Project Report Template

1 INTRODUCTION

1.1 Overview

A loan is a sum of money that is borrowed and repaid over a period of time, typically with interest. There are various types of loans available to individuals and businesses, such as personal loans, mortgages, auto loans, student loans, business loans and many more.They are offered by banks, credit unions, and other financial institutions, and the terms of the loan, such as interest rate, repayment period, and fees, vary depending on the lender and the type of loan.

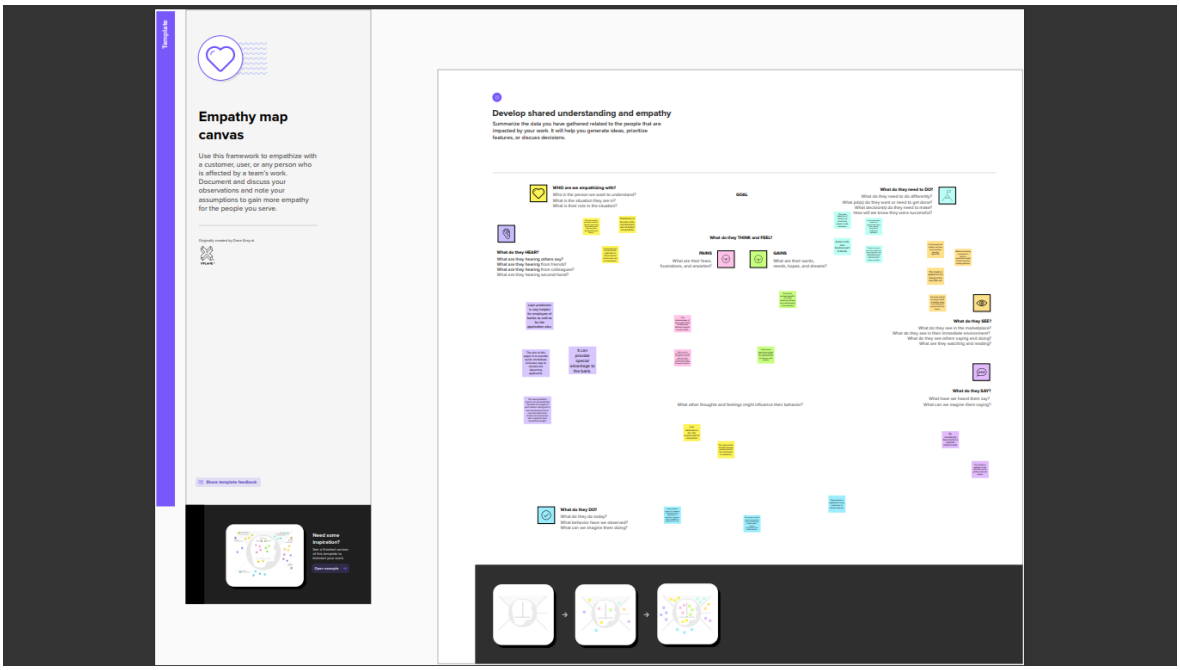
1.2 purpose

A personal loan is a type of unsecured loan that can be used for a variety of expenses such as home repairs, medical expenses, debt consolidation, and more. The loan amount, interest rate, and repayment period vary depending on the lender and the borrower's creditworthiness. To qualify for a personal loan, borrowers typically need to provide proof of income and have a good credit score.

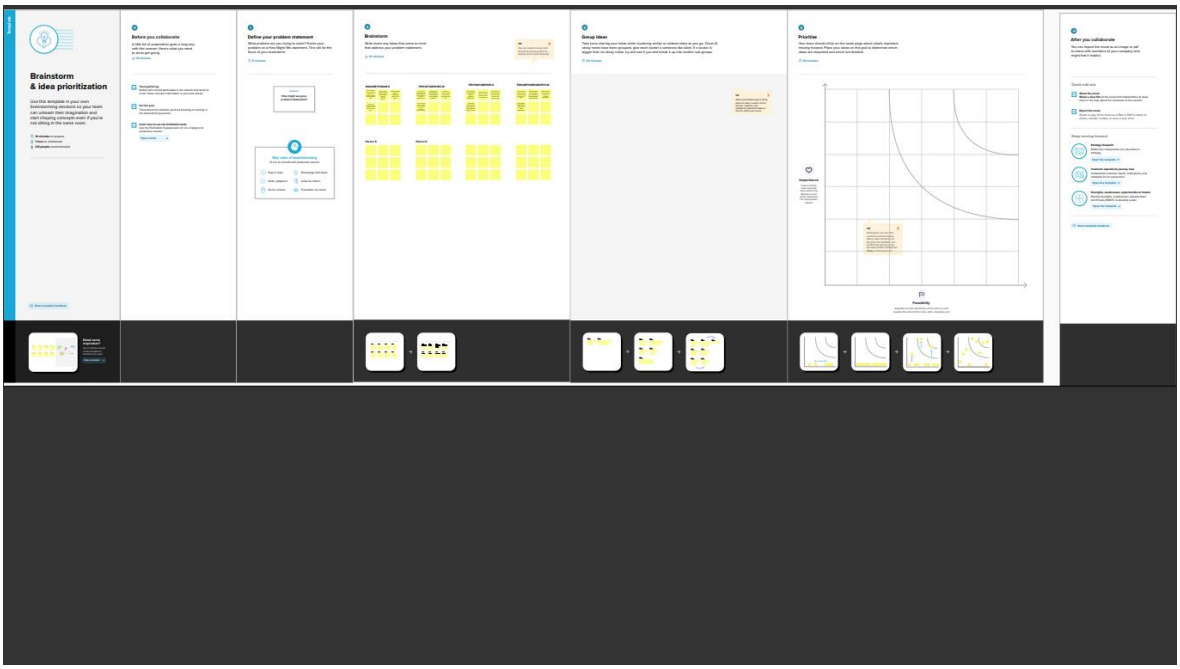
Predicting personal loan approval using machine learning analyses a borrower's financial data and credit history to determine the likelihood of loan approval. This can help financial institutions to make more informed decisions about which loan applications to approve and which to deny.

