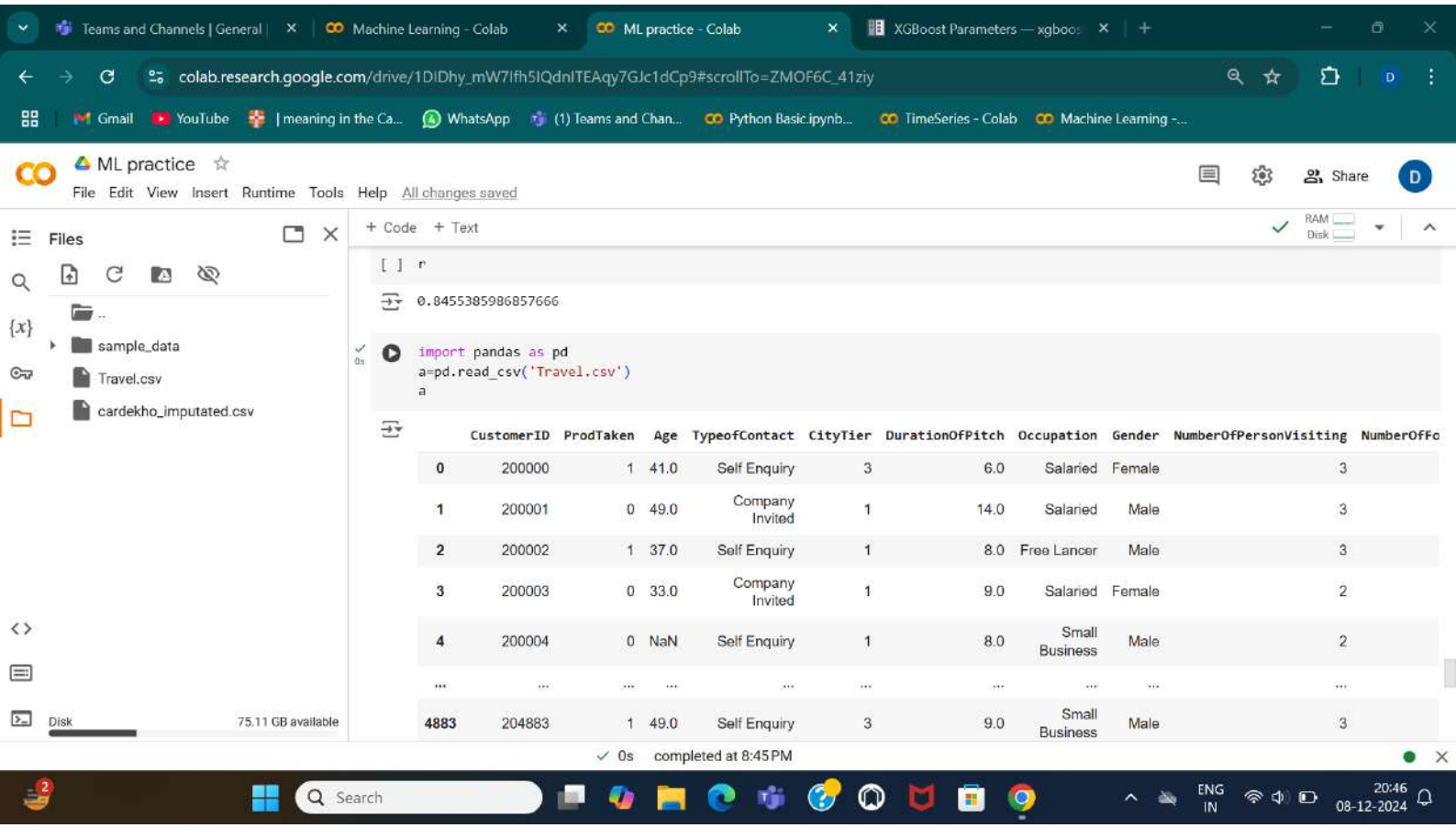
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[ ] r
0.8455385986857666
import pandas as pd
a=pd.read_csv('Travel.csv')
a
CustomerID ProdTaken Age TypeofContact CityTier DurationOfPitch Occupation Gender NumberOfPersonVisiting NumberOfFo
0 200000 1 41.0 Self Enquiry 3 6.0 Salaried Female 3
1 200001 0 49.0 Company Invited 1 14.0 Salaried Male 3
2 200002 1 37.0 Self Enquiry 1 8.0 Free Lancer Male 3
3 200003 0 33.0 Company Invited 1 9.0 Salaried Female 2
4 200004 0 NaN Self Enquiry 1 8.0 Small Business Male 2
... ... ... ... ... ... ... ... ... ...
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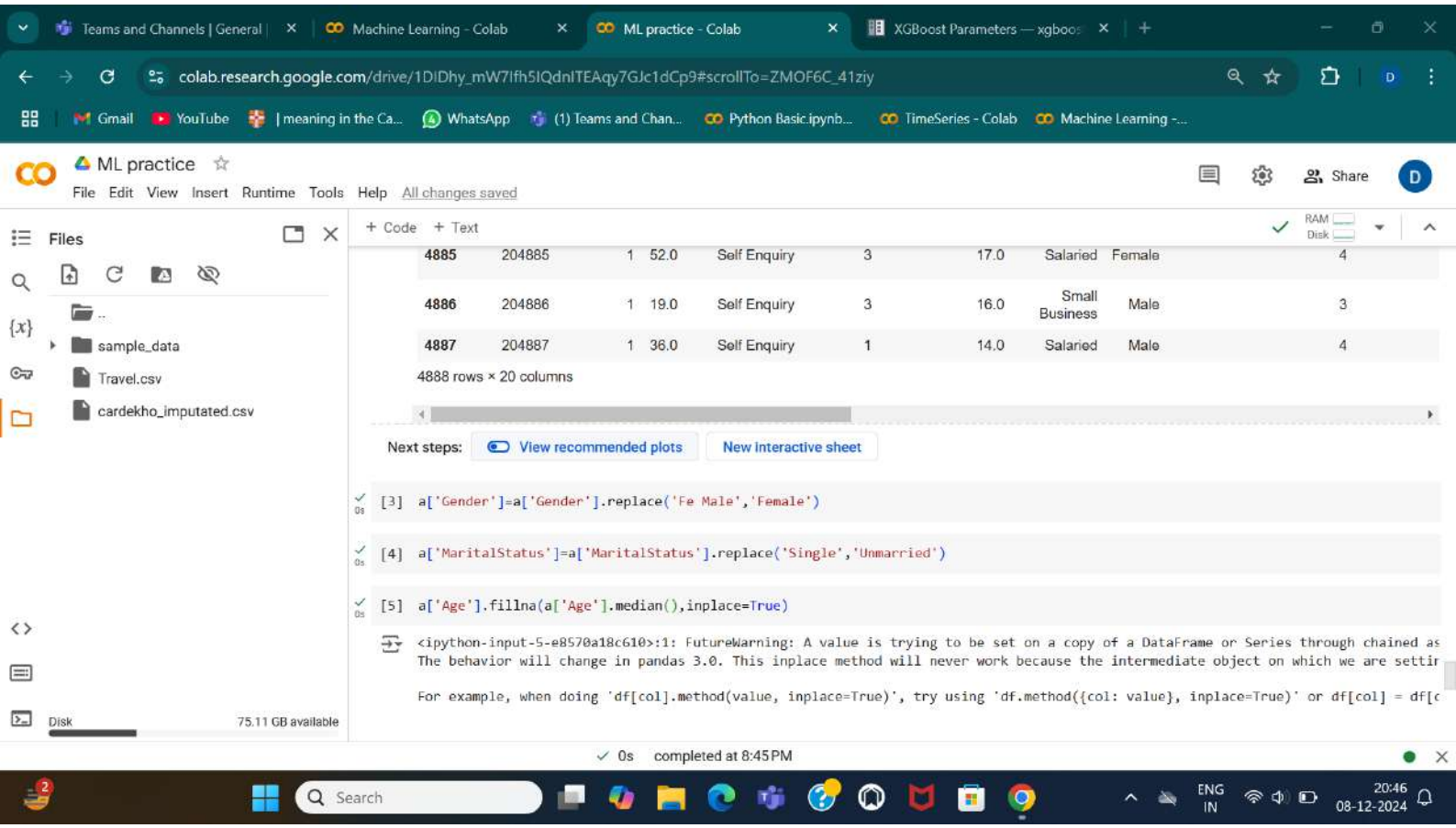
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4885 204885 1 52.0 Self Enquiry 3 17.0 Salaried Female 4
4886 204886 1 19.0 Self Enquiry 3 16.0 Small Business Male 3
4887 204887 1 36.0 Self Enquiry 1 14.0 Salaried Male 4
4888 rows × 20 columns
Next steps: View recommended plots New interactive sheet
[3] a['Gender']=a['Gender'].replace('Fe Male','Female')
[4] a['MaritalStatus']=a['MaritalStatus'].replace('Single','Unmarried')
[5] a['Age'].fillna(a['Age'].median(),inplace=True)
<ipython-input-5-e8570a18c610>:1: FutureWarning: A value is trying to be set on a copy of a DataFrame or Series through chained as
The behavior will change in pandas 3.0. This inplace method will never work because the intermediate object on which we are settir
For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method({col: value}, inplace=True)' or df[col] = df[c
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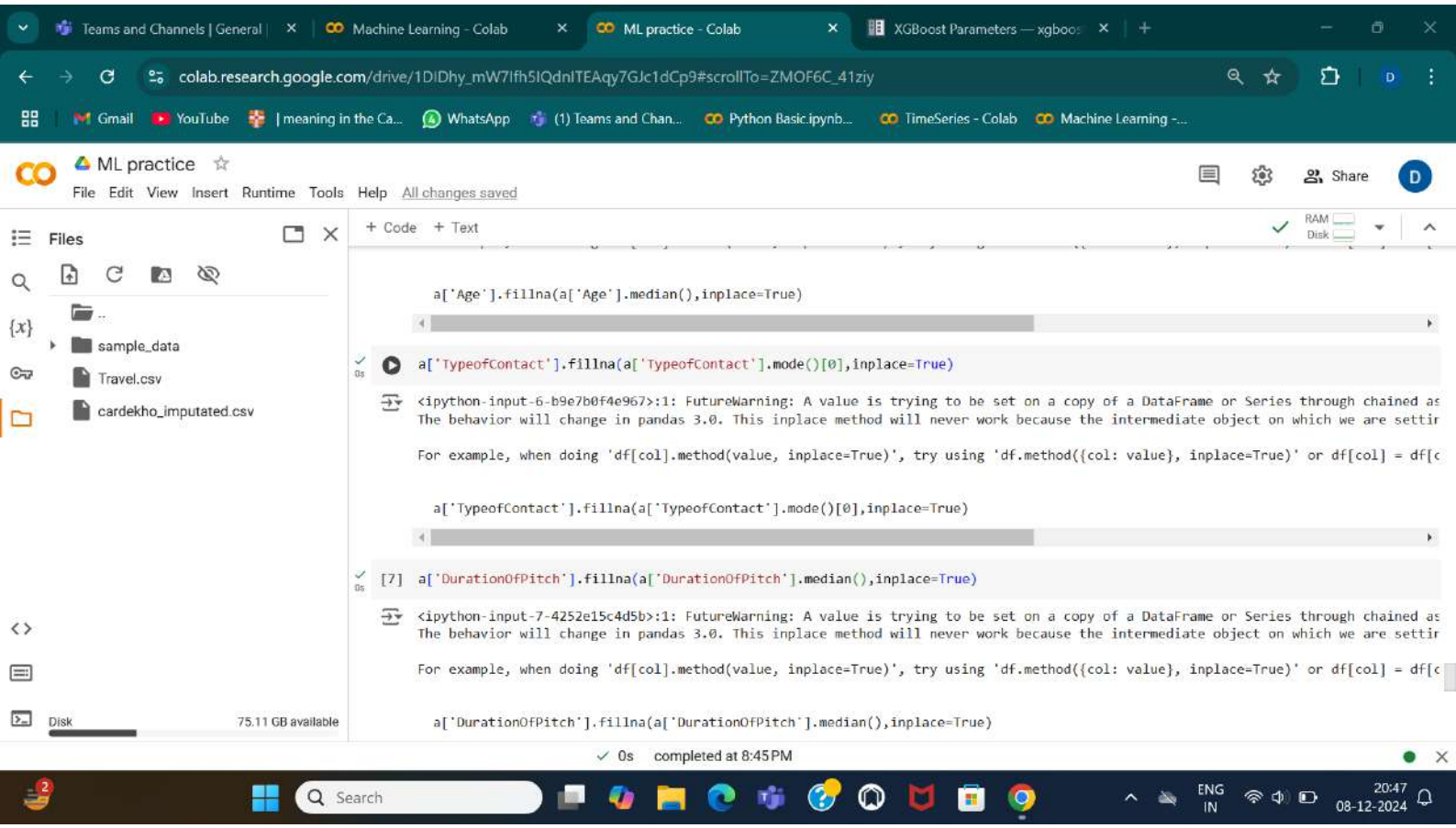
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a['Age'].fillna(a['Age'].median(),inplace=True)
a['TypeofContact'].fillna(a['TypeofContact'].mode()[0],inplace=True)
<ipython-input-6-b9e7b0f4e967>:1: FutureWarning: A value is trying to be set on a copy of a DataFrame or Series through chained as
The behavior will change in pandas 3.0. This inplace method will never work because the intermediate object on which we are settir
For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method({col: value}, inplace=True)' or df[col] = df[c
a['TypeofContact'].fillna(a['TypeofContact'].mode()[0],inplace=True)
[7] a['DurationOfPitch'].fillna(a['DurationOfPitch'].median(),inplace=True)
<ipython-input-7-4252e15c4d5b>:1: FutureWarning: A value is trying to be set on a copy of a DataFrame or Series through chained as
The behavior will change in pandas 3.0. This inplace method will never work because the intermediate object on which we are settir
For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method({col: value}, inplace=True)' or df[col] = df[c
a['DurationOfPitch'].fillna(a['DurationOfPitch'].median(),inplace=True)
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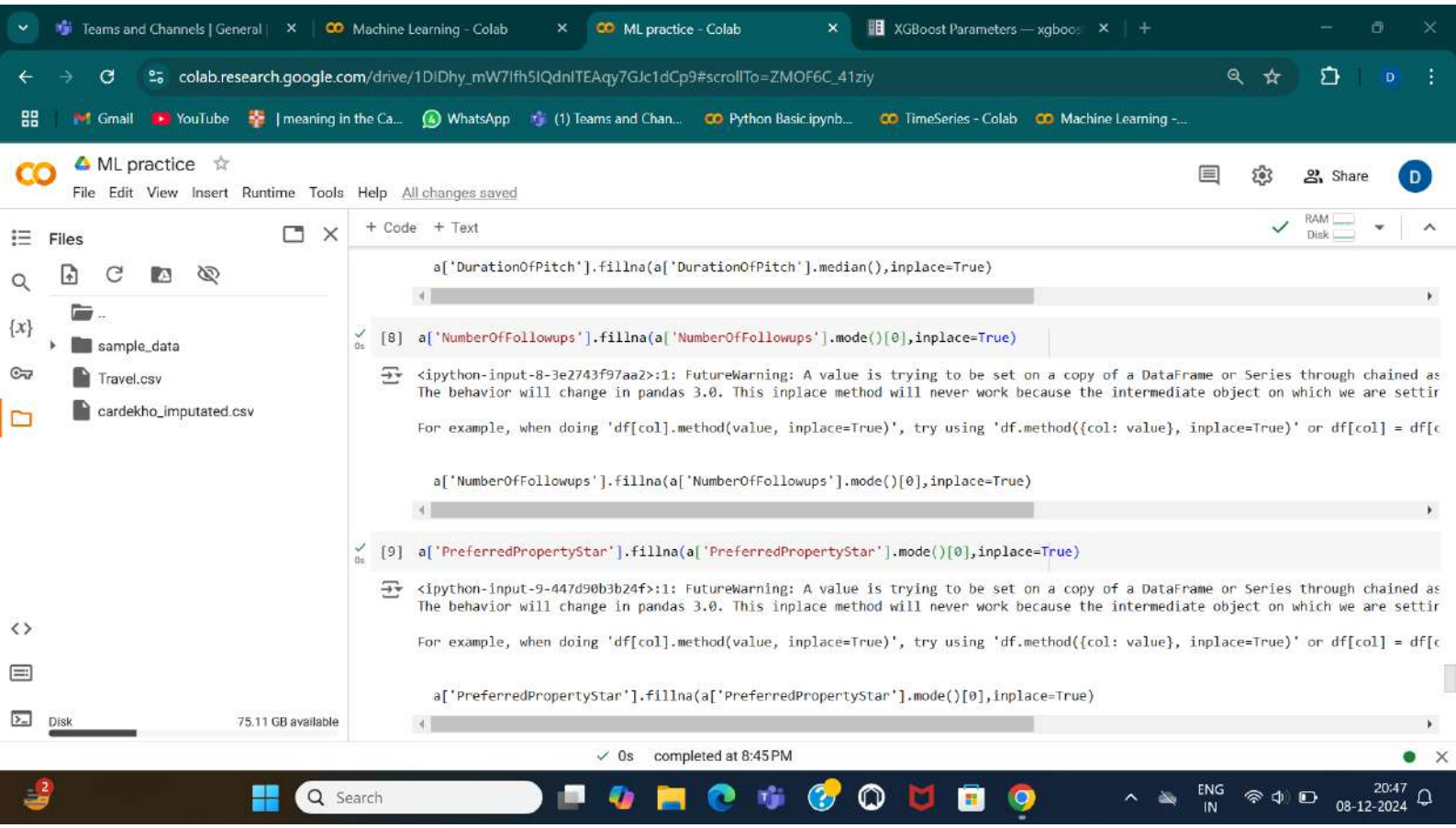
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a['DurationOfPitch'].fillna(a['DurationOfPitch'].median(),inplace=True)
[8] a['NumberOfFollowups'].fillna(a['NumberOfFollowups'].mode()[0],inplace=True)
<ipython-input-8-3e2743f97aa2>:1: FutureWarning: A value is trying to be set on a copy of a DataFrame or Series through chained as
The behavior will change in pandas 3.0. This inplace method will never work because the intermediate object on which we are settir
For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method({col: value}, inplace=True)' or df[col] = df[c
a['NumberOfFollowups'].fillna(a['NumberOfFollowups'].mode()[0],inplace=True)
[9] a['PreferredPropertyStar'].fillna(a['PreferredPropertyStar'].mode()[0],inplace=True)
<ipython-input-9-447d90b3b24f>:1: FutureWarning: A value is trying to be set on a copy of a DataFrame or Series through chained as
The behavior will change in pandas 3.0. This inplace method will never work because the intermediate object on which we are settir
For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method({col: value}, inplace=True)' or df[col] = df[c
a['PreferredPropertyStar'].fillna(a['PreferredPropertyStar'].mode()[0],inplace=True)
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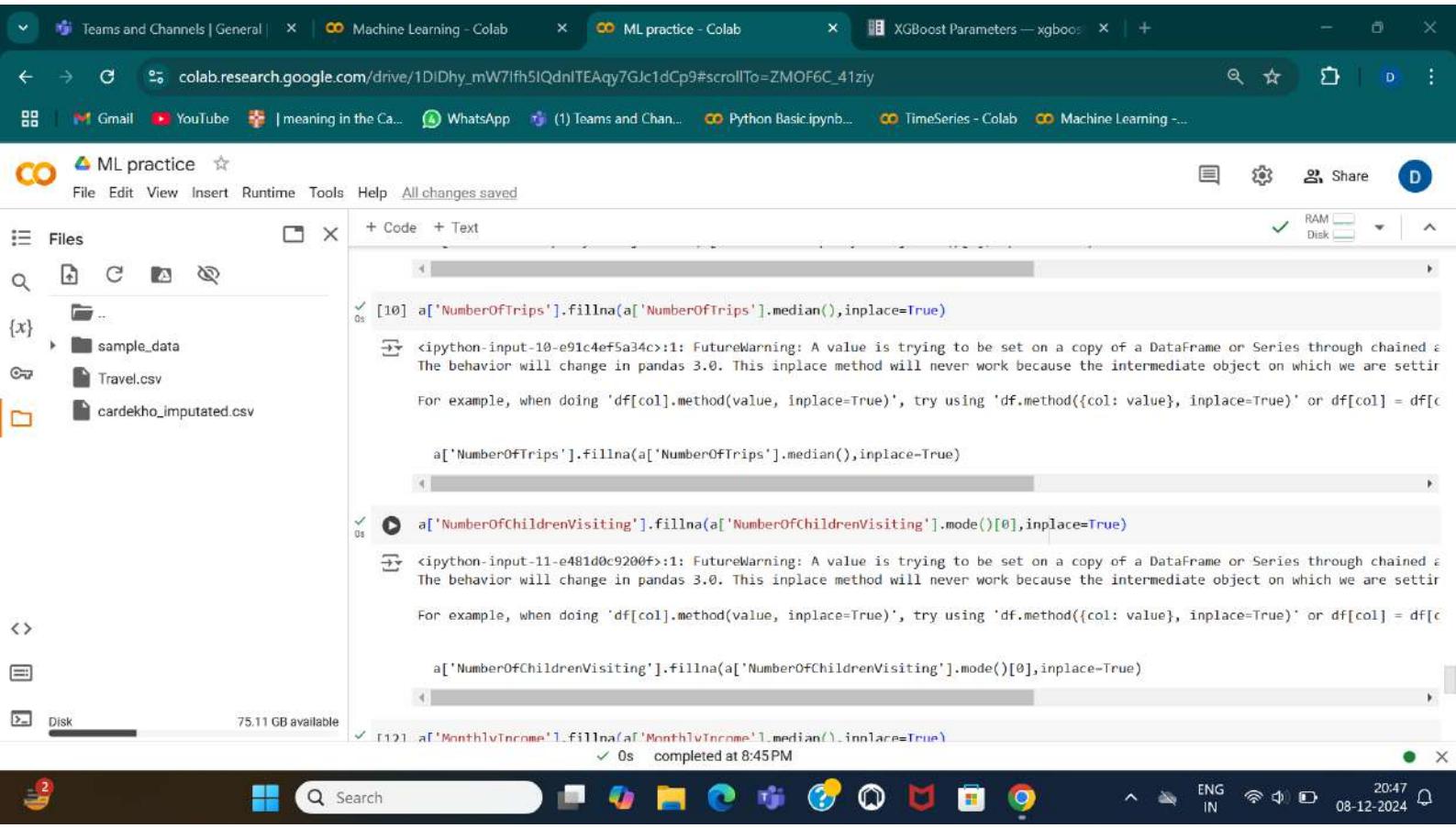
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[10] a['NumberOfTrips'].fillna(a['NumberOfTrips'].median(),inplace=True)
<ipython-input-10-e91c4ef5a34c>:1: FutureWarning: A value is trying to be set on a copy of a DataFrame or Series through chained a
The behavior will change in pandas 3.0. This inplace method will never work because the intermediate object on which we are settir
For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method({col: value}, inplace=True)' or df[col] = df[c
a['NumberOfTrips'].fillna(a['NumberOfTrips'].median(),inplace=True)
a['NumberOfChildrenVisiting'].fillna(a['NumberOfChildrenVisiting'].mode()[0],inplace=True)
<ipython-input-11-e481d0c9200f>:1: FutureWarning: A value is trying to be set on a copy of a DataFrame or Series through chained a
The behavior will change in pandas 3.0. This inplace method will never work because the intermediate object on which we are settir
For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method({col: value}, inplace=True)' or df[col] = df[c
a['NumberOfChildrenVisiting'].fillna(a['NumberOfChildrenVisiting'].mode()[0],inplace=True)
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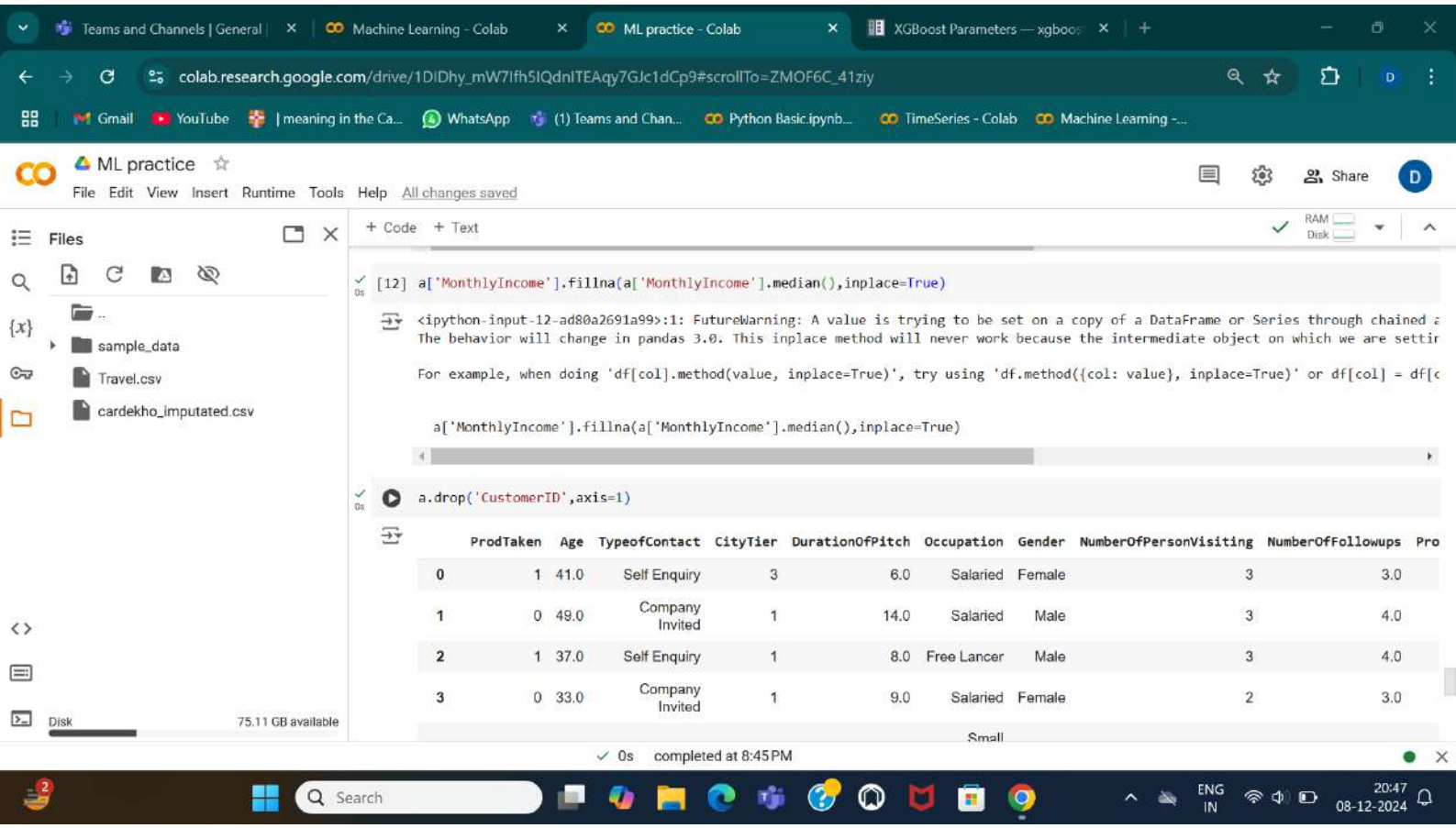
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[12] a['MonthlyIncome'].fillna(a['MonthlyIncome'].median(),inplace=True)
<ipython-input-12-ad80a2691a99>:1: FutureWarning: A value is trying to be set on a copy of a DataFrame or Series through chained a
The behavior will change in pandas 3.0. This inplace method will never work because the intermediate object on which we are settir
For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method({col: value}, inplace=True)' or df[col] = df[c
a['MonthlyIncome'].fillna(a['MonthlyIncome'].median(),inplace=True)
a.drop('CustomerID',axis=1)
ProdTaken Age TypeofContact CityTier DurationOfPitch Occupation Gender NumberOfPersonVisiting NumberOfFollowups Pro
0 1 41.0 Self Enquiry 3 6.0 Salaried Female 3 3.0
1 0 49.0 Company Invited 1 14.0 Salaried Male 3 4.0
2 1 37.0 Self Enquiry 1 8.0 Free Lancer Male 3 4.0
3 0 33.0 Company Invited 1 9.0 Salaried Female 2 3.0
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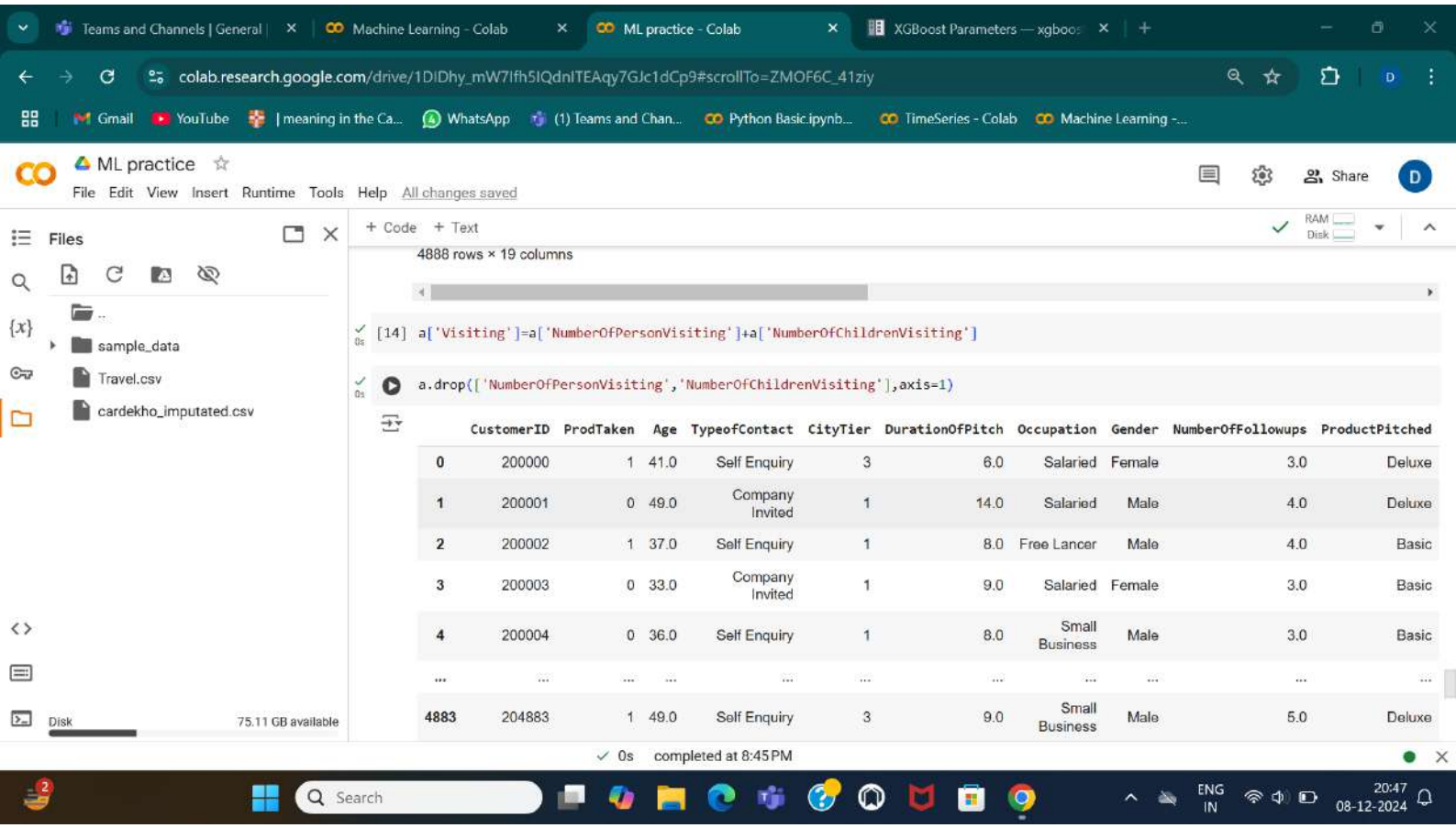
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4888 rows × 19 columns
[14] a['Visiting']=a['NumberOfPersonVisiting']+a['NumberOfChildrenVisiting']
a.drop(['NumberOfPersonVisiting','NumberOfChildrenVisiting'],axis=1)
CustomerID ProdTaken Age TypeofContact CityTier DurationOfPitch Occupation Gender NumberOfFollowups ProductPitched
0 200000 1 41.0 Self Enquiry 3 6.0 Salaried Female 3.0 Deluxe
1 200001 0 49.0 Company Invited 1 14.0 Salaried Male 4.0 Deluxe
2 200002 1 37.0 Self Enquiry 1 8.0 Free Lancer Male 4.0 Basic
3 200003 0 33.0 Company Invited 1 9.0 Salaried Female 3.0 Basic
4 200004 0 36.0 Self Enquiry 1 8.0 Small Business Male 3.0 Basic
... ... ... ... ... ... ... ... ... ... ...
4883 204883 1 49.0 Self Enquiry 3 9.0 Small Business Male 5.0 Deluxe
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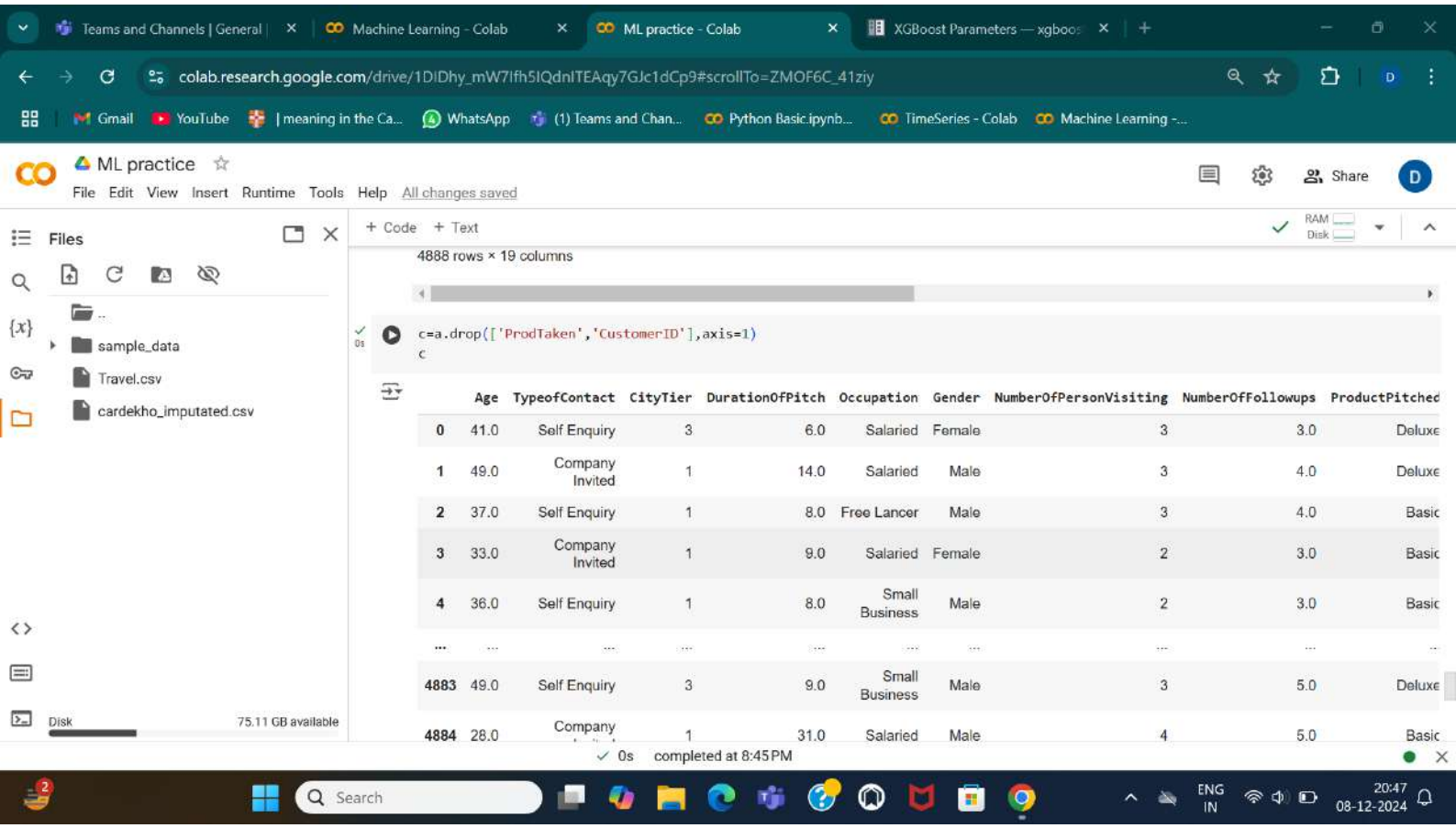
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4888 rows × 19 columns
c=a.drop(['ProdTaken','CustomerID'],axis=1)
c
Age TypeofContact CityTier DurationOfPitch Occupation Gender NumberOfPersonVisiting NumberOfFollowups ProductPitched
0 41.0 Self Enquiry 3 6.0 Salaried Female 3 3.0 Deluxe
1 49.0 Company Invited 1 14.0 Salaried Male 3 4.0 Deluxe
2 37.0 Self Enquiry 1 8.0 Free Lancer Male 3 4.0 Basic
3 33.0 Company Invited 1 9.0 Salaried Female 2 3.0 Basic
4 36.0 Self Enquiry 1 8.0 Small Business Male 2 3.0 Basic
... ... ... ... ... ... ... ... ... ...
4883 49.0 Self Enquiry 3 9.0 Small Business Male 3 5.0 Deluxe
4884 28.0 Company 1 31.0 Salaried Male 4 5.0 Basic
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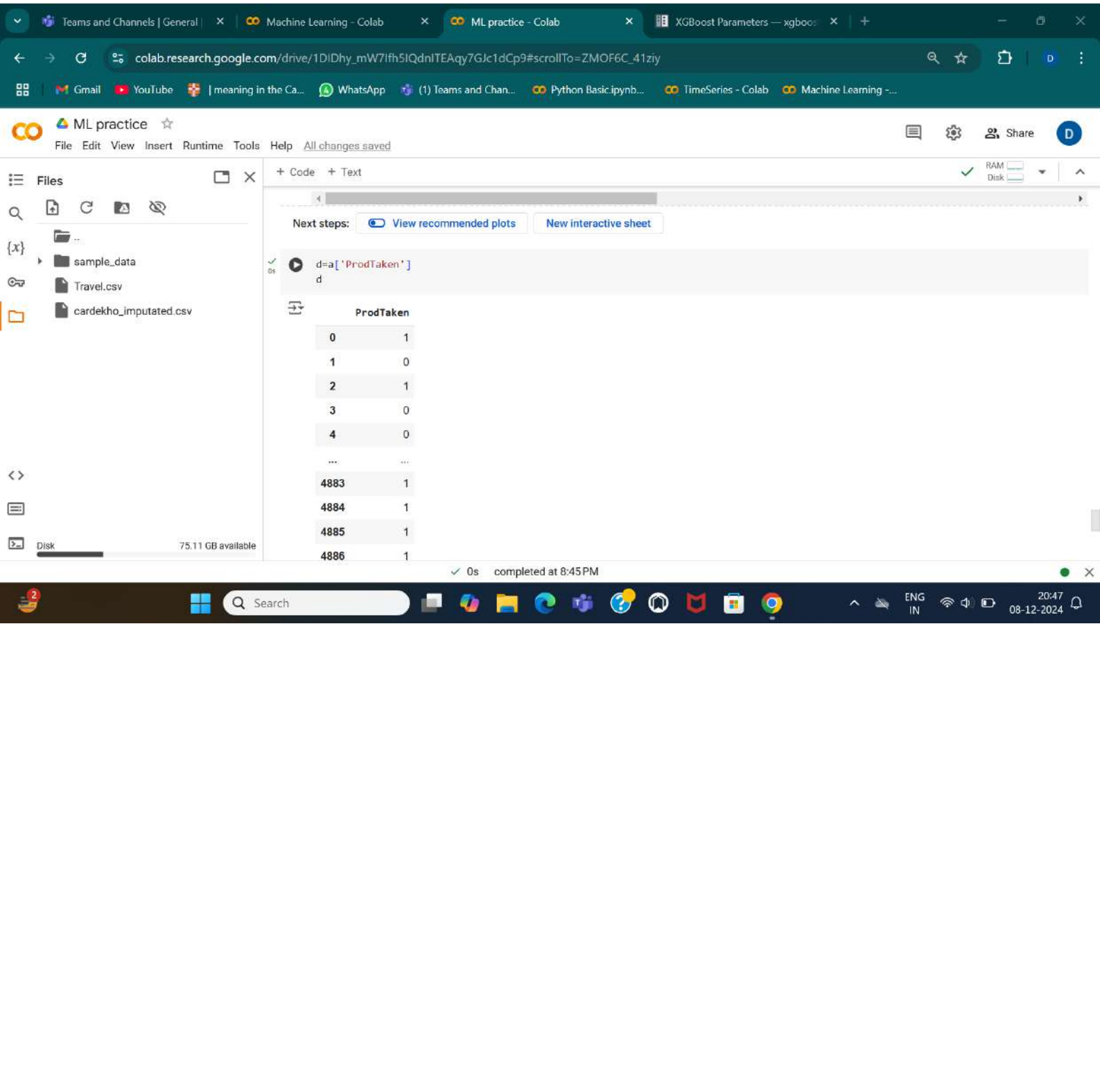
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Next steps: View recommended plots New interactive sheet
d=a['ProdTaken']
d
ProdTaken
0 1
1 0
2 1
3 0
4 0
... ...
