In [109]:
```
import pandas as pd
import numpy as np
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LogisticRegression
from sklearn.tree import DecisionTreeClassifier
from sklearn.ensemble import RandomForestClassifier
from sklearn.neighbors import KNeighborsClassifier
from sklearn.svm import SVC
from sklearn.naive_bayes import GaussianNB,MultinomialNB,BernoulliNB
from sklearn.metrics import confusion_matrix,classification_report
from sklearn.preprocessing import LabelEncoder,MinMaxScaler,OneHotEncoder
from sklearn.compose import ColumnTransformer
from sklearn.pipeline import Pipeline
from xgboost.sklearn import XGBClassifier
```

In [4]:
```
df = pd.read_csv('EDA_Customer.csv')
```

In [7]:
```
df.drop(columns=['Unnamed: 0'],inplace=True)
```

In [8]:
```
df
```

Out[8]:

	CustomerID	Age	Gender	ContractType_In_days	MonthlyCharges	TotalCharges	TechSupport	Inte
0	1083	79.0	Male	365	90.038513	3511.502019	No	
1	1117	60.0	Female	365	80.590894	2901.272196	No	
2	3833	84.0	Female	365	43.042067	1549.514395	No	
3	1976	69.0	Male	365	51.930032	2232.991377	No	
4	3132	49.0	Male	365	101.524194	913.717747	Yes	
...	...	...	...	...	...	...	...	
4359	2133	39.0	Male	365	30.017101	210.119705	No	
4360	1514	54.0	Male	365	57.803077	462.424613	No	
4361	2716	45.0	Male	730	103.314530	826.516243	No	
4362	756	21.0	Female	730	103.105344	103.105344	Yes	
4363	3284	85.0	Male	730	36.907180	1660.823112	Yes	

4364 rows × 12 columns

In [11]:
```
X = df.iloc[:,1:11]
```

In [12]:
```
X
```

Out[12]:

	Age	Gender	ContractType_In_days	MonthlyCharges	TotalCharges	TechSupport	InternetService	T
0	79.0	Male	365	90.038513	3511.502019	No	No	
1	60.0	Female	365	80.590894	2901.272196	No	Fiber optic	
2	84.0	Female	365	43.042067	1549.514395	No	No	
3	69.0	Male	365	51.930032	2232.991377	No	No	
4	49.0	Male	365	101.524194	913.717747	Yes	DSL	
...	...	...	...	...	...	...	...	
4359	39.0	Male	365	30.017101	210.119705	No	Fiber optic	
4360	54.0	Male	365	57.803077	462.424613	No	DSL	
4361	45.0	Male	730	103.314530	826.516243	No	DSL	
4362	21.0	Female	730	103.105344	103.105344	Yes	Fiber optic	
4363	85.0	Male	730	36.907180	1660.823112	Yes	Fiber optic	

4364 rows × 10 columns

In [14]:
```
y = df.iloc[:,11]
```

In [28]:
```
encode = LabelEncoder()
y = pd.Series(encode.fit_transform(y))
```

In [30]:
```
y.value_counts()
```

Out[30]:
```
1    2233
0    2131
Name: count, dtype: int64
```

In [37]:
```
X
```

Out[37]:

	Age	Gender	ContractType_In_days	MonthlyCharges	TotalCharges	TechSupport	InternetService	T
0	79.0	Male	365	90.038513	3511.502019	No	No	
1	60.0	Female	365	80.590894	2901.272196	No	Fiber optic	
2	84.0	Female	365	43.042067	1549.514395	No	No	
3	69.0	Male	365	51.930032	2232.991377	No	No	
4	49.0	Male	365	101.524194	913.717747	Yes	DSL	
...	...	...	...	...	...	...	...	
4359	39.0	Male	365	30.017101	210.119705	No	Fiber optic	
4360	54.0	Male	365	57.803077	462.424613	No	DSL	
4361	45.0	Male	730	103.314530	826.516243	No	DSL	
4362	21.0	Female	730	103.105344	103.105344	Yes	Fiber optic	
4363	85.0	Male	730	36.907180	1660.823112	Yes	Fiber optic	

4364 rows × 10 columns

In [65]:
```
X_train, X_test, y_train, y_test = train_test_split(X,y,test_size=0.1,random_state=42
```

In [ ]:
```

```

In [189]:
```
step1 = ColumnTransformer(transformers=[('cols',
                                        OneHotEncoder(sparse_output=False,drop='first
                                         ,[1,2,5,6,8,9])],remainder='passthrough')
step2 = MinMaxScaler()

step3 = LogisticRegression()
step4 = RandomForestClassifier()
step5 = BernoulliNB()
step6 = XGBClassifier(objective='binary:logistic', use_label_encoder=False, eval_metr
step7 = SVC()
```

