```
import numpy as np
import pandas as pd
from sklearn.preprocessing import LabelEncoder
from sklearn.tree import DecisionTreeClassifier
from sklearn.tree import export_graphviz
from IPython.display import Image
from sklearn.compose import make_column_transformer
from sklearn.model_selection import train_test_split
from  sklearn.metrics  import accuracy_score
from sklearn.metrics import confusion_matrix
import matplotlib.pyplot as plt
import seaborn as sns
```

```
#loading titanic dataset
df = pd.read_csv("titanic.csv")
```

```
df
```

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Tic
0	1	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	A/5 21
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1	0	PC 17
2	3	1	3	Heikkinen, Miss. Laina	female	26.0	0	0	STON/ 3101
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1	0	113
4	5	0	3	Allen, Mr. William Henry	male	35.0	0	0	373
...	...	...	...	...	...	...	...	...	
886	887	0	2	Montvila, Rev.	male	27.0	0	0	211

```
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
std	257.353842	0.486592	0.836071	14.526497	1.102743	0.806057	49
min	1.000000	0.000000	1.000000	0.420000	0.000000	0.000000	0
25%	223.500000	0.000000	2.000000	20.125000	0.000000	0.000000	7
50%	446.000000	0.000000	3.000000	28.000000	0.000000	0.000000	14
75%	668.500000	1.000000	3.000000	38.000000	1.000000	0.000000	31
max	891.000000	1.000000	3.000000	80.000000	8.000000	6.000000	512

```
#dropping unnecessary values such as PassengerID, Name and Ticket
drop_elements = ['PassengerId', 'Name', 'Ticket']
df = df.drop(drop_elements, axis = 1)
```

```
#checking null values in the dataset
df.isnull().sum()
```

```
Survived      0
Pclass        0
Sex           0
Age         177
SibSp         0
Parch         0
Fare          0
Cabin       687
Embarked      2
dtype: int64
```

```
#filling age and embarked null values
cols = ['Pclass', 'Sex']
age_class_sex = df.groupby(cols)['Age'].mean().reset_index()
df['Age'] = df['Age'].fillna(df[cols].reset_index().merge(age_class_sex, how='le

df['Embarked'] = df['Embarked'].fillna('S')
```

```
#converting data attributes into categorial numerical form
df['Cabin'] = df["Cabin"].apply(lambda x: 0 if type(x) == float else 1)
df['Embarked'] = df['Embarked'].map( {'S': 0, 'C': 1, 'Q': 2} ).astype(int)
df['Sex'] = df['Sex'].map( {'female': 0, 'male': 1} ).astype(int)

df.loc[ df['Fare'] <= 7.91, 'Fare'] = 0
df.loc[(df['Fare'] > 7.91) & (df['Fare'] <= 14.454), 'Fare'] = 1
df.loc[(df['Fare'] > 14.454) & (df['Fare'] <= 31), 'Fare']   = 2
df.loc[ df['Fare'] > 31, 'Fare'] = 3
df['Fare'] = df['Fare'].astype(int)

df.loc[ df['Age'] <= 16, 'Age'] = 0
df.loc[(df['Age'] > 16) & (df['Age'] <= 32), 'Age'] = 1
df.loc[(df['Age'] > 32) & (df['Age'] <= 48), 'Age'] = 2
df.loc[(df['Age'] > 48) & (df['Age'] <= 64), 'Age'] = 3
df.loc[ df['Age'] > 64, 'Age'] = 4;
df['Age'] = df['Age'].astype(int)


#final cleaned dataset
df
```

	Survived	Pclass	Sex	Age	SibSp	Parch	Fare	Cabin	Embarked
0	0	3	1	1	1	0	0	0	0
1	1	1	0	2	1	0	3	1	1
2	1	3	0	1	0	0	1	0	0
3	1	1	0	2	1	0	3	1	0
4	0	3	1	2	0	0	1	0	0
...	...	...	...	...	...	...	...	...	...
886	0	2	1	1	0	0	1	0	0
887	1	1	0	1	0	0	2	1	0
888	0	3	0	1	1	2	2	0	0
889	1	1	1	1	0	0	2	1	1
890	0	3	1	1	0	0	0	0	2

891 rows × 9 columns

```
y = df['Survived']
x = df.drop(['Survived'], axis=1).values
x_features = df.iloc[:,1:]
```

```
#split data into train and test
x_train, x_test, y_train, y_test = train_test_split(x, y, test_size=0.33, random
```

```
#train the decision tree classifier
dt=DecisionTreeClassifier()
dt.fit(x_train,y_train)
```

```
    DecisionTreeClassifier()
```

```
#predicting the y values from the test data
y_pred = dt.predict(x_test)
```

```
print("Accuracy:",accuracy_score(y_test,y_pred))
```

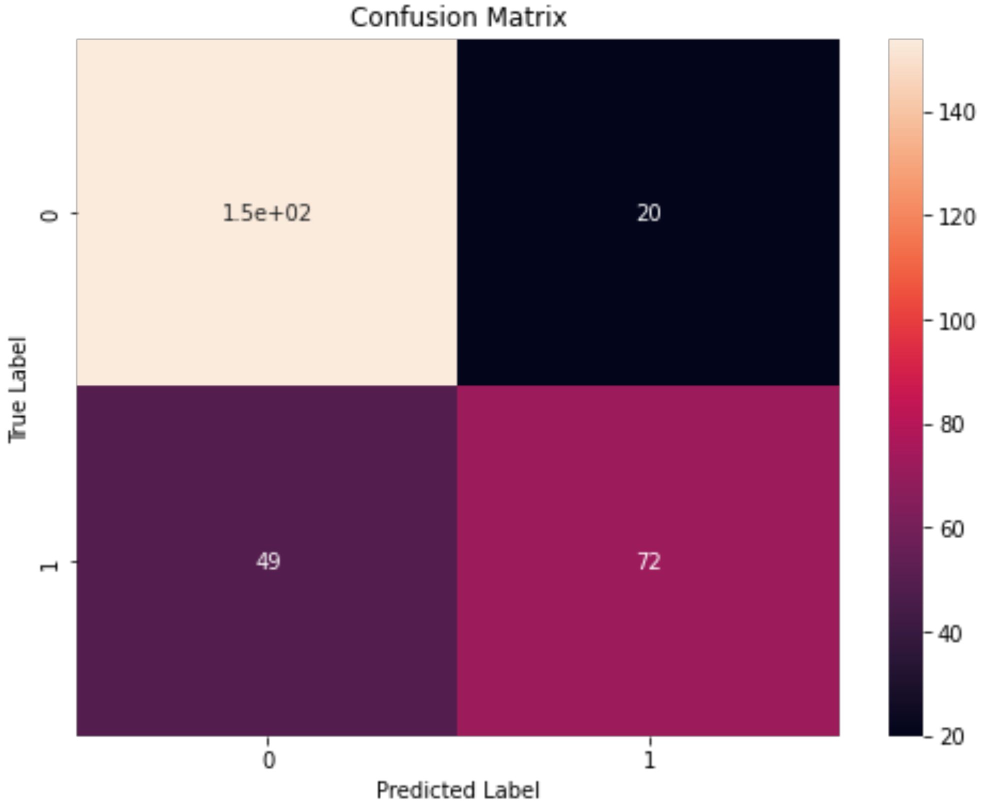
```
    Accuracy: 0.7661016949152543
```

```
#comparision of Actual and Predicted values
res = pd.DataFrame(list(zip(y_test, y_pred)), columns =['Actual', 'Predicted'])
res.head(100)
```

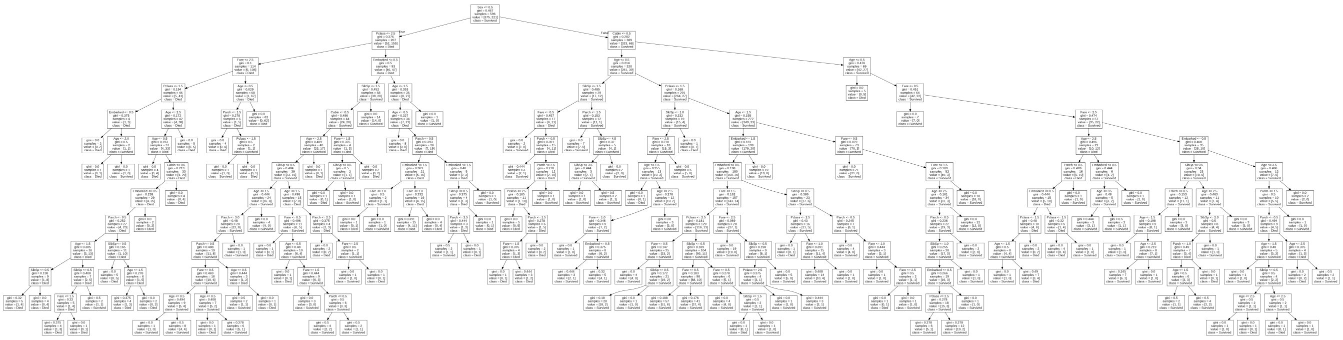
```
     Actual  Predicted
 0        1          1
 1        0          0
 2        1          1
 3        0          1
 4        1          1
...     ...        ...
95        0          1
96        0          0
97        1          1
98        0          0
99        0          0

100 rows × 2 columns
```

```
#Confusion Matrix
conf_matrix = confusion_matrix(y_test, y_pred)
fig, ax = plt.subplots(figsize=(8,6))
sns.heatmap(conf_matrix,annot=True,cbar=True)
plt.ylabel('True Label')
plt.xlabel('Predicted Label')
plt.title('Confusion Matrix')
conf_matrix
```

```
array([[154,  20],
       [ 49,  72]])
```



```
export_graphviz(dt,out_file="data.dot",feature_names=x_features.columns,class_na
!dot -Tpng data.dot -o tree1.png
Image("tree1.png")
```



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