Titanic_Dtree_RF_Prediction

```
import pandas as pd
import numpy as np
from sklearn import tree
from sklearn import preprocessing
```

Loading Data and Data Treatment:

```
titanic_train = pd.read_csv("train.csv")
titanic_train.head()
Out[6]:
   PassengerId  Survived  Pclass  ...     Fare Cabin  Embarked
0            1         0       3  ...   7.2500   NaN         S
1            2         1       1  ...  71.2833   C85         C
2            3         1       3  ...   7.9250   NaN         S
3            4         1       1  ...  53.1000  C123         S
4            5         0       3  ...   8.0500   NaN         S

[5 rows x 12 columns]

titanic_train.isnull().sum()
Out[7]:
PassengerId      0
Survived         0
Pclass           0
Name             0
Sex              0
Age              0
SibSp            0
Parch            0
Ticket           0
```

```
Fare           0
Cabin        687
Embarked       0
dtype: int64
```

```
titanic_train["Cabin"].mode()
Out[8]:
0       B96 B98
1    C23 C25 C27
2             G6
dtype: object
```

Encoding Categorical Variables

```
label_encoder = preprocessing.LabelEncoder()
titanic_train["Sex"] = label_encoder.fit_transform(titanic_train["Sex"])
titanic_train["Embarked"] = label_encoder.fit_transform(titanic_train["Embarked"])
```

Random Forest Algorithm to find imp Variables

```
from sklearn.ensemble import RandomForestClassifier

features = ['Pclass','Sex','Age','SibSp','Parch','Fare','Embarked']

rf_model = RandomForestClassifier(n_estimators= 1000, max_features= 2, oob_score= True)
rf_model.fit(X = titanic_train[features], y = titanic_train["Survived"])
Out[17]:
RandomForestClassifier(bootstrap=True, ccp_alpha=0.0, class_weight=None,
                       criterion='gini', max_depth=None, max_features=2,
                       max_leaf_nodes=None, max_samples=None,
                       min_impurity_decrease=0.0, min_impurity_split=None,
                       min_samples_leaf=1, min_samples_split=2,
                       min_weight_fraction_leaf=0.0, n_estimators=1000,
```

```
                n_jobs=None, oob_score=True, random_state=None,
                verbose=0, warm_start=False)

print("Model Accuracy: ",rf_model.oob_score_)
```

Model Accuracy: 0.8087739032620922

```
for feature,imp in zip(features,rf_model.feature_importances_):
   print(feature,imp)
```

Pclass 0.08674014645814597

Sex 0.26124666544869013

Age 0.25688283002534956

SibSp 0.04911199836747369

Parch 0.039625779248592244

Fare 0.2716301019408058

Embarked 0.03476247851094266

Generating Decision Tree Model

```
tree_model = tree.DecisionTreeClassifier(max_depth= 8)

predictors = titanic_train[['Sex','Age','Fare']]

tree_model.fit(X = predictors, y = titanic_train['Survived'])
Out[22]:
DecisionTreeClassifier(ccp_alpha=0.0, class_weight=None, criterion='gini',
                max_depth=8, max_features=None, max_leaf_nodes=None,
                min_impurity_decrease=0.0, min_impurity_split=None,
                min_samples_leaf=1, min_samples_split=2,
                min_weight_fraction_leaf=0.0, presort='deprecated',
                random_state=None, splitter='best')
```

```
with open("titanic_DTree1.dot","w") as f:
    f = tree.export_graphviz(tree_model,feature_names=['Sex','Age','Fare'], out_file= f)
```

```
print("DTree Model Accuracy: ", tree_model.score(X = predictors, y = titanic_train['Survived']))
```

DTree Model Accuracy: 0.8706411698537683

Testing the Model

```
titanic_test = pd.read_csv("test.csv")
```

```
titanic_test.head()
```

Out[26]:

	PassengerId	Pclass	...	Fare	Embarked
0	892	3	...	7.8292	Q
1	893	3	...	7.0000	S
2	894	2	...	9.6875	Q
3	895	3	...	8.6625	S
4	896	3	...	12.2875	S

[5 rows x 10 columns]

```
titanic_test.isnull().sum()
```

Out[27]:

```
PassengerId    0
Pclass         0
Name           0
Sex            0
Age            0
SibSp          0
Parch          0
```

Ticket 0

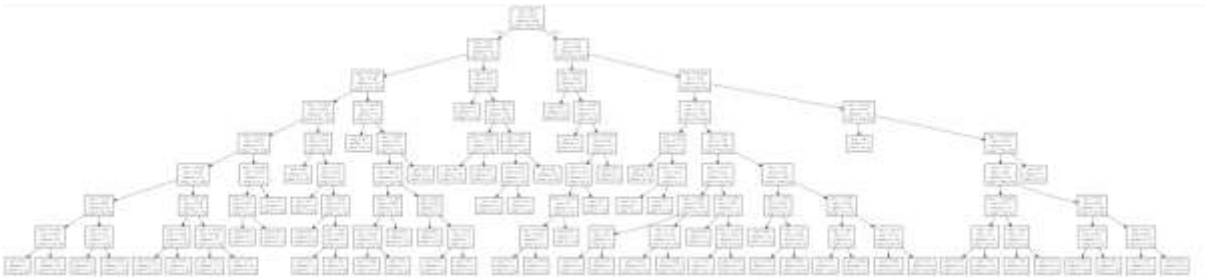
Fare 0

Embarked 0

dtype: int64

```
titanic_test['Sex']= label_encoder.fit_transform(titanic_test['Sex'])

test_features = titanic_test[['Sex','Age','Fare']]

test_pred = tree_model.predict(X = test_features)

Predicted_output = pd.DataFrame({"PassengerId": titanic_test["PassengerId"], "Name":
titanic_test["Name"], "Survived": test_pred})

Predicted_output.to_csv("titanic_testdata_output1.csv", index= False)
```

Decision Tree



Inference:

1. Based on the importance value generated with Random forest algorithm, it is seen that the features **'Sex', 'Age' and 'Fare'** are more significant for decision tree generation.
2. Decision tree generated with these features and max-depth of 8 provides **87%** accuracy in classifying the record as Survived(Y/N) and also predicting the survival(Y/N) for any unseen record.