In [190]:
```
pipe1 = Pipeline([
    ('step1',step1),
    ('step2',step2),
    ('step3',step3)
])
```

In [191]:

```
pipe2 = Pipeline([
    ('step1',step1),
    ('step2',step2),
    ('step4',step4)
])
```

In [192]:

```
pipe3 = Pipeline([
    ('step1',step1),
    ('step2',step2),
    ('step5',step5)
])
```

In [193]:

```
pipe4 = Pipeline([
    ('step1',step1),
    ('step2',step2),
    ('step6',step6)
])
```

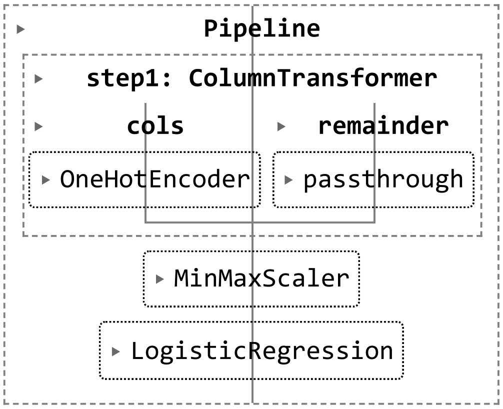
In [194]:

```
pipe5 = Pipeline([
    ('step1',step1),
    ('step2',step2),
    ('step7',step7)
])
```

In [195]:

```
pipe1.fit(X_train,y_train)
```

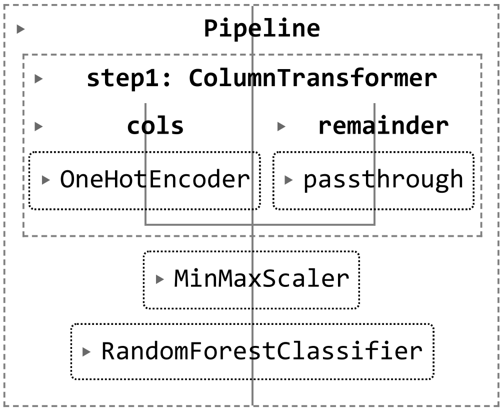
Out[195]:



In [196]:

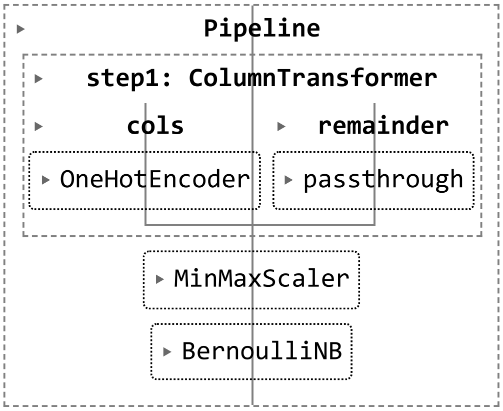
```
pipe2.fit(X_train,y_train)
```

Out[196]:



In [197]:
```
pipe3.fit(X_train,y_train)
```

Out[197]:

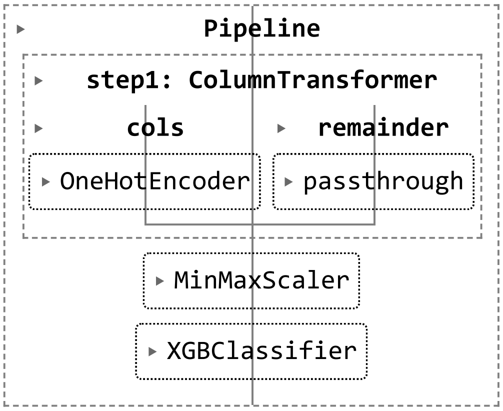


```
Pipeline
step1: ColumnTransformer
cols                remainder
OneHotEncoder       passthrough
MinMaxScaler
BernoulliNB
```

In [198]:
```
pipe4.fit(X_train,y_train)
```

```
C:\Users\Mangukiya Ansh\anaconda3\Lib\site-packages\xgboost\core.py:158: UserWarnin
g: [17:44:19] WARNING: C:\buildkite-agent\builds\buildkite-windows-cpu-autoscaling-g
roup-i-0015a694724fa8361-1\xgboost\xgboost-ci-windows\src\learner.cc:740:
Parameters: { "use_label_encoder" } are not used.

  warnings.warn(smsg, UserWarning)
```