2.Problem Definition & Design Thinking

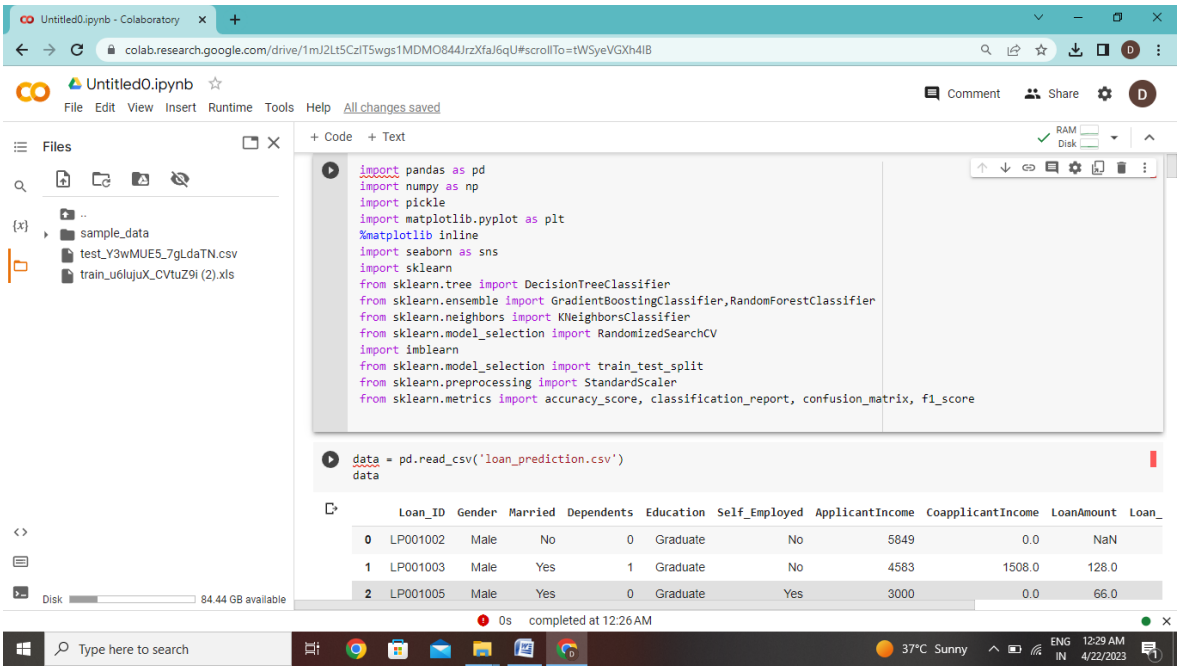
2.1Empathy Map



2.2Ideation & Brainstorm Map



3.RESULT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sample_data
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import pandas as pd
import numpy as np
import pickle
import matplotlib.pyplot as plt
%matplotlib inline
import seaborn as sns
import sklearn
from sklearn.tree import DecisionTreeClassifier
from sklearn.ensemble import GradientBoostingClassifier,RandomForestClassifier
from sklearn.neighbors import KNeighborsClassifier
from sklearn.model_selection import RandomizedSearchCV
import imblearn
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
from sklearn.metrics import accuracy_score, classification_report, confusion_matrix, f1_score
data = pd.read_csv('loan_prediction.csv')
data
Loan_ID Gender Married Dependents Education Self_Employed ApplicantIncome CoapplicantIncome LoanAmount Loan_
0 LP001002 Male No 0 Graduate No 5849 0.0 NaN
1 LP001003 Male Yes 1 Graduate No 4583 1508.0 128.0
2 LP001005 Male Yes 0 Graduate Yes 3000 0.0 66.0
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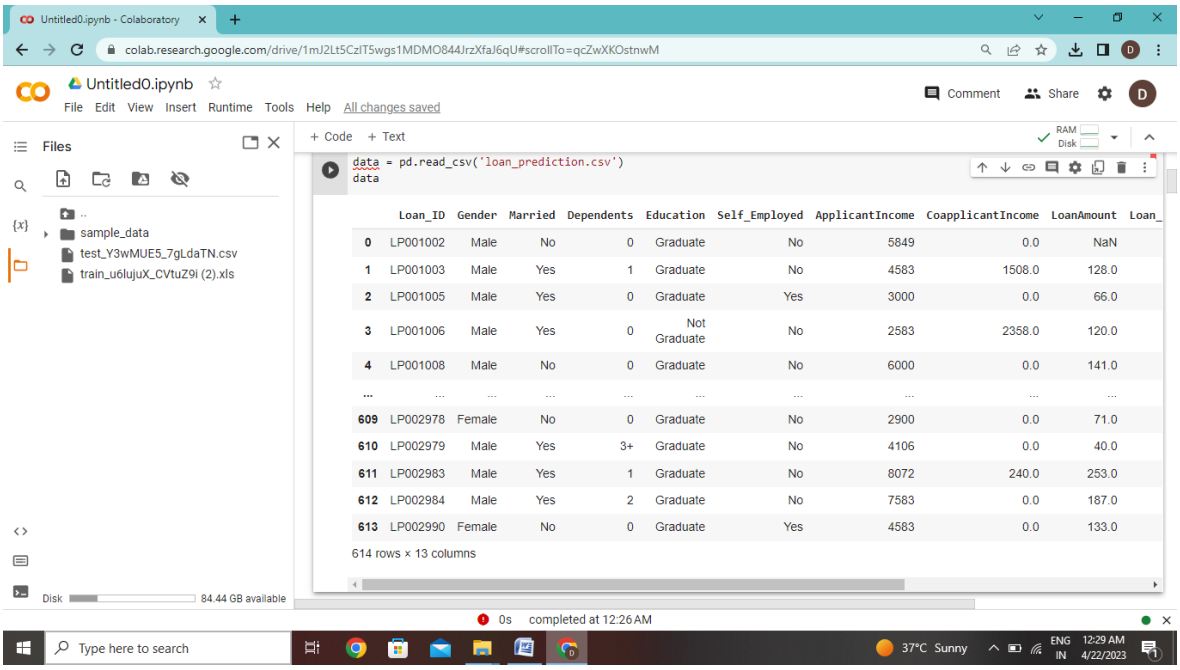
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data = pd.read_csv('loan_prediction.csv')
data
Loan_ID Gender Married Dependents Education Self_Employed ApplicantIncome CoapplicantIncome LoanAmount Loan_
0 LP001002 Male No 0 Graduate No 5849 0.0 NaN
1 LP001003 Male Yes 1 Graduate No 4583 1508.0 128.0
2 LP001005 Male Yes 0 Graduate Yes 3000 0.0 66.0
3 LP001006 Male Yes 0 Not Graduate No 2583 2358.0 120.0
4 LP001008 Male No 0 Graduate No 6000 0.0 141.0
... ...
609 LP002978 Female No 0 Graduate No 2900 0.0 71.0
610 LP002979 Male Yes 3+ Graduate No 4106 0.0 40.0
611 LP002983 Male Yes 1 Graduate No 8072 240.0 253.0
612 LP002984 Male Yes 2 Graduate No 7583 0.0 187.0
613 LP002990 Female No 0 Graduate Yes 4583 0.0 133.0
614 rows × 13 columns
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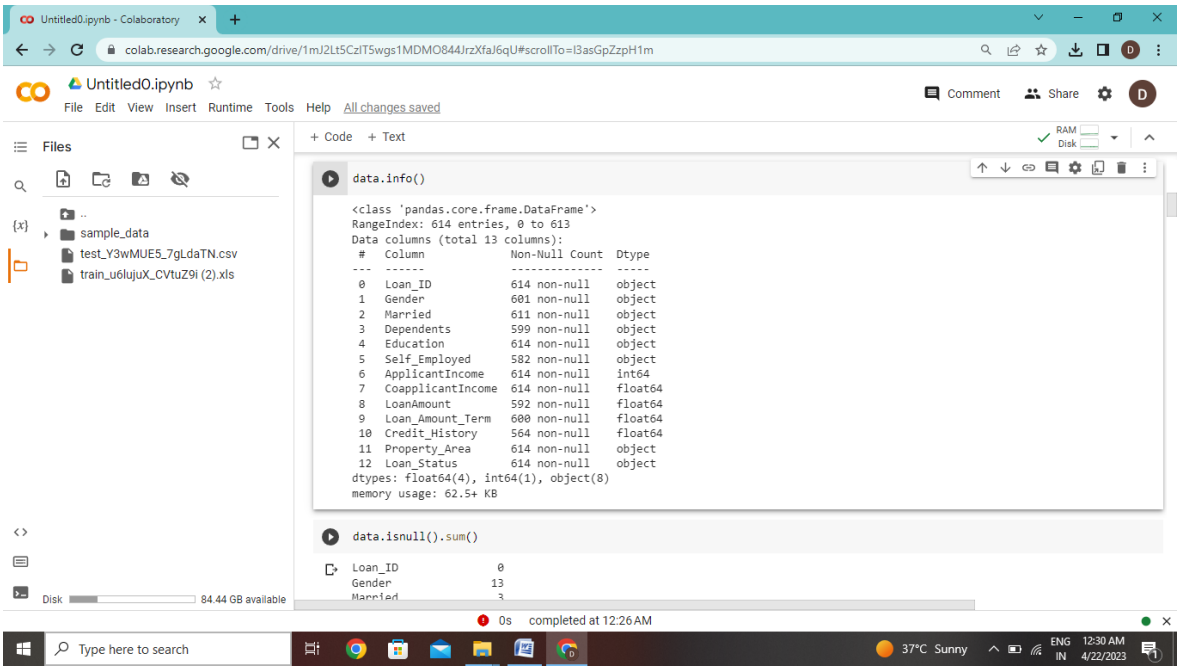
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sample_data
test_Y3wMUE5_7gLdaTN.csv
train_u6lujuX_CVtuZ9i (2).xls
data.info()
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 614 entries, 0 to 613
Data columns (total 13 columns):
Column Non-Null Count Dtype
0 Loan_ID 614 non-null object
1 Gender 601 non-null object
2 Married 611 non-null object
3 Dependents 599 non-null object
4 Education 614 non-null object
5 Self_Employed 582 non-null object
6 ApplicantIncome 614 non-null int64
7 CoapplicantIncome 614 non-null float64
8 LoanAmount 592 non-null float64
9 Loan_Amount_Term 600 non-null float64
10 Credit_History 564 non-null float64
11 Property_Area 614 non-null object
12 Loan_Status 614 non-null object
dtypes: float64(4), int64(1), object(8)
memory usage: 62.5+ KB
data.isnull().sum()
Loan_ID 0
Gender 13
Married 3
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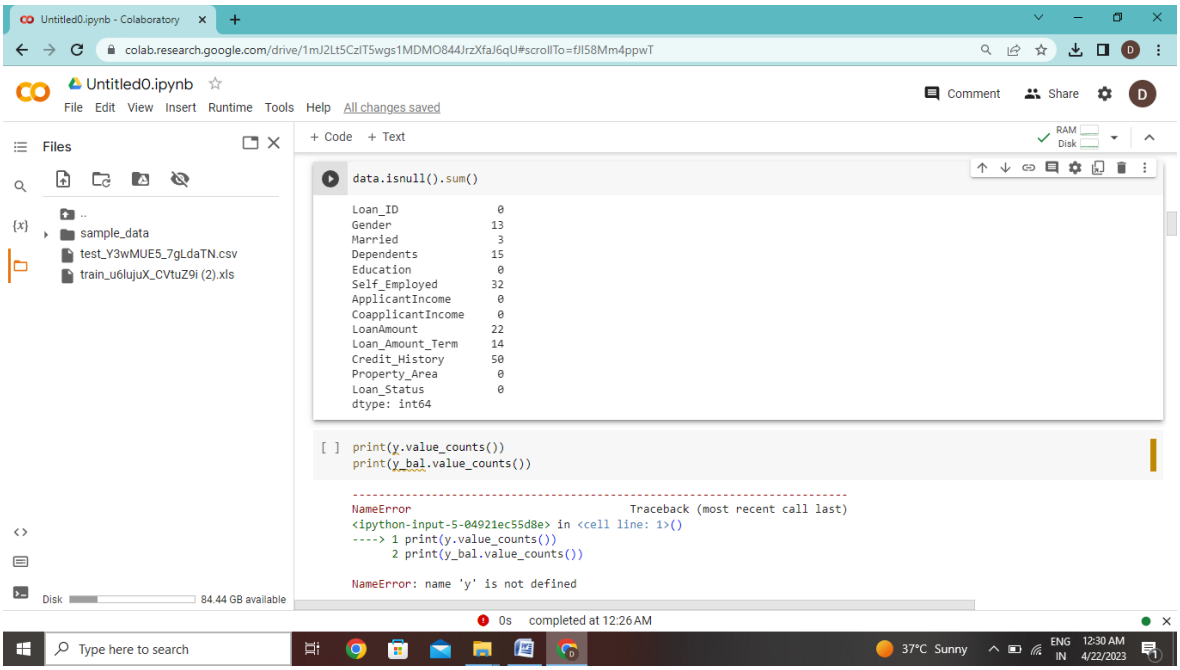
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RAM
Disk
sample_data
test_Y3wMUE5_7gLdaTN.csv
train_u6lujuX_CVtuZ9i (2).xls
data.isnull().sum()
Loan_ID 0
Gender 13
Married 3
Dependents 15
Education 0
Self_Employed 32
ApplicantIncome 0
CoapplicantIncome 0
LoanAmount 22
Loan_Amount_Term 14
Credit_History 50
Property_Area 0
Loan_Status 0
dtype: int64
[ ] print(y.value_counts())
print(y_bal.value_counts())
NameError Traceback (most recent call last)
<ipython-input-5-04921ec55d8e> in <cell line: 1>()
----> 1 print(y.value_counts())
2 print(y_bal.value_counts())
NameError: name 'y' is not defined
Disk 84.44 GB available
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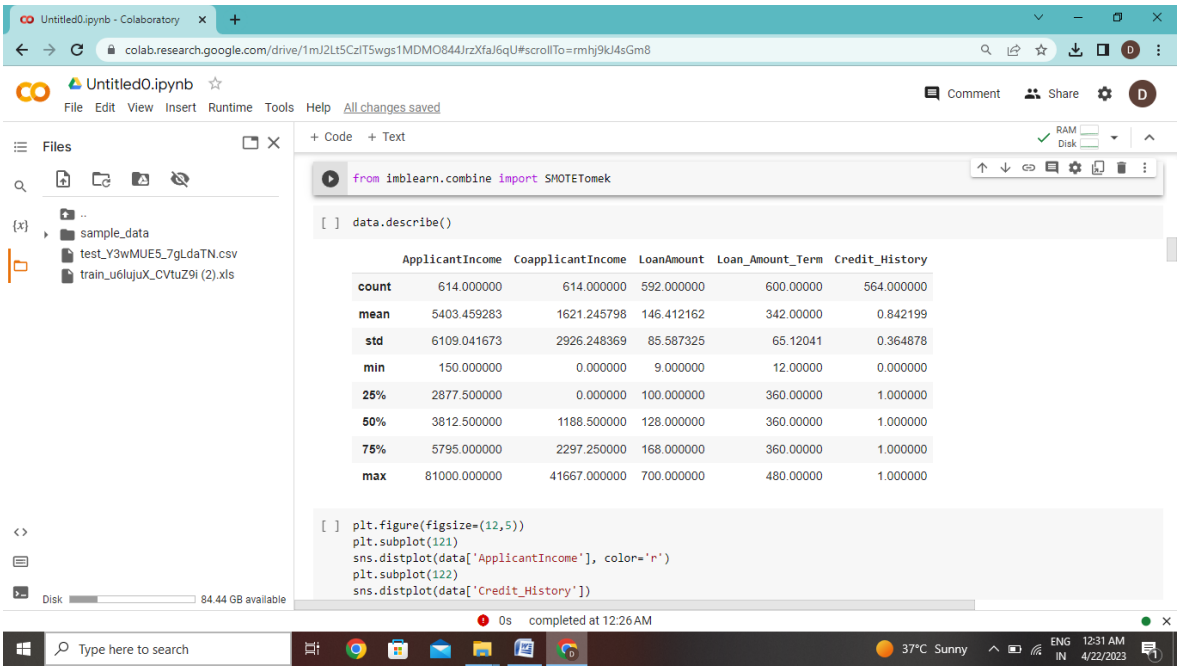
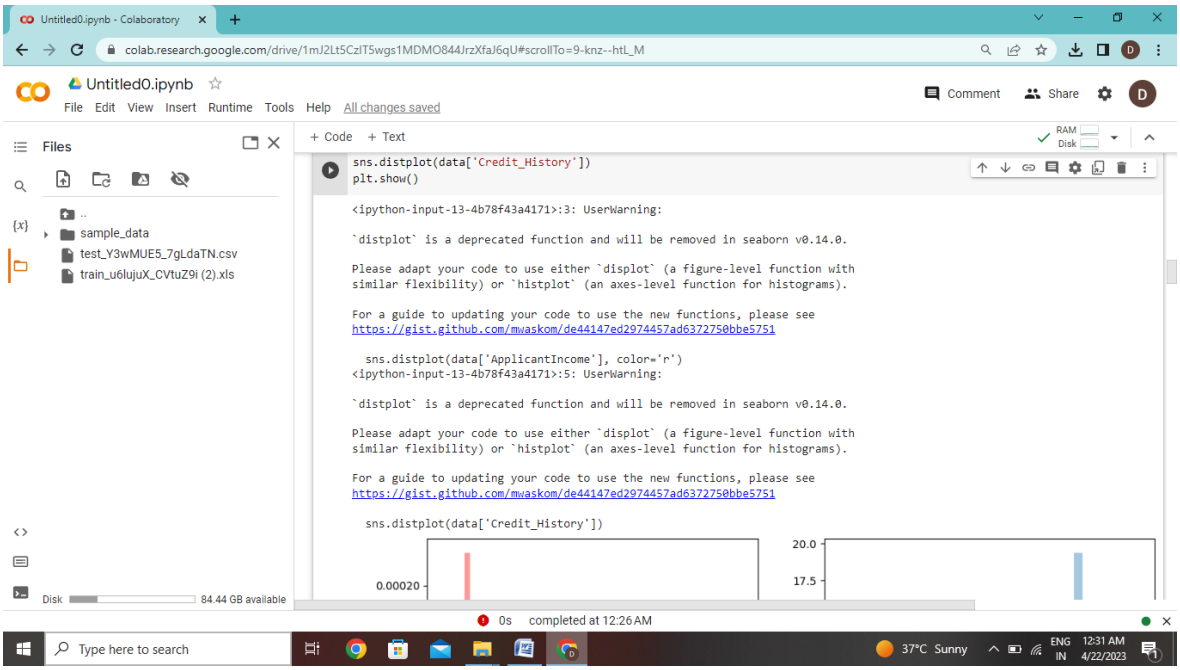


```
from imblearn.combine import SMOTETomek
```

```
data.describe()
```

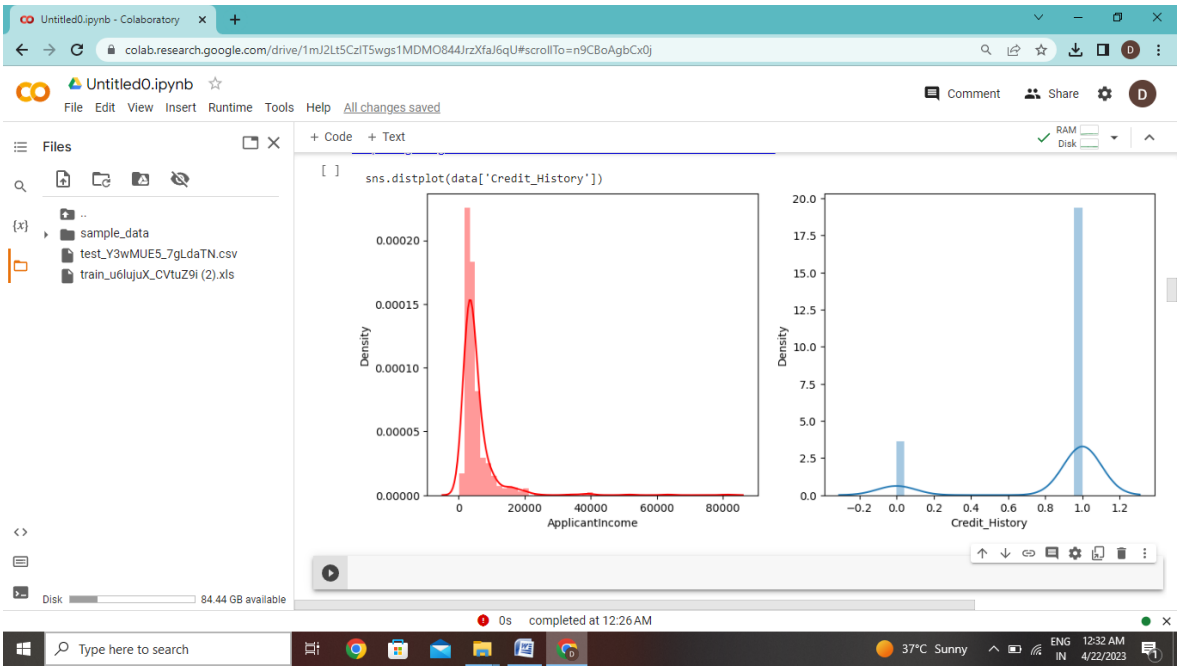
	ApplicantIncome	CoapplicantIncome	LoanAmount	Loan_Amount_Term	Credit_History
count	614.000000	614.000000	592.000000	600.00000	564.000000
mean	5403.459283	1621.245798	146.412162	342.00000	0.842199
std	6109.041673	2926.248369	85.587325	65.12041	0.364878
min	150.000000	0.000000	9.000000	12.00000	0.000000
25%	2877.500000	0.000000	100.000000	360.00000	1.000000
50%	3812.500000	1188.500000	128.000000	360.00000	1.000000
75%	5795.000000	2297.250000	168.000000	360.00000	1.000000
max	81000.000000	41667.000000	700.000000	480.00000	1.000000

```
plt.figure(figsize=(12,5))
plt.subplot(121)
sns.distplot(data['ApplicantIncome'], color='r')
plt.subplot(122)
sns.distplot(data['Credit_History'])
```



```
sns.distplot(data['Credit_History'])
plt.show()
```

```
<ipython-input-13-4b78f43a4171>:3: UserWarning:

`distplot` is a deprecated function and will be removed in seaborn v0.14.0.

Please adapt your code to use either `displot` (a figure-level function with
similar flexibility) or `histplot` (an axes-level function for histograms).

For a guide to updating your code to use the new functions, please see
https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751

  sns.distplot(data['ApplicantIncome'], color='r')
<ipython-input-13-4b78f43a4171>:5: UserWarning:

`distplot` is a deprecated function and will be removed in seaborn v0.14.0.

Please adapt your code to use either `displot` (a figure-level function with
similar flexibility) or `histplot` (an axes-level function for histograms).

For a guide to updating your code to use the new functions, please see
https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751

  sns.distplot(data['Credit_History'])
```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sns.distplot(data['Credit_History'])
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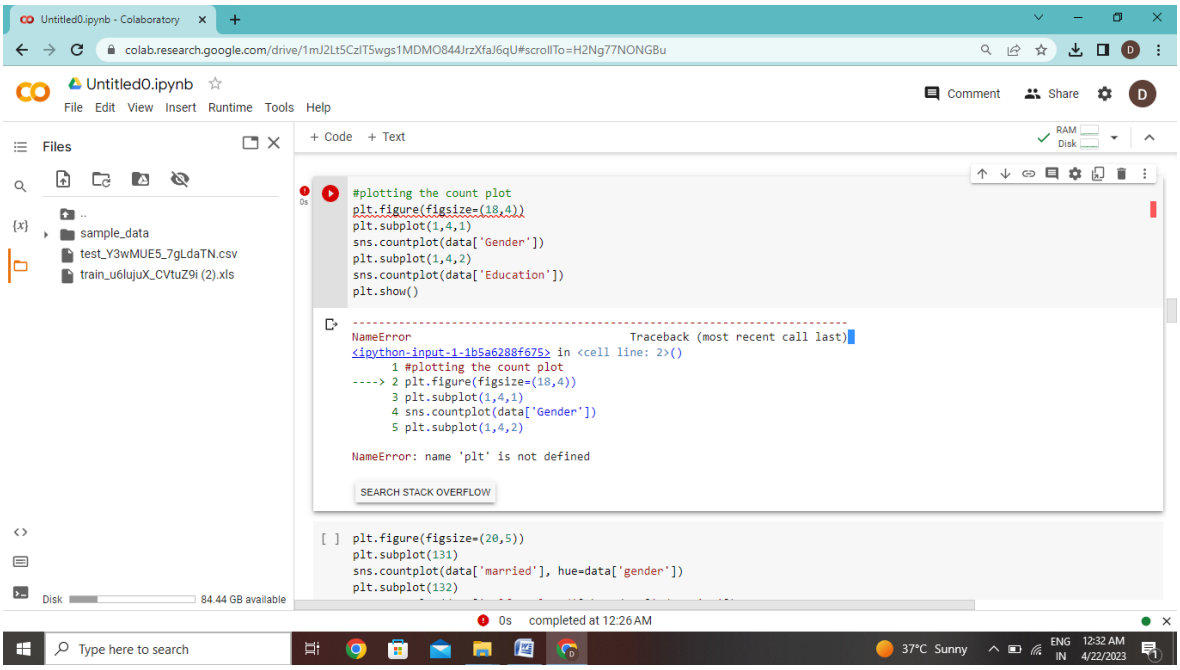
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sample_data
test_Y3wMUE5_7gLdaTN.csv
train_u6lujuX_CVtuZ9i (2).xls
#plotting the count plot
plt.figure(figsize=(18,4))
plt.subplot(1,4,1)
sns.countplot(data['Gender'])
plt.subplot(1,4,2)
sns.countplot(data['Education'])
plt.show()
NameError Traceback (most recent call last)
<ipython-input-1-1b5a6288f675> in <cell line: 2>()
1 #plotting the count plot
----> 2 plt.figure(figsize=(18,4))
3 plt.subplot(1,4,1)
4 sns.countplot(data['Gender'])
5 plt.subplot(1,4,2)
NameError: name 'plt' is not defined
SEARCH STACK OVERFLOW
plt.figure(figsize=(20,5))
plt.subplot(131)
sns.countplot(data['married'], hue=data['gender'])
plt.subplot(132)
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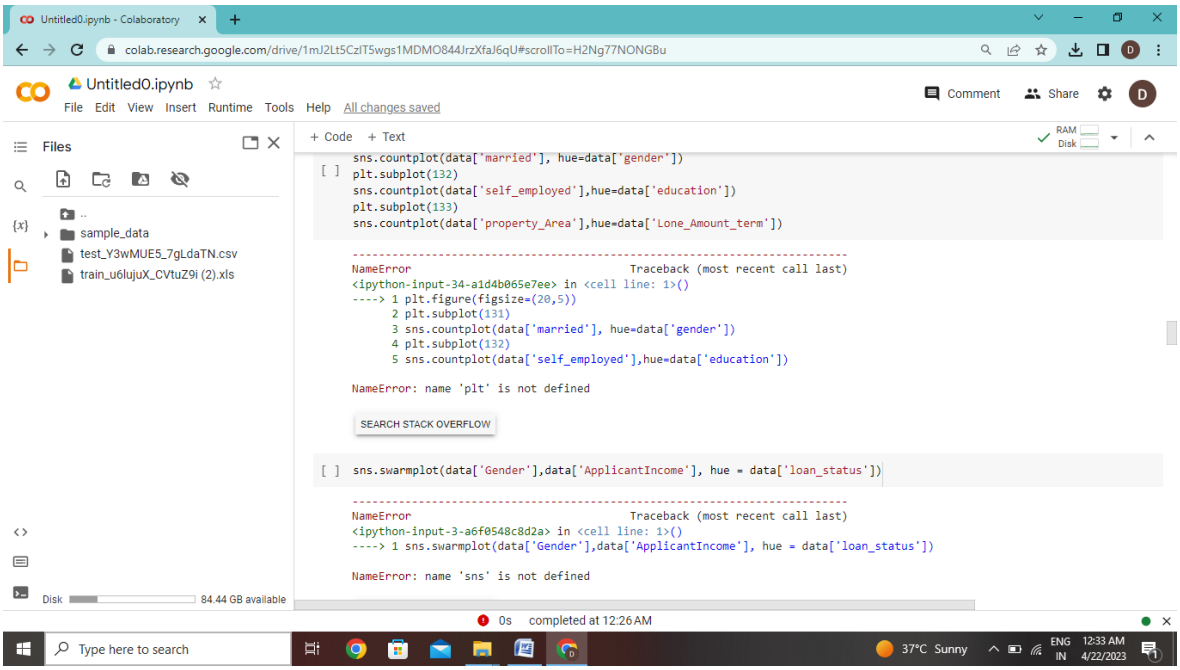
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train_u6lujuX_CVtuZ9i (2).xls
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sns.countplot(data['married'], hue=data['gender'])
plt.subplot(132)
sns.countplot(data['self_employed'],hue=data['education'])
plt.subplot(133)
sns.countplot(data['property_Area'],hue=data['Lone_Amount_term'])
NameError Traceback (most recent call last)
<ipython-input-34-a1d4b065e7ee> in <cell line: 1>()
----> 1 plt.figure(figsize=(20,5))
