In [14]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns

from sklearn.linear_model import LogisticRegression
from sklearn.tree import DecisionTreeClassifier
from sklearn.ensemble import RandomForestClassifier
from sklearn.metrics import accuracy_score, f1_score, precision_score, recall_score
from sklearn.metrics import confusion_matrix, roc_auc_score, roc_curve, classification_report, precisio
from sklearn.model_selection import train_test_split, cross_val_score, StratifiedKFold, GridSearchCV, Ra

from collections import Counter
```

In [15]:
```
df = pd.read_csv("churn_prediction2.csv")
df.shape
```

Out[15]:
```
(28382, 11)
```

In [16]:
```
df['churn'].value_counts()
```

Out[16]:
```
0    23122
1     5260
Name: churn, dtype: int64
```

In [17]:
```
df.isnull().sum()
```

Out[17]:
```
customer_id               0
vintage                   0
age                       0
gender                  525
dependents             2463
occupation               80
city                    803
customer_nw_category      0
branch_code               0
churn                     0
last_transaction          0
dtype: int64
```

In [18]:
```
#Convert Gender
dict_gender = {'Male': 1, 'Female':0}
df.replace({'gender': dict_gender}, inplace = True)

# Replace with -1 for missing gender
df['gender'] = df['gender'].fillna(-1)

# Replacing with max. occurence values
df['dependents'] = df['dependents'].fillna(0)
df['occupation'] = df['occupation'].fillna('self_employed')
df['city'] = df['city'].fillna(1020)
```

In [19]:
```
# Convert occupation to one hot encoded features
df = pd.concat([df,pd.get_dummies(df['occupation'],prefix = str('occupation'),prefix_sep='_')],axis = 1
```

In [20]:
```
df.head()
```

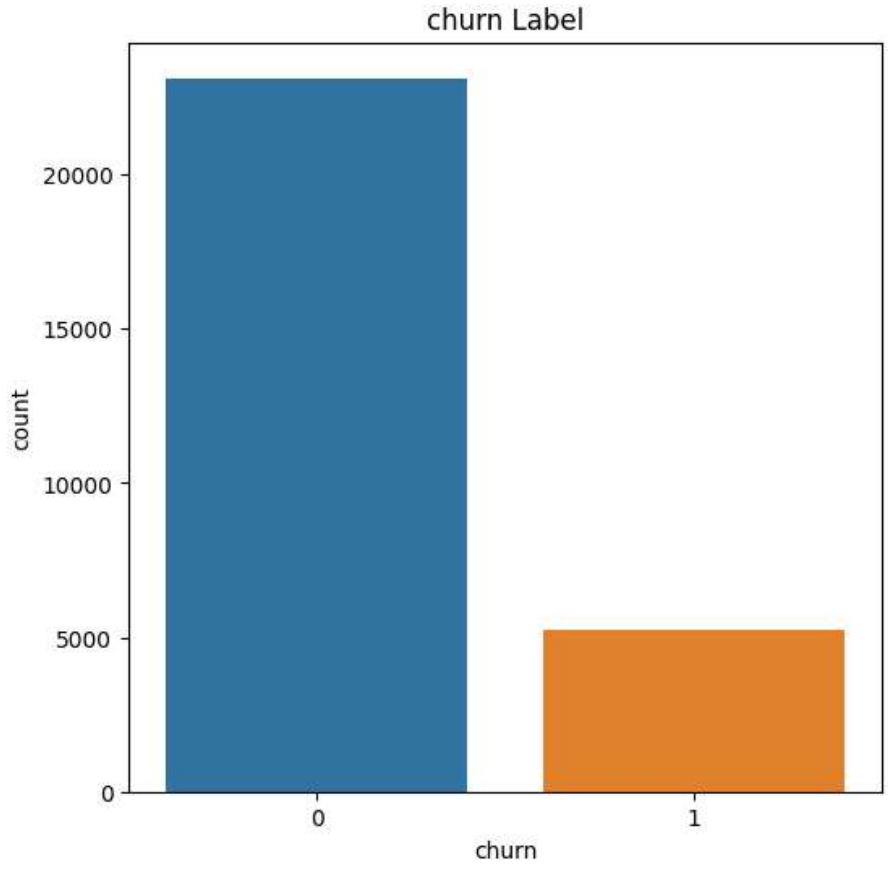
Out[20]:

	customer_id	vintage	age	gender	dependents	occupation	city	customer_nw_category	branch_code	churn	last_trans
0	1	2101	66	1.0	0.0	self_employed	187.0	2	755	0	201
1	2	2348	35	1.0	0.0	self_employed	1020.0	2	3214	0	201
2	4	2194	31	1.0	0.0	salaried	146.0	2	41	0	
3	5	2329	90	-1.0	0.0	self_employed	1020.0	2	582	1	201
4	6	1579	42	1.0	2.0	self_employed	1494.0	3	388	1	201

In [31]:
```
print(df["churn"].unique())
```

```
[0 1]
```

In [29]:
```
df.churn.value_counts()
plt.figure(figsize=(6,6))
sns.countplot(x='churn', data=df)
plt.title('churn Label')
plt.show()
```



In [21]:
```
#x = df.drop('Attrition', axis=1)
x = df.drop(['churn','customer_id', 'occupation', 'last_transaction'], axis=1)
y = df['churn']
# Splitting the data into train and test
X_train,X_test,y_train,y_test=train_test_split(x, y, train_size=0.8, stratify = y, random_state=100)
```

In [22]:
```
y_train.shape, y_test.shape
```

Out[22]:
```
((22705,), (5677,))
```

In [23]:
```
y_train.value_counts()/len(y_train)
```

Out[23]:
```
0    0.814666
1    0.185334
Name: churn, dtype: float64
```

In [24]:
```
y_test.value_counts()/len(y_test)
```

Out[24]:
```
0    0.814691
1    0.185309
Name: churn, dtype: float64
```

In [26]:
```
from sklearn.preprocessing import StandardScaler
Scaler_X = StandardScaler()
X_train = Scaler_X.fit_transform(X_train)
X_test = Scaler_X.transform(X_test)
```

In [27]:
```
#smote technique
from imblearn.over_sampling import SMOTE

counter = Counter(y_train)
print('Before',counter)
# oversampling the train dataset using SMOTE
smt = SMOTE()
#X_train, y_train = smt.fit_resample(X_train, y_train)
X_train_sm, y_train_sm = smt.fit_resample(X_train, y_train)

counter = Counter(y_train_sm)
print('After',counter)
```

```
Before Counter({0: 18497, 1: 4208})
After Counter({0: 18497, 1: 18497})
```

In [ ]:

In [ ]: