1, 0, 0, 0, 1, 0, 0, 0, 1, 0, 1, 0, 0,
       1, 1, 1, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 1, 1, 1, 0,
       1, 1, 0, 1, 1, 1, 0, 1, 0, 0, 0, 0, 0, 0, 1, 0, 1, 0, 1, 0, 1, 0,
       0, 1, 0, 0, 0, 1, 0, 0, 1, 1, 0, 1, 0, 1, 0, 1, 1, 1, 1, 0, 0, 1,
       0, 1, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 1, 0, 1, 1, 0, 1, 0,
       0, 0, 0, 0])
```

```
cm=confusion_matrix(y_test,y_pred)
cm
```

```
array([[133,  24],
       [ 31,  80]])
```

115 0

```
accuracy_score(y_test,y_pred)
```

```
0.7947761194029851
```

```
print(classification_report(y_test,y_pred))
```

```
              precision    recall  f1-score   support

           0       0.81      0.85      0.83       157
           1       0.77      0.72      0.74       111

    accuracy                           0.79       268
   macro avg       0.79      0.78      0.79       268
weighted avg       0.79      0.79      0.79       268
```

```
cmd=ConfusionMatrixDisplay(cm,display_labels=[0,1])
cmd.plot()
```

```
<sklearn.metrics._plot.confusion_matrix.ConfusionMatrixDisplay at 0x7f0a46f75240>
```