2 plt.subplot(131)
3 sns.countplot(data['married'], hue=data['gender'])
4 plt.subplot(132)
5 sns.countplot(data['self_employed'],hue=data['education'])
NameError: name 'plt' is not defined
SEARCH STACK OVERFLOW
sns.swarmplot(data['Gender'],data['ApplicantIncome'], hue = data['loan_status'])
NameError Traceback (most recent call last)
<ipython-input-3-a6f0548c8d2a> in <cell line: 1>()
----> 1 sns.swarmplot(data['Gender'],data['ApplicantIncome'], hue = data['loan_status'])
NameError: name 'sns' is not defined
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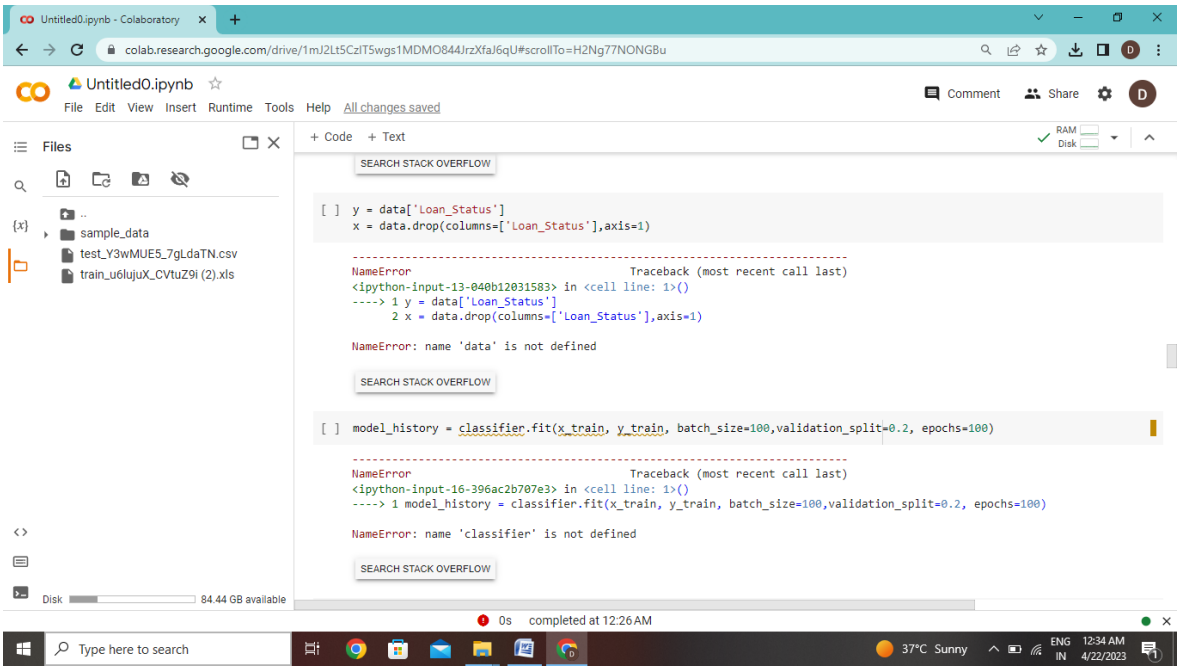
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sample_data
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SEARCH STACK OVERFLOW
y = data['Loan_Status']
x = data.drop(columns=['Loan_Status'],axis=1)
NameError Traceback (most recent call last)
<ipython-input-13-040b12031583> in <cell line: 1>()
----> 1 y = data['Loan_Status']
2 x = data.drop(columns=['Loan_Status'],axis=1)
NameError: name 'data' is not defined
SEARCH STACK OVERFLOW
model_history = classifier.fit(x_train, y_train, batch_size=100,validation_split=0.2, epochs=100)
NameError Traceback (most recent call last)
<ipython-input-16-396ac2b707e3> in <cell line: 1>()
----> 1 model_history = classifier.fit(x_train, y_train, batch_size=100,validation_split=0.2, epochs=100)
NameError: name 'classifier' is not defined
SEARCH STACK OVERFLOW
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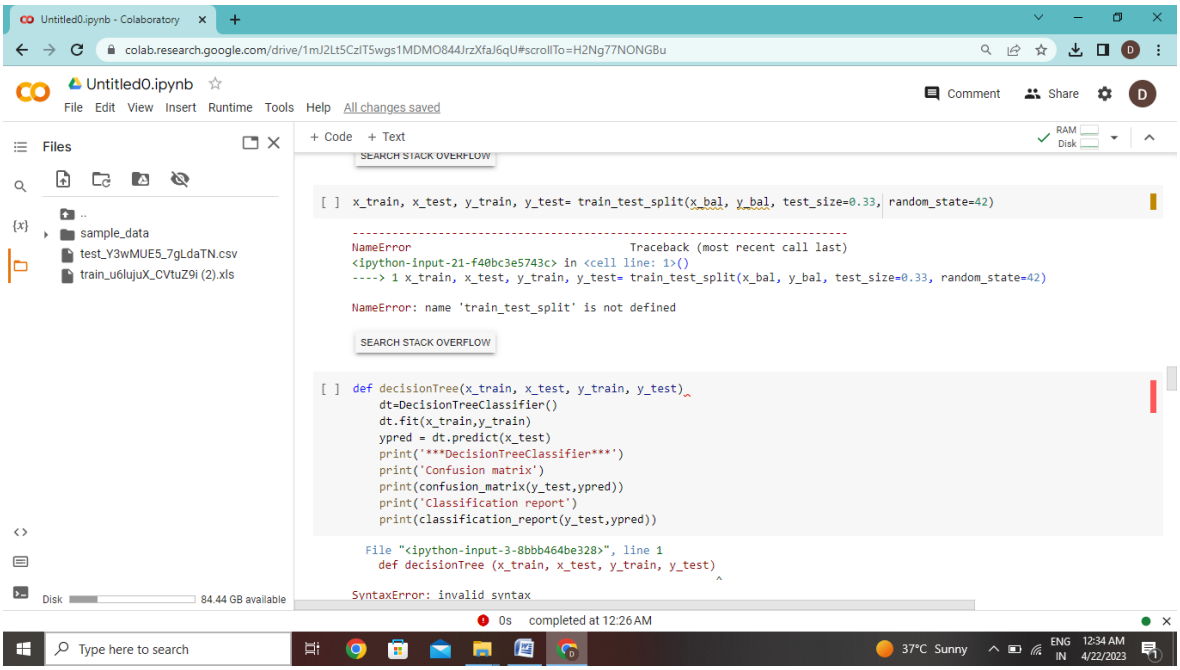
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train_u6lujuX_CVtuZ9i (2).xls
+ Code + Text
[ ] x_train, x_test, y_train, y_test= train_test_split(x_bal, y_bal, test_size=0.33, random_state=42)
NameError Traceback (most recent call last)
<ipython-input-21-f40bc3e5743c> in <cell line: 1>()
----> 1 x_train, x_test, y_train, y_test= train_test_split(x_bal, y_bal, test_size=0.33, random_state=42)
NameError: name 'train_test_split' is not defined
SEARCH STACK OVERFLOW
[ ] def decisionTree(x_train, x_test, y_train, y_test)
dt=DecisionTreeClassifier()
dt.fit(x_train,y_train)
ypred = dt.predict(x_test)
print('***DecisionTreeClassifier***')
print('Confusion matrix')
print(confusion_matrix(y_test,ypred))
print('Classification report')
print(classification_report(y_test,ypred))
File "<ipython-input-3-8bbb464be328>", line 1
def decisionTree (x_train, x_test, y_train, y_test)
SyntaxError: invalid syntax
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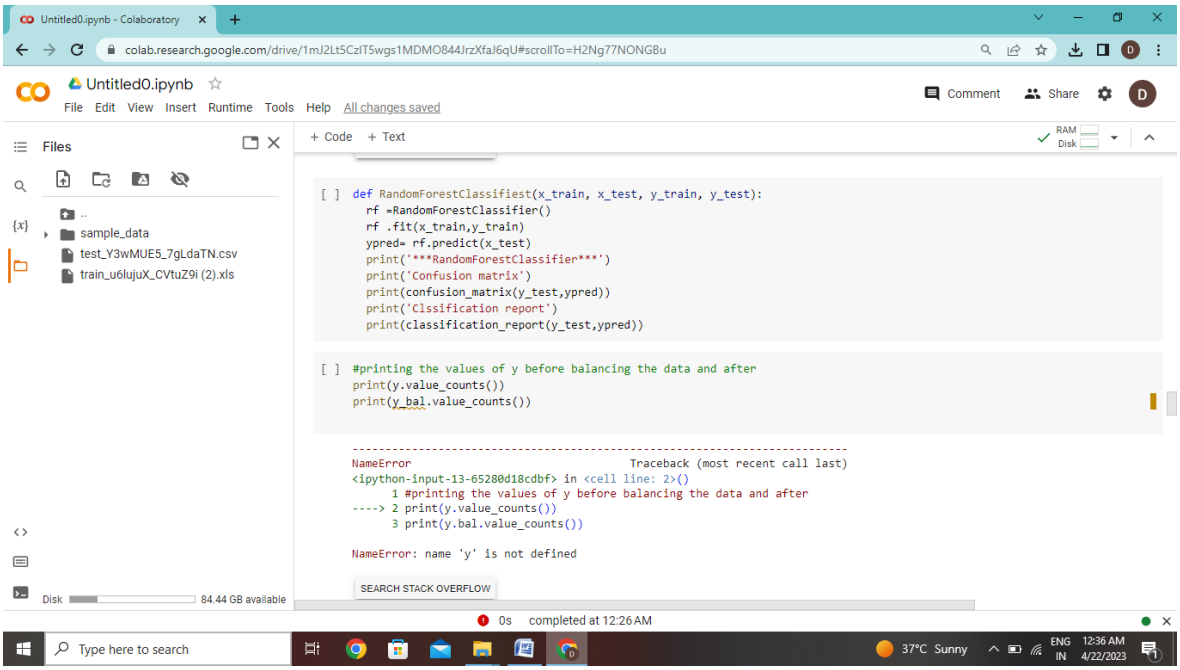
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sample_data
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train_u6lujuX_CVtuZ9i (2).xls
+ Code + Text
[ ] def RandomForestClassifiest(x_train, x_test, y_train, y_test):
rf =RandomForestClassifier()
rf .fit(x_train,y_train)
ypred= rf.predict(x_test)
print('***RandomForestClassifier***')
print('Confusion matrix')
print(confusion_matrix(y_test,ypred))
print('Clssification report')
print(classification_report(y_test,ypred))
[ ] #printing the values of y before balancing the data and after
print(y.value_counts())
print(y_bal.value_counts())
NameError Traceback (most recent call last)
<ipython-input-13-65280d18cdbf> in <cell line: 2>()
1 #printing the values of y before balancing the data and after
----> 2 print(y.value_counts())
3 print(y.bal.value_counts())
NameError: name 'y' is not defined
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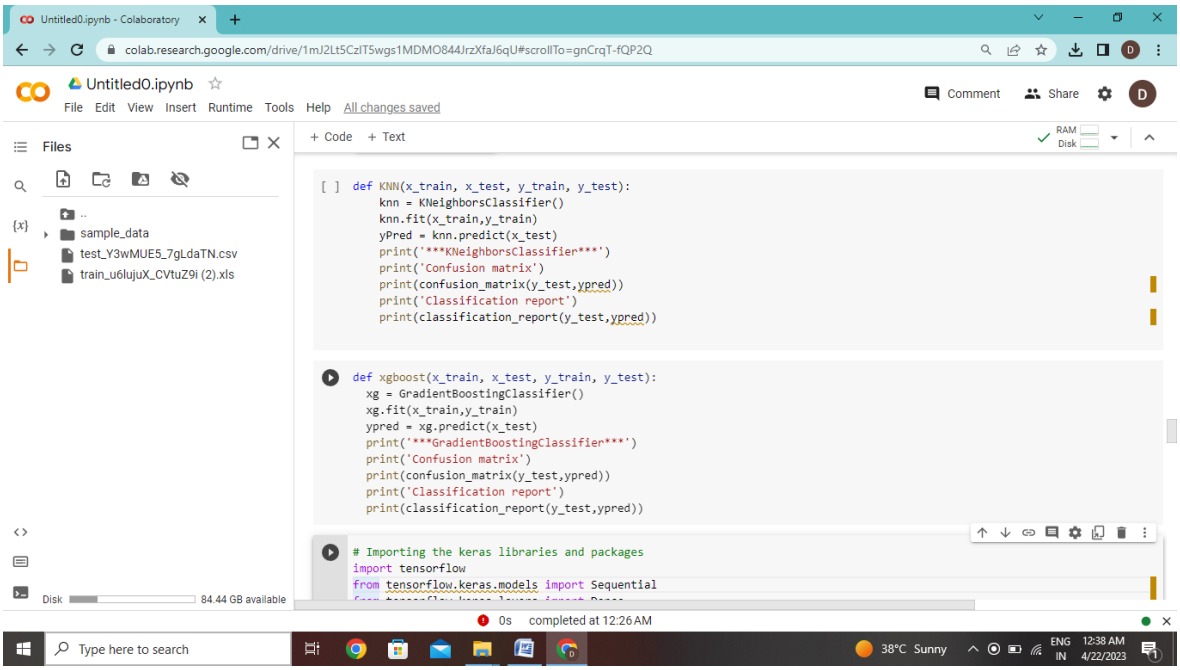
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[ ] def KNN(x_train, x_test, y_train, y_test):
knn = KNeighborsClassifier()
knn.fit(x_train,y_train)
ypred = knn.predict(x_test)
print('***KNeighborsClassifier***')
print('Confusion matrix')
print(confusion_matrix(y_test,ypred))
print('Classification report')
print(classification_report(y_test,ypred))
def xgboost(x_train, x_test, y_train, y_test):
xg = GradientBoostingClassifier()
xg.fit(x_train,y_train)
ypred = xg.predict(x_test)
print('***GradientBoostingClassifier***')
print('Confusion matrix')
print(confusion_matrix(y_test,ypred))
print('Classification report')
print(classification_report(y_test,ypred))
# Importing the keras libraries and packages
import tensorflow
from tensorflow.keras.models import Sequential
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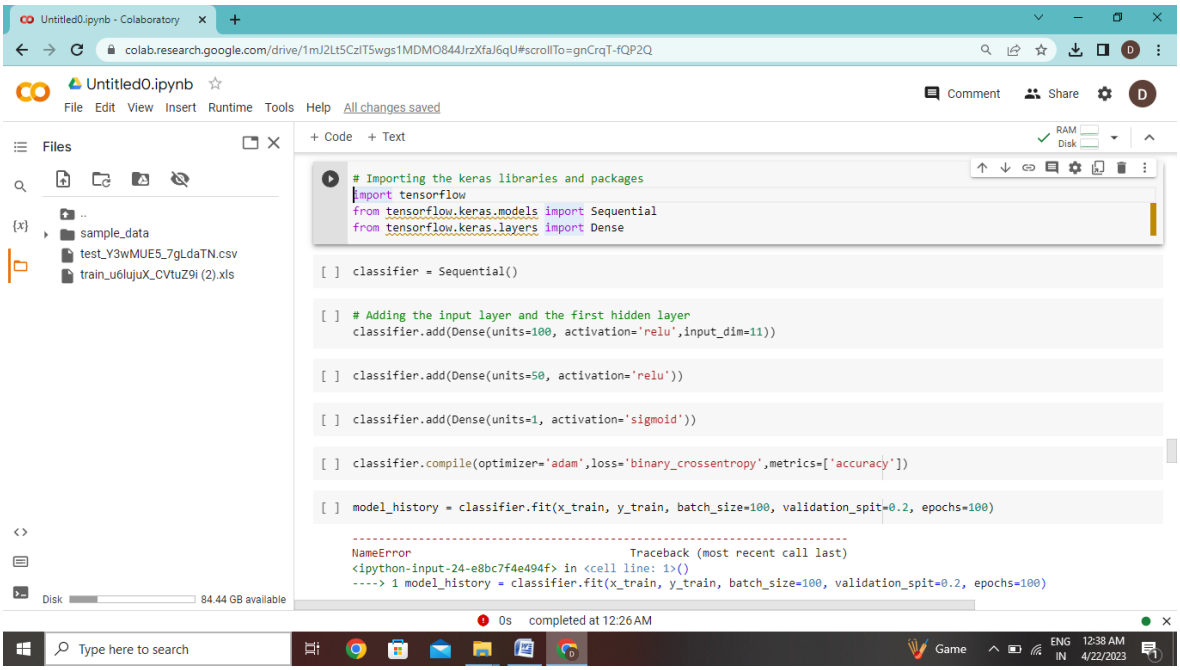
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# Importing the keras libraries and packages
import tensorflow
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense
[ ] classifier = Sequential()
[ ] # Adding the input layer and the first hidden layer