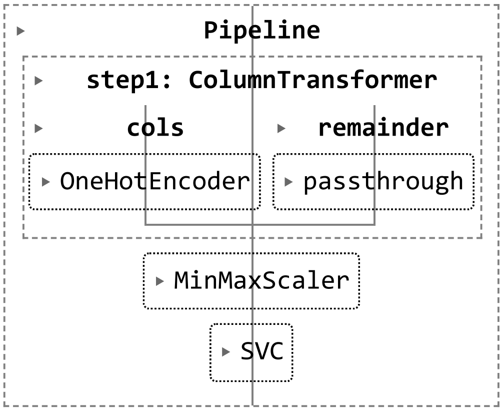
Out[198]:



```
Pipeline
step1: ColumnTransformer
cols                remainder
OneHotEncoder       passthrough
MinMaxScaler
XGBClassifier
```

In [199]:
```
pipe5.fit(X_train,y_train)
```

Out[199]:



```
Pipeline
step1: ColumnTransformer
cols                remainder
OneHotEncoder       passthrough
MinMaxScaler
SVC
```

In [200]:

```
pipe1.score(X_test,y_test)
```

Out[200]:

```
0.49
```

In [201]:

```
pipe2.score(X_test,y_test)
```

Out[201]:

```
0.495
```

In [202]:

```
pipe3.score(X_test,y_test)
```

Out[202]:

```
0.51
```

In [203]:

```
pipe4.score(X_test,y_test)
```

Out[203]:

```
0.51
```

In [204]:

```
pipe5.score(X_test,y_test)
```

Out[204]:

```
0.485
```

In [206]:

```
y_pred = pipe3.predict(X_test)
```

In [209]:

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

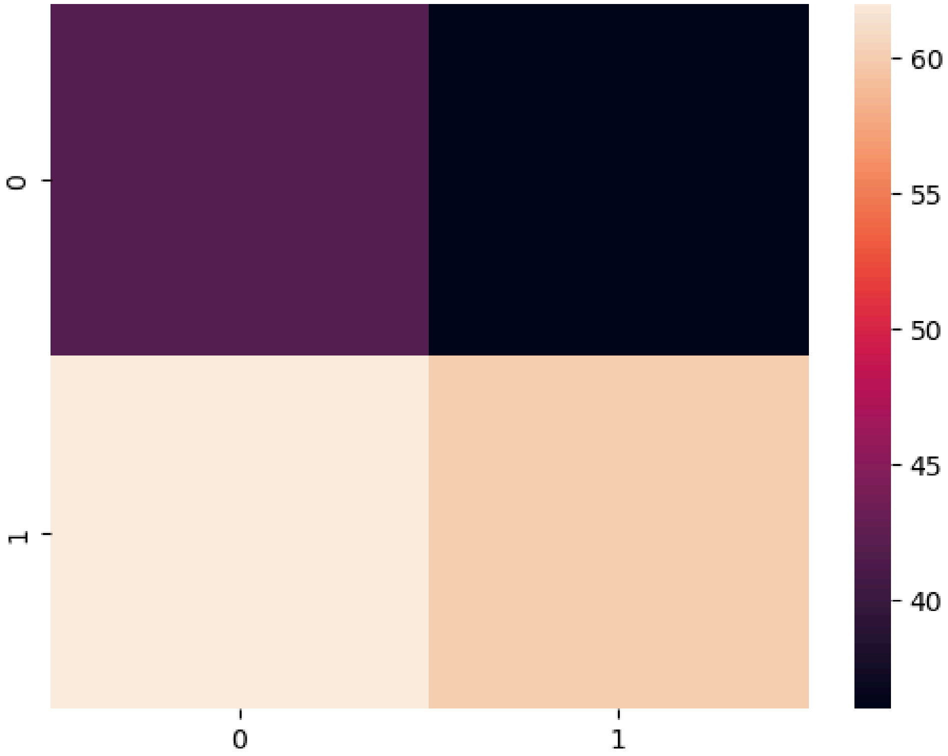
```
              precision    recall  f1-score   support

           0       0.54      0.40      0.46       104
           1       0.49      0.62      0.55        96

    accuracy                           0.51       200
   macro avg       0.52      0.51      0.51       200
weighted avg       0.52      0.51      0.50       200
```

In [210]:

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

In [213]:
```
import seaborn as sns
sns.heatmap(metrics)
```

Out[213]:
```
<Axes: >
```


0
1
0
1
60
55
50
45
40