4883 1
4884 1
4885 1
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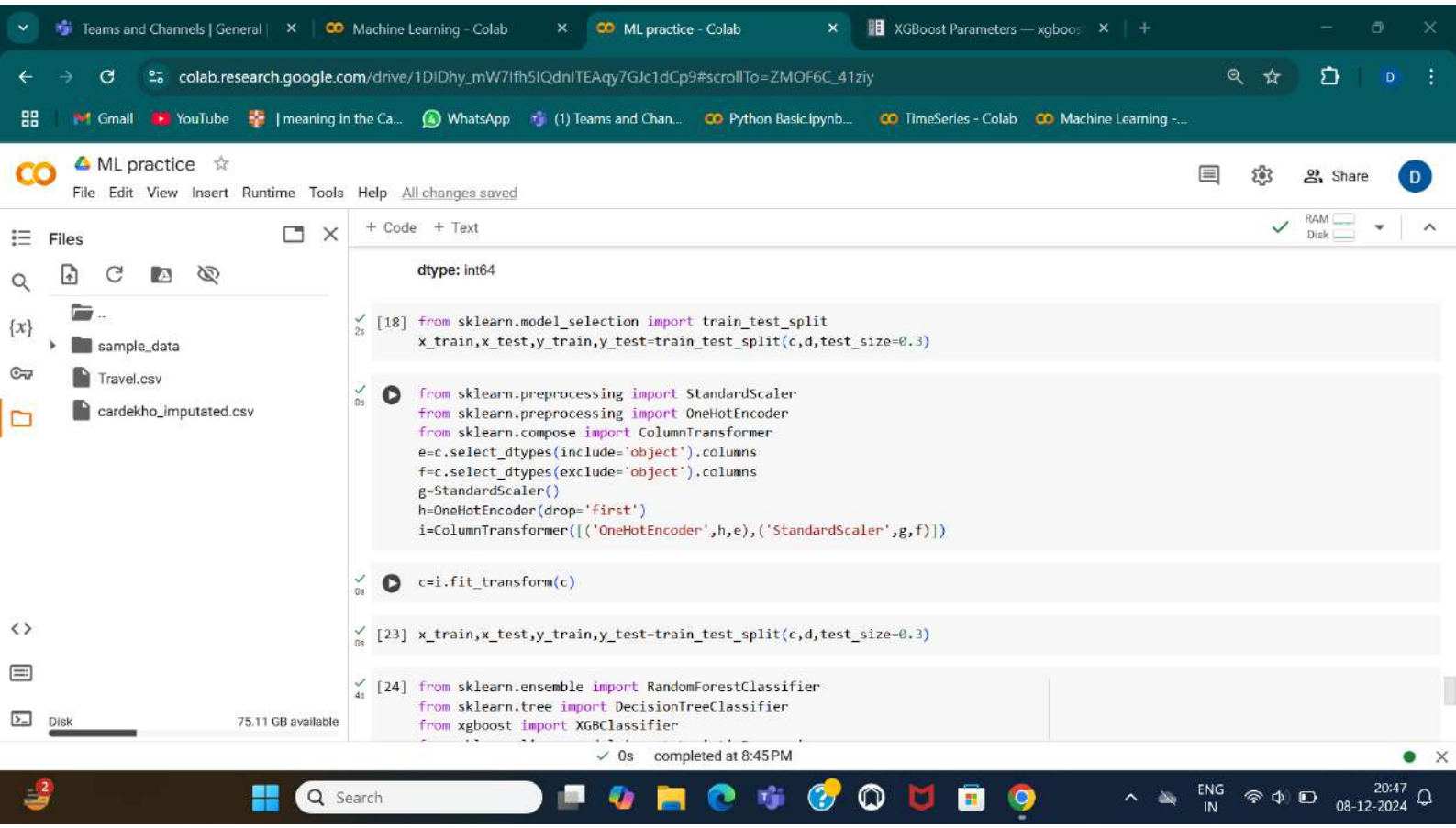
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dtype: int64
[18] from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test=train_test_split(c,d,test_size=0.3)
from sklearn.preprocessing import StandardScaler
from sklearn.preprocessing import OneHotEncoder
from sklearn.compose import ColumnTransformer
e=c.select_dtypes(include='object').columns
f=c.select_dtypes(exclude='object').columns
g=StandardScaler()
h=OneHotEncoder(drop='first')
i=ColumnTransformer([('OneHotEncoder',h,e),('StandardScaler',g,f)])
c=i.fit_transform(c)
[23] x_train,x_test,y_train,y_test=train_test_split(c,d,test_size=0.3)
[24] from sklearn.ensemble import RandomForestClassifier
from sklearn.tree import DecisionTreeClassifier
from xgboost import XGBClassifier
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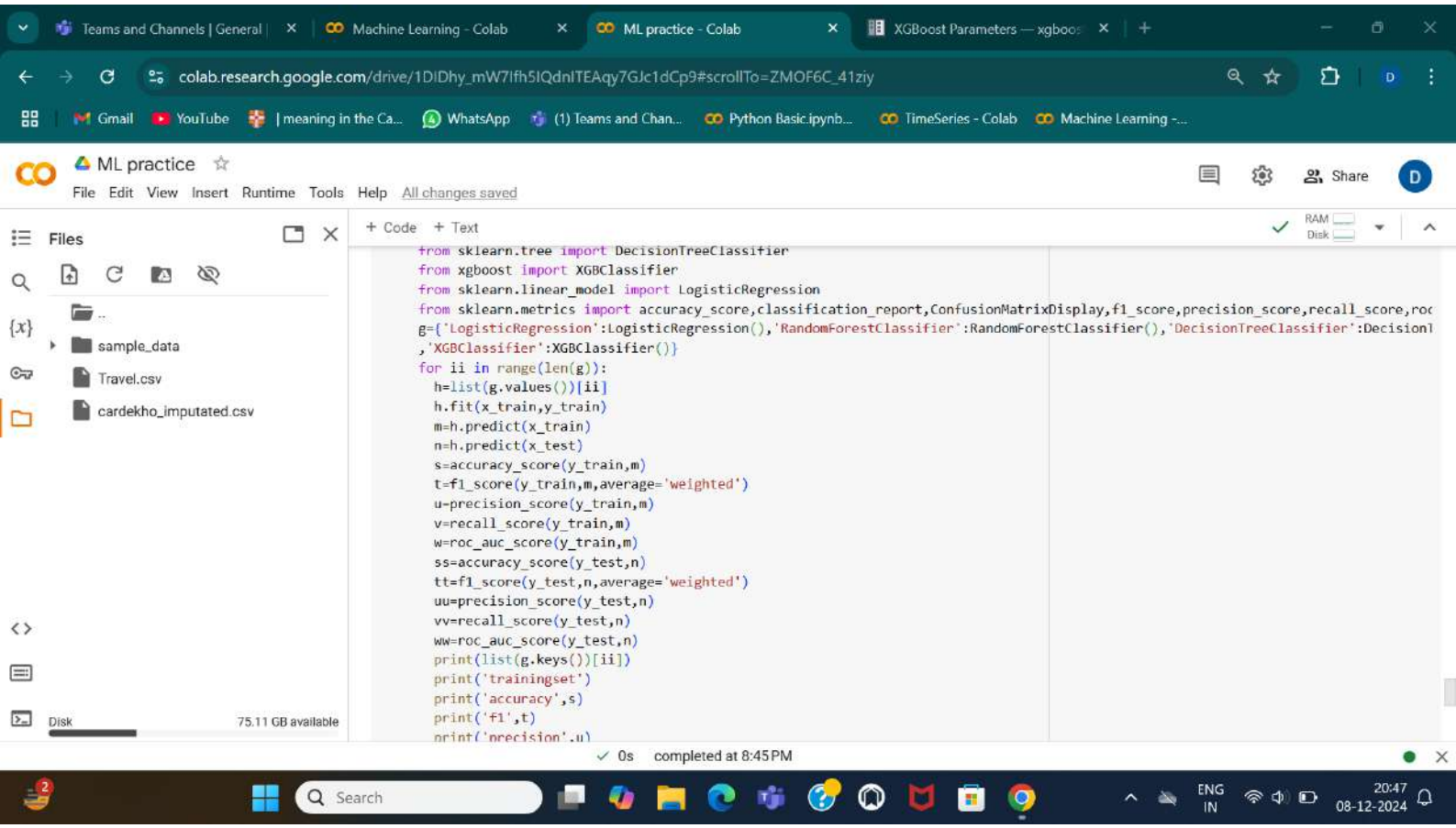
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from sklearn.tree import DecisionTreeClassifier
from xgboost import XGBClassifier
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import accuracy_score,classification_report,ConfusionMatrixDisplay,f1_score,precision_score,recall_score,roc
g={'LogisticRegression':LogisticRegression(),'RandomForestClassifier':RandomForestClassifier(),'DecisionTreeClassifier':DecisionT
,'XGBClassifier':XGBClassifier()}
for ii in range(len(g)):
h=list(g.values())[ii]
h.fit(x_train,y_train)
m=h.predict(x_train)
n=h.predict(x_test)
s=accuracy_score(y_train,m)
t=f1_score(y_train,m,average='weighted')
u=precision_score(y_train,m)
v=recall_score(y_train,m)
w=roc_auc_score(y_train,m)
ss=accuracy_score(y_test,n)
tt=f1_score(y_test,n,average='weighted')
uu=precision_score(y_test,n)
vv=recall_score(y_test,n)
ww=roc_auc_score(y_test,n)
print(list(g.keys())[ii])
print('trainingset')
print('accuracy',s)
print('f1',t)
print('precision',u)
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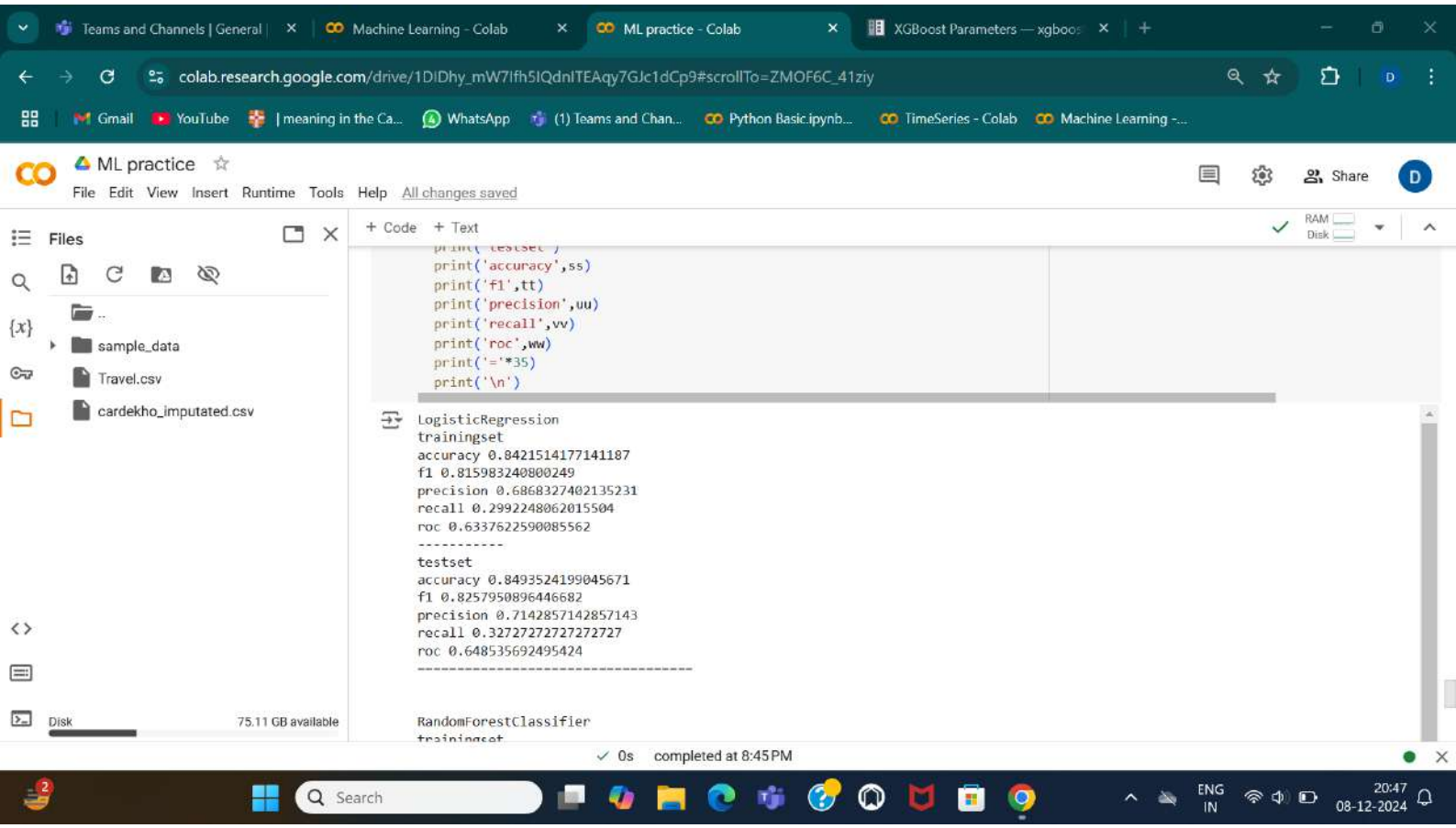
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print('accuracy',ss)
print('f1',tt)
print('precision',uu)
print('recall',vv)