classifier.add(Dense(units=100, activation='relu',input_dim=11))
[ ] classifier.add(Dense(units=50, activation='relu'))
[ ] classifier.add(Dense(units=1, activation='sigmoid'))
[ ] classifier.compile(optimizer='adam',loss='binary_crossentropy',metrics=['accuracy'])
[ ] model_history = classifier.fit(x_train, y_train, batch_size=100, validation_spit=0.2, epochs=100)
NameError Traceback (most recent call last)
<ipython-input-24-e8bc7f4e494f> in <cell line: 1>()
----> 1 model_history = classifier.fit(x_train, y_train, batch_size=100, validation_spit=0.2, epochs=100)
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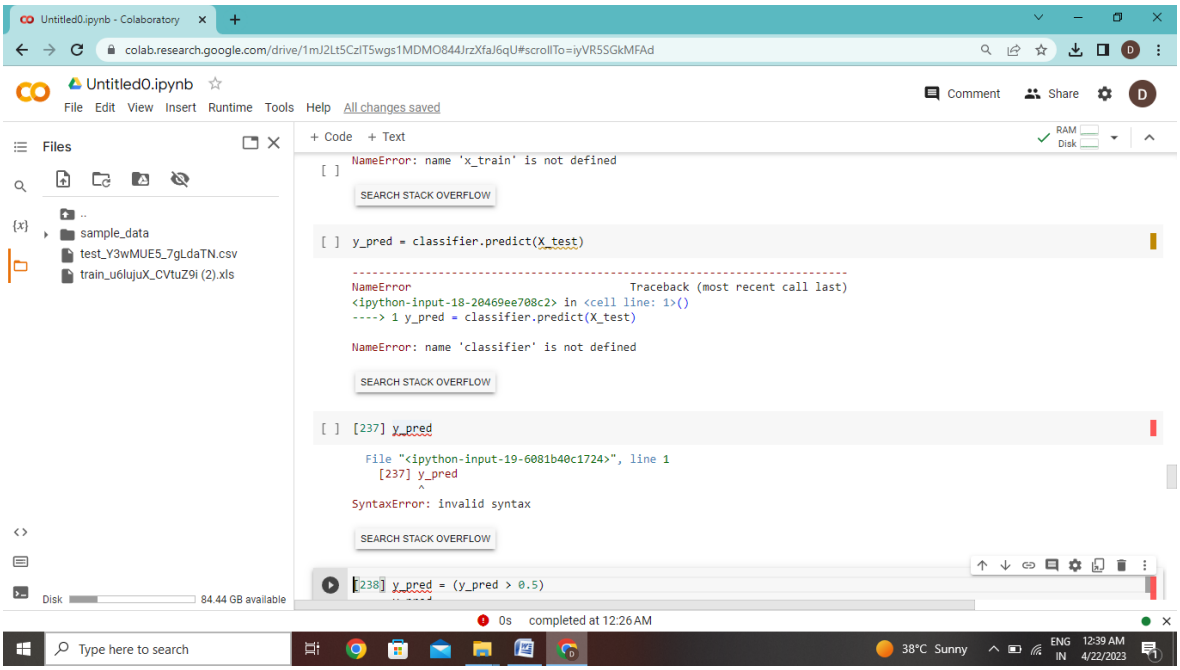
Game
ENG IN 12:38 AM 4/22/2023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colab.research.google.com/drive/1mJ2Lt5CzIT5wgs1MDMO844JrzXfaJ6qU#scrollTo=iyVR5SGkMFAd
Untitled0.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Comment
Share
Files
sample_data
test_Y3wMUE5_7gLdaTN.csv
train_u6lujuX_CVtuZ9i (2).xls
+ Code + Text
NameError: name 'x_train' is not defined
SEARCH STACK OVERFLOW
[ ] y_pred = classifier.predict(X_test)
NameError Traceback (most recent call last)
<ipython-input-18-20469ee708c2> in <cell line: 1>()
----> 1 y_pred = classifier.predict(X_test)
NameError: name 'classifier' is not defined
SEARCH STACK OVERFLOW
[ ] [237] y_pred
File "<ipython-input-19-6081b40c1724>", line 1
[237] y_pred
^
SyntaxError: invalid syntax
SEARCH STACK OVERFLOW
[238] y_pred = (y_pred > 0.5)
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ENG IN
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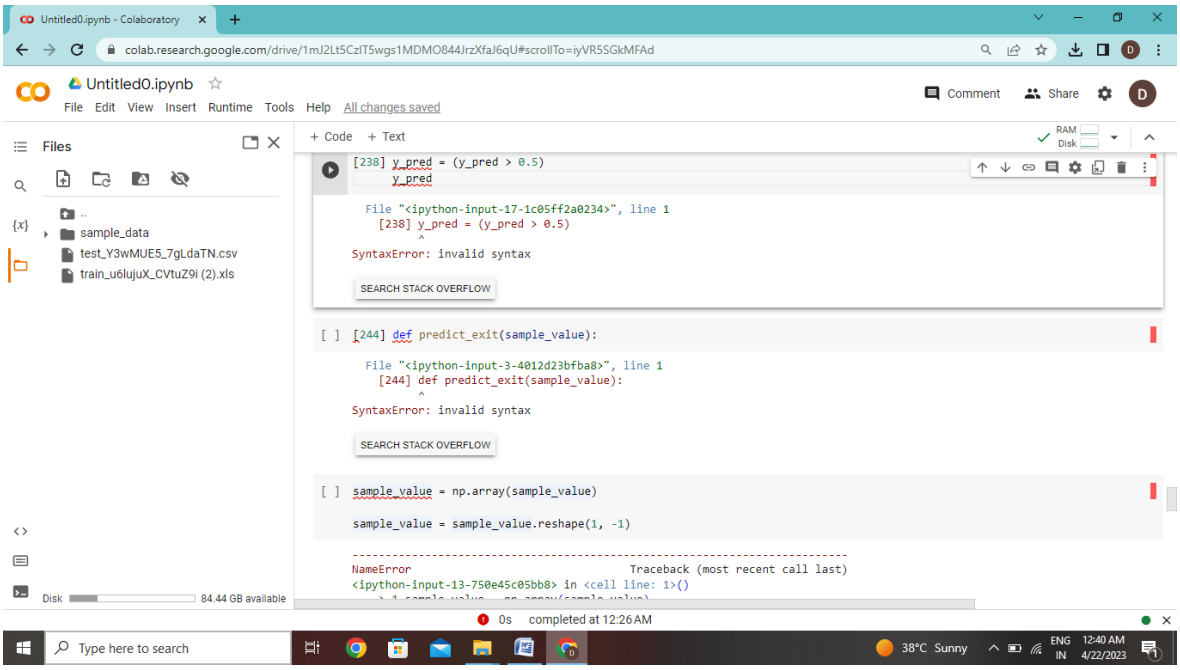
4/22/2023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colab.research.google.com/drive/1mJ2Lt5CzIT5wgs1MDMO844JrzXfaJ6qU#scrollTo=iyVR5SGkMFAd
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File Edit View Insert Runtime Tools Help All changes saved
Comment
Share
Files
sample_data
test_Y3wMUE5_7gLdaTN.csv
train_u6lujuX_CVtuZ9i (2).xls
+ Code + Text
[238] y_pred = (y_pred > 0.5)
y_pred
File "<ipython-input-17-1c05ff2a0234>", line 1
[238] y_pred = (y_pred > 0.5)
^
SyntaxError: invalid syntax
SEARCH STACK OVERFLOW
[ ] [244] def predict_exit(sample_value):
File "<ipython-input-3-4012d23bfba8>", line 1
[244] def predict_exit(sample_value):
^
SyntaxError: invalid syntax
SEARCH STACK OVERFLOW
[ ] sample_value = np.array(sample_value)
sample_value = sample_value.reshape(1, -1)
NameError Traceback (most recent call last)
<ipython-input-13-750e45c05bb8> in <cell line: 1>()
Disk 84.44 GB available
0s completed at 12:26 AM
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38°C Sunny
ENG IN
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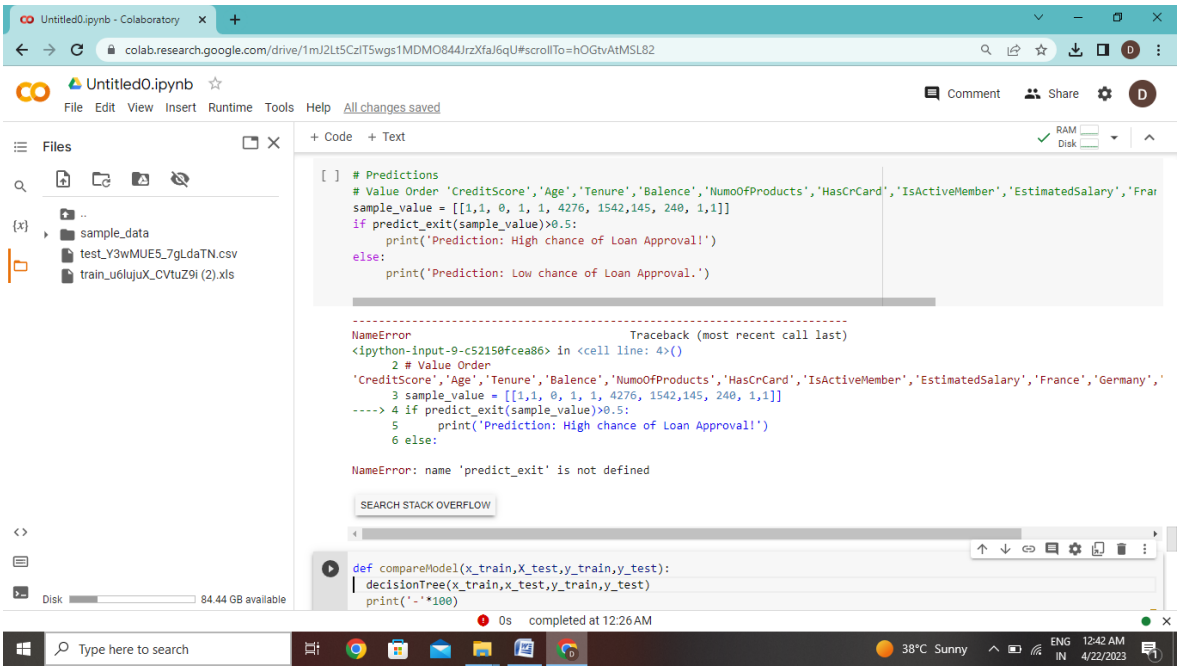
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colab.research.google.com/drive/1mJ2Lt5CzIT5wgs1MDMO844JrzXfaJ6qU#scrollTo=hOGtvAtMSL82
Untitled0.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Comment Share
Files
sample_data
test_Y3wMUE5_7gLdaTN.csv
train_u6lujuX_CVtuZ9i (2).xls
+ Code + Text
# Predictions
# Value Order 'CreditScore','Age','Tenure','Balence','NumoOfProducts','HasCrCard','IsActiveMember','EstimatedSalary','Fran
sample_value = [[1,1, 0, 1, 1, 4276, 1542,145, 240, 1,1]]
if predict_exit(sample_value)>0.5:
print('Prediction: High chance of Loan Approval!')
else:
print('Prediction: Low chance of Loan Approval.')
NameError Traceback (most recent call last)
<ipython-input-9-c52150fcea86> in <cell line: 4>()
2 # Value Order
'CreditScore','Age','Tenure','Balence','NumOfProducts','HasCrCard','IsActiveMember','EstimatedSalary','France','Germany','
3 sample_value = [[1,1, 0, 1, 1, 4276, 1542,145, 240, 1,1]]
----> 4 if predict_exit(sample_value)>0.5:
5 print('Prediction: High chance of Loan Approval!')
6 else:
NameError: name 'predict_exit' is not defined
SEARCH STACK OVERFLOW
def compareModel(x_train,X_test,y_train,y_test):
decisionTree(x_train,x_test,y_train,y_test)
print('-'*100)
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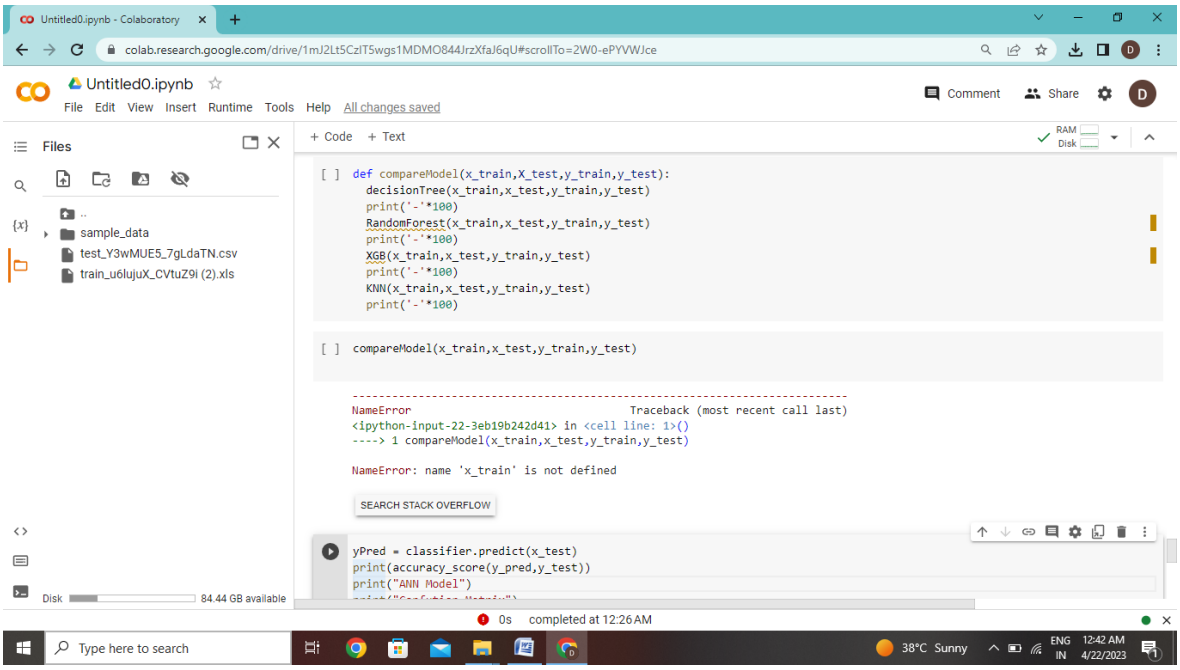
12:42 AM 4/22/2023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File Edit View Insert Runtime Tools Help All changes saved
Comment Share
Files
sample_data
test_Y3wMUE5_7gLdaTN.csv
train_u6lujuX_CVtuZ9i (2).xls
+ Code + Text
def compareModel(x_train,X_test,y_train,y_test):
decisionTree(x_train,x_test,y_train,y_test)
print('-'*100)
RandomForest(x_train,x_test,y_train,y_test)
print('-'*100)
XGB(x_train,x_test,y_train,y_test)
print('-'*100)
KNN(x_train,x_test,y_train,y_test)
print('-'*100)
compareModel(x_train,x_test,y_train,y_test)
NameError Traceback (most recent call last)
<ipython-input-22-3eb19b242