print('roc',ww)
print('='*35)
print('\n')
LogisticRegression
trainingset
accuracy 0.8421514177141187
f1 0.815983240800249
precision 0.6868327402135231
recall 0.2992248062015504
roc 0.6337622590085562
---
testset
accuracy 0.8493524199045671
f1 0.8257950896446682
precision 0.7142857142857143
recall 0.32727272727272727
roc 0.648535692495424
RandomForestClassifier
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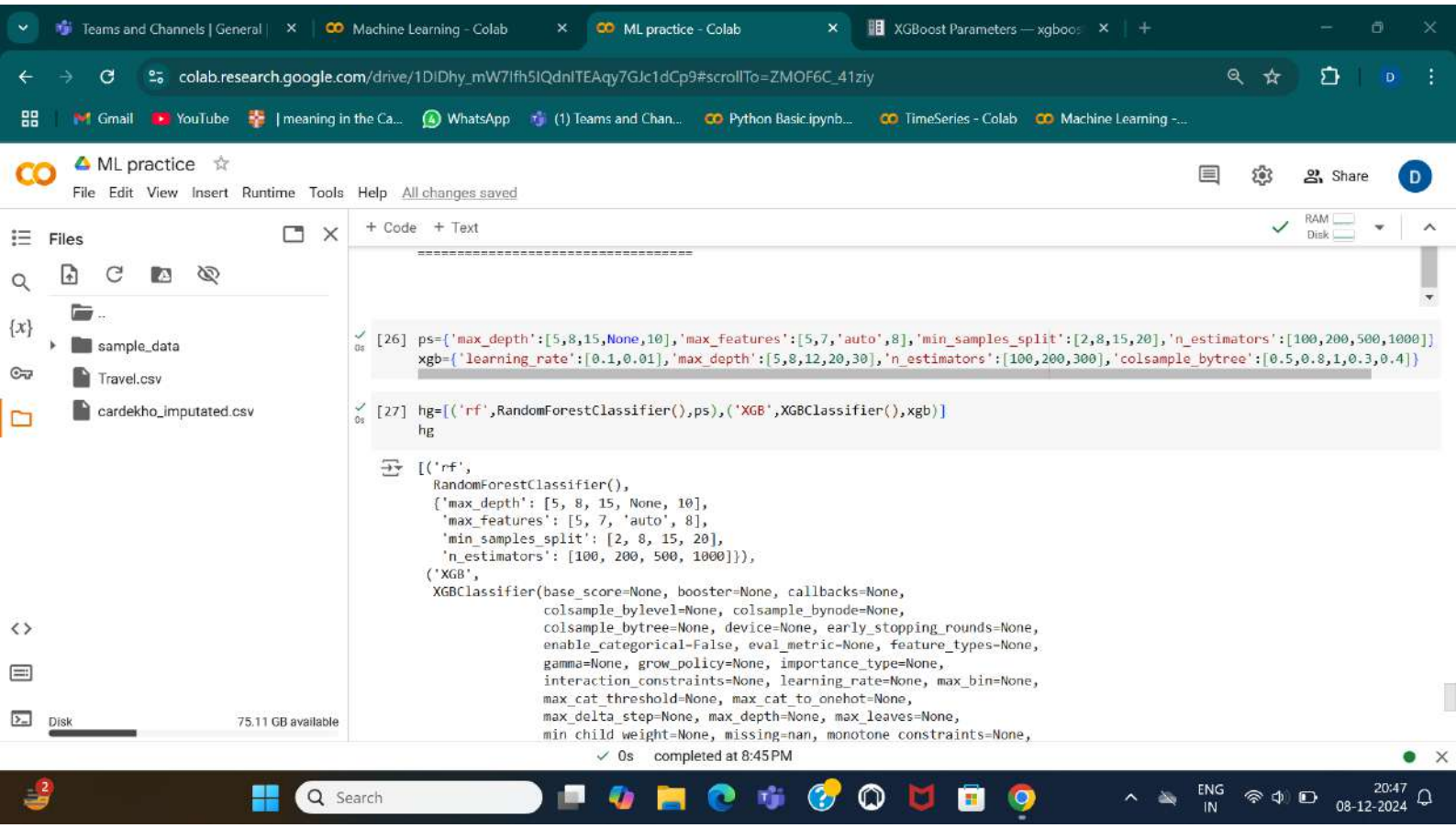
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[26] ps={'max_depth':[5,8,15,None,10],'max_features':[5,7,'auto',8],'min_samples_split':[2,8,15,20],'n_estimators':[100,200,500,1000]}
xgb={'learning_rate':[0.1,0.01],'max_depth':[5,8,12,20,30],'n_estimators':[100,200,300],'colsample_bytree':[0.5,0.8,1,0.3,0.4]}
[27] hg=[('rf',RandomForestClassifier(),ps),('XGB',XGBClassifier(),xgb)]
hg
[('rf',
RandomForestClassifier(),
{'max_depth': [5, 8, 15, None, 10],
'max_features': [5, 7, 'auto', 8],
'min_samples_split': [2, 8, 15, 20],
'n_estimators': [100, 200, 500, 1000]}),
('XGB',
XGBClassifier(base_score=None, booster=None, callbacks=None,
colsample_bylevel=None, colsample_bynode=None,
colsample_bytree=None, device=None, early_stopping_rounds=None,
enable_categorical=False, eval_metric=None, feature_types=None,
gamma=None, grow_policy=None, importance_type=None,
interaction_constraints=None, learning_rate=None, max_bin=None,
max_cat_threshold=None, max_cat_to_onehot=None,
max_delta_step=None, max_depth=None, max_leaves=None,
min_child_weight=None, missing=nan, monotone_constraints=None,
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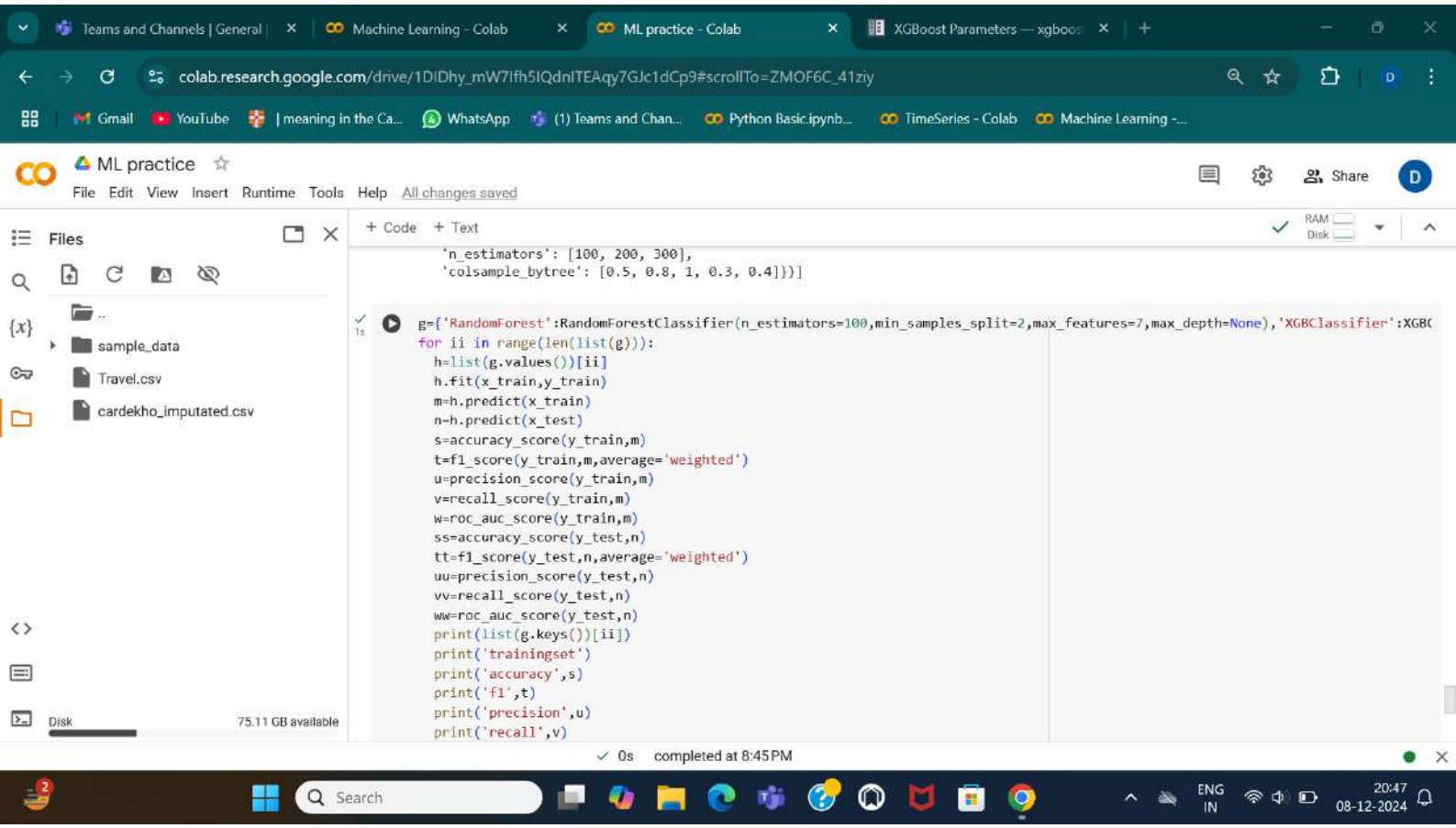
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cardekho_imputated.csv
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'n_estimators': [100, 200, 300],
'colsample_bytree': [0.5, 0.8, 1, 0.3, 0.4]})]
g={'RandomForest':RandomForestClassifier(n_estimators=100,min_samples_split=2,max_features=7,max_depth=None),'XGBClassifier':XGBC
for ii in range(len(list(g))):
h=list(g.values())[ii]
h.fit(x_train,y_train)
m=h.predict(x_train)
n=h.predict(x_test)
s=accuracy_score(y_train,m)
t=f1_score(y_train,m,average='weighted')
u=precision_score(y_train,m)
v=recall_score(y_train,m)
w=roc_auc_score(y_train,m)
ss=accuracy_score(y_test,n)
tt=f1_score(y_test,n,average='weighted')
uu=precision_score(y_test,n)
vv=recall_score(y_test,n)
ww=roc_auc_score(y_test,n)
print(list(g.keys())[ii])
print('trainingset')
print('accuracy',s)
print('f1',t)
print('precision',u)
print('recall',v)
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```
import matplotlib.pyplot as plt
from sklearn.metrics import roc_curve
plt.figure()
dd=[{'label':'XGBClassifier','model':XGBClassifier(learning_rate=0.1,max_depth=5,n_estimators=100,colsample_bytree=0.5),'auc':0.7
for roo in dd:
  ghf=roo['model']
  ghf.fit(x_train,y_train)
  fpr,tpr,thresholds=roc_curve(y_test,ghf.predict_proba(x_test)[:,1])
  plt.plot(fpr,tpr,label='%s roc(area=%0.2f)'%(roo['label'],roo['auc']))
  plt.plot([0,1],[0,1],'r--')
  plt.xlim([0.0,1.0])
  plt.ylim([0.0,1.05])
  plt.xlabel('x')
  plt.ylabel('y')
  plt.legend()
  plt.show()
```


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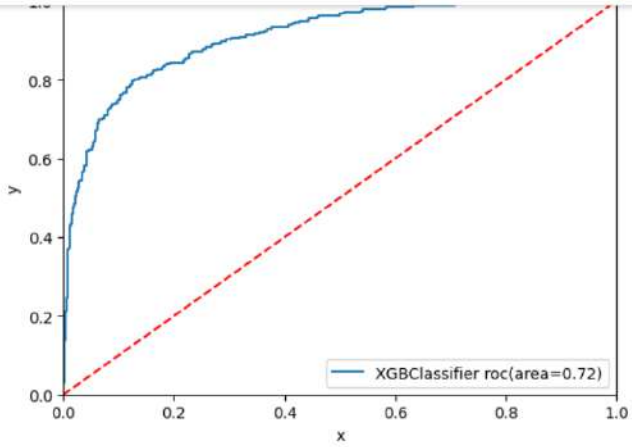


```
[31] import pandas as pd
     a=pd.read_csv('cardekho_imputated.csv')
     a
```

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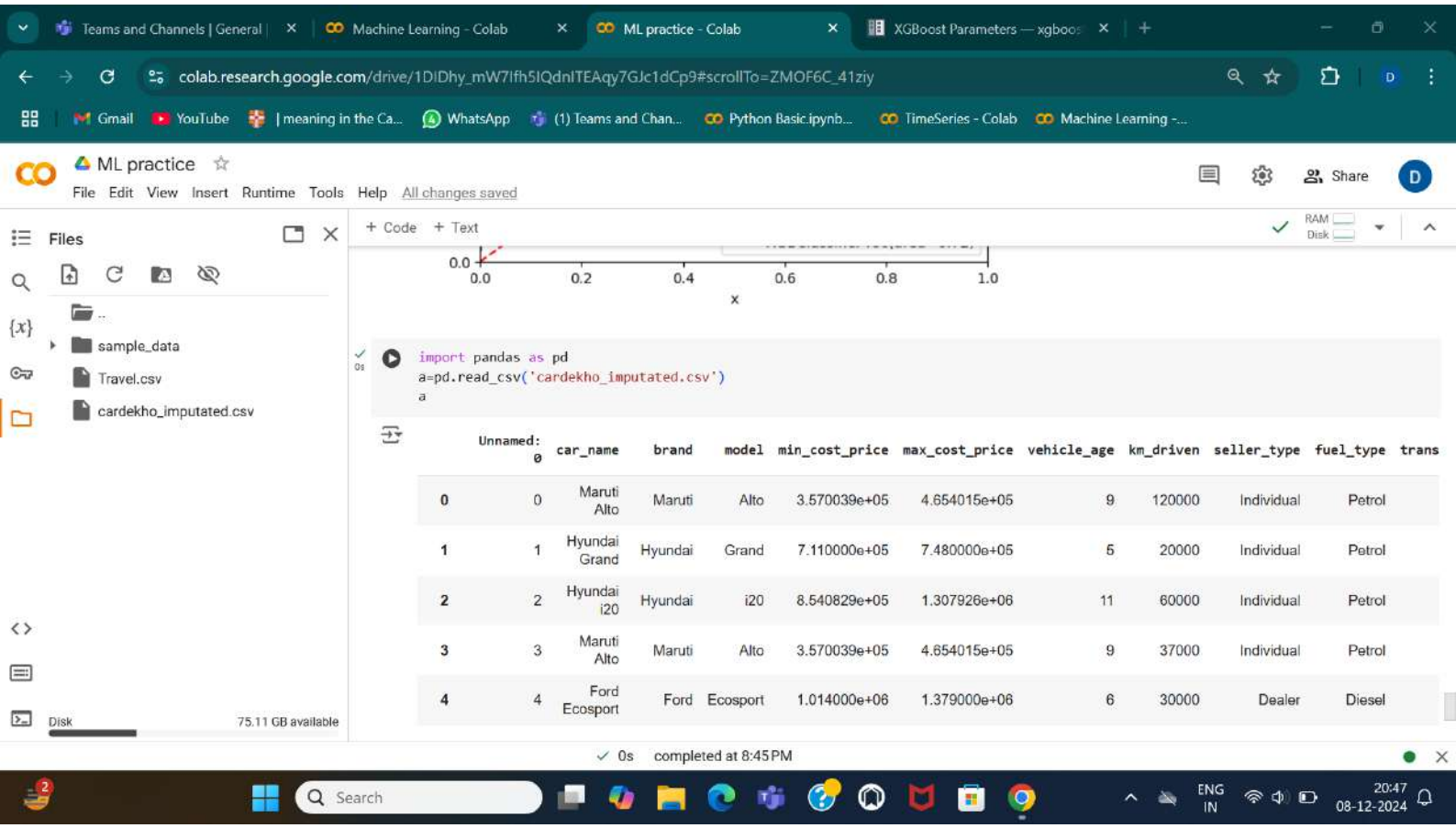
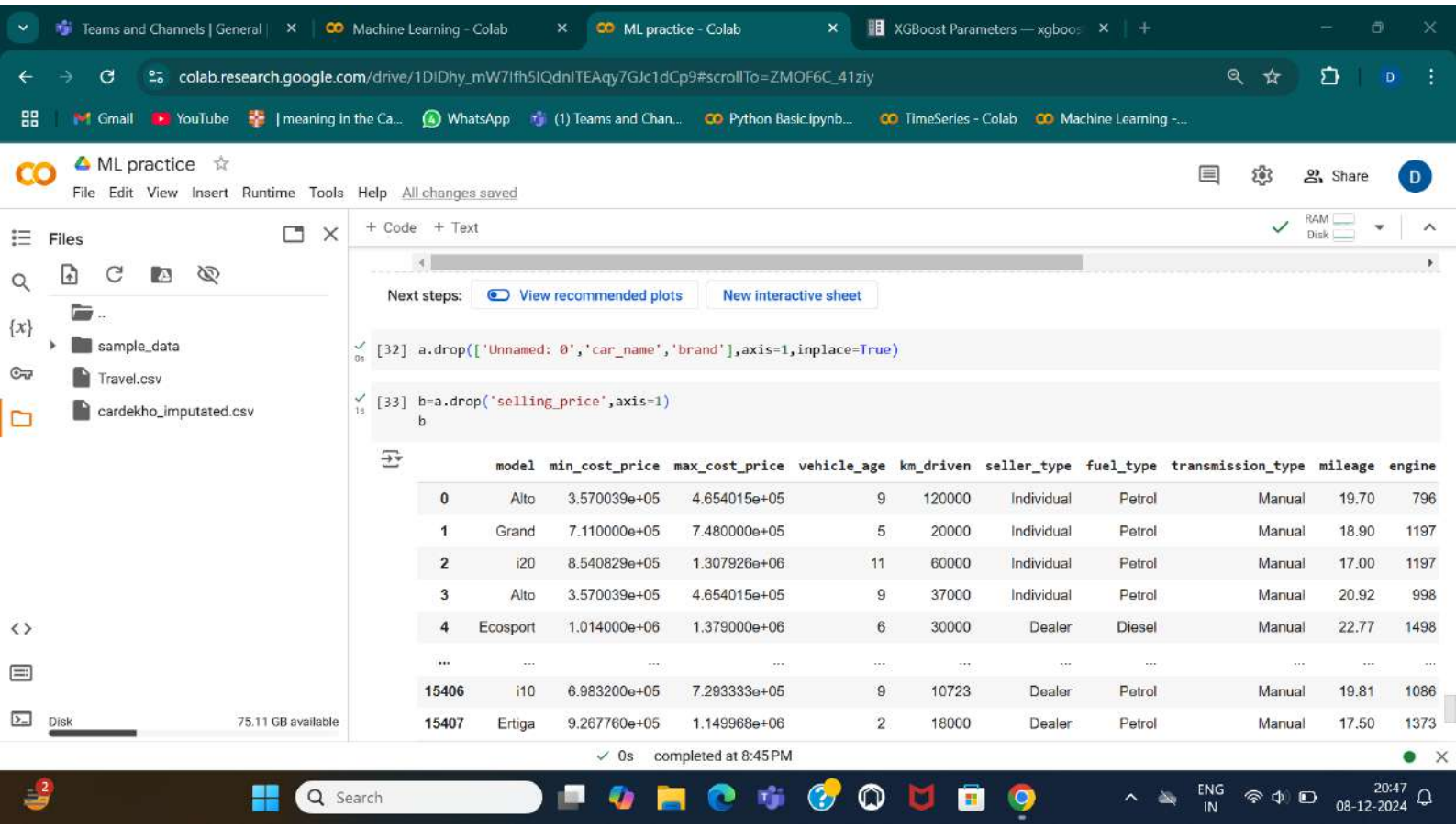
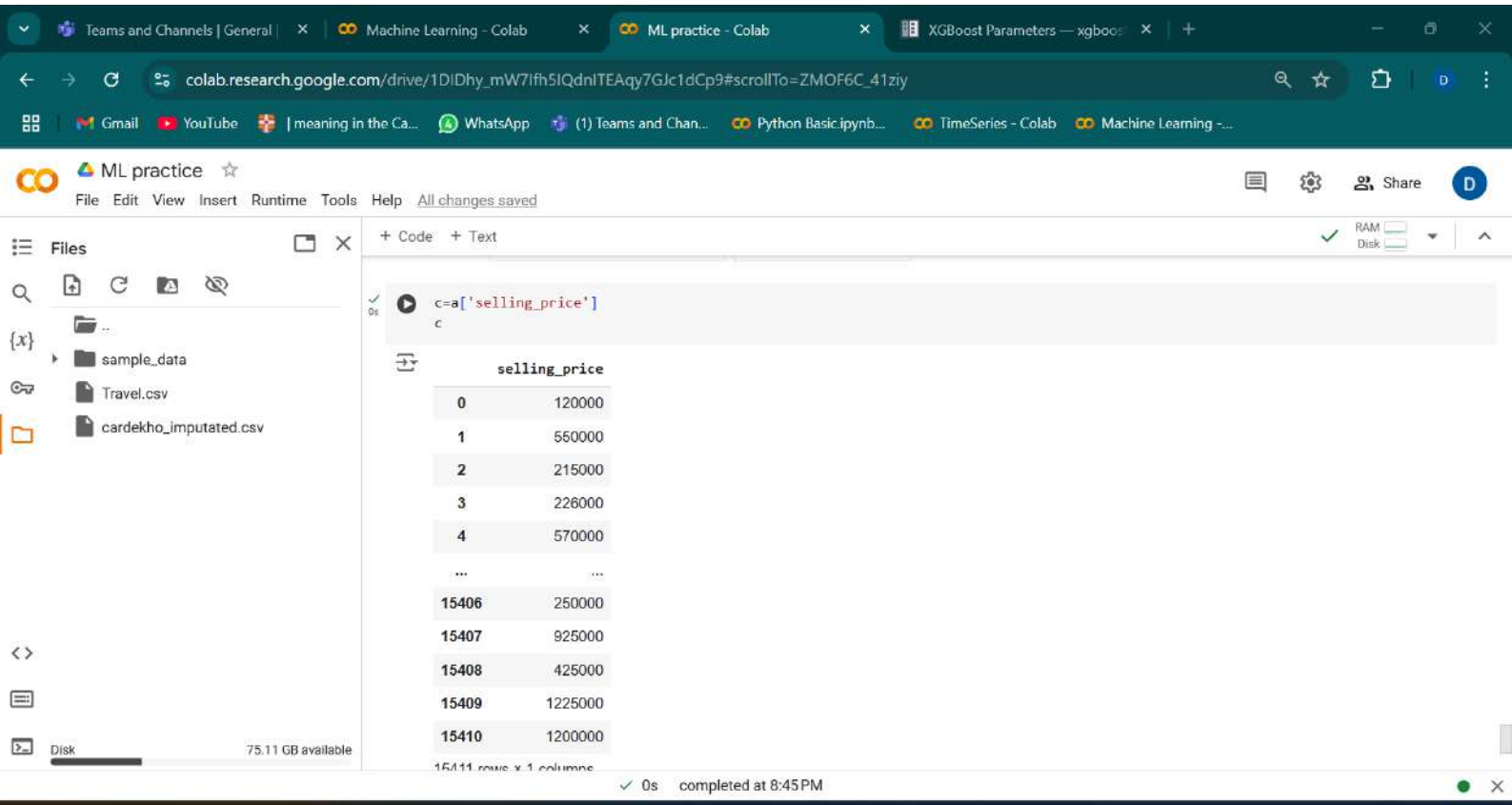



| | Unnamed: 0 | car_name | brand | model | min_cost_price | max_cost_price | vehicle_age | km_driven | seller_type | fuel_type | trans |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | Maruti Alto | Maruti | Alto | 3.570039e+05 | 4.654015e+05 | 9 | 120000 | Individual | Petrol | |
| 1 | 1 | Hyundai Grand | Hyundai | Grand | 7.110000e+05 | 7.480000e+05 | 5 | 20000 | Individual | Petrol | |
| 2 | 2 | Hyundai i20 | Hyundai | i20 | 8.540829e+05 | 1.307926e+06 | 11 | 60000 | Individual | Petrol | |
| 3 | 3 | Maruti Alto | Maruti | Alto | 3.570039e+05 | 4.654015e+05 | 9 | 37000 | Individual | Petrol | |
| 4 | 4 | Ford Ecosport | Ford | Ecosport | 1.014000e+06 | 1.379000e+06 | 6 | 30000 | Dealer | Diesel | |




| | model | min_cost_price | max_cost_price | vehicle_age | km_driven | seller_type | fuel_type | transmission_type | mileage | engine |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | Alto | 3.570039e+05 | 4.654015e+05 | 9 | 120000 | Individual | Petrol | Manual | 19.70 | 796 |
| 1 | Grand | 7.110000e+05 | 7.480000e+05 | 5 | 20000 | Individual | Petrol | Manual | 18.90 | 1197 |
| 2 | i20 | 8.540829e+05 | 1.307926e+06 | 11 | 60000 | Individual | Petrol | Manual | 17.00 | 1197 |
| 3 | Alto | 3.570039e+05 | 4.654015e+05 | 9 | 37000 | Individual | Petrol | Manual | 20.92 | 998 |
| 4 | Ecosport | 1.014000e+06 | 1.379000e+06 | 6 | 30000 | Dealer | Diesel | Manual | 22.77 | 1498 |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 15406 | i10 | 6.983200e+05 | 7.293333e+05 | 9 | 10723 | Dealer | Petrol | Manual | 19.81 | 1086 |
| 15407 | Ertiga | 9.267760e+05 | 1.149968e+06 | 2 | 18000 | Dealer | Petrol | Manual | 17.50 | 1373 |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sample_data
Travel.csv
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c=a['selling_price']
c
selling_price
0 120000
1 550000
2 215000
3 226000
4 570000
... ...
15406 250000
15407 925000
15408 425000
15409 1225000
15410 1200000
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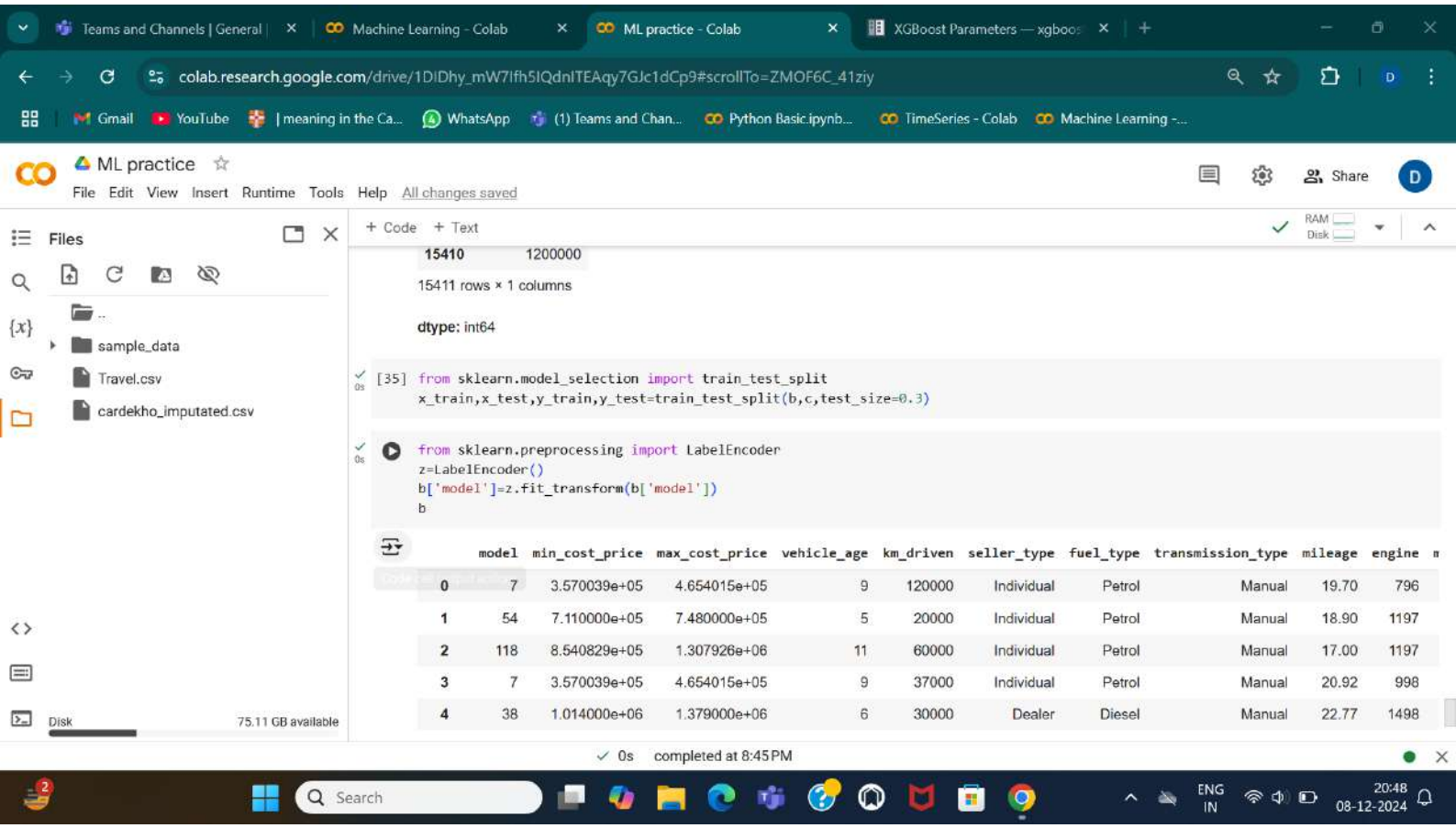
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cardekho_imputated.csv
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15410 1200000
15411 rows × 1 columns
dtype: int64
[35] from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test=train_test_split(b,c,test_size=0.3)
from sklearn.preprocessing import LabelEncoder
z=LabelEncoder()
b['model']=z.fit_transform(b['model'])
b
model min_cost_price max_cost_price vehicle_age km_driven seller_type fuel_type transmission_type mileage engine
0 7 3.570039e+05 4.654015e+05 9 120000 Individual Petrol Manual 19.70 796
1 54 7.110000e+05 7.480000e+05 5 20000 Individual Petrol Manual 18.90 1197
2 118 8.540829e+05 1.307926e+06 11 60000 Individual Petrol Manual 17.00 1197
3 7 3.570039e+05 4.654015e+05 9 37000 Individual Petrol Manual 20.92 998
4 38 1.014000e+06 1.379000e+06 6 30000 Dealer Diesel Manual 22.77 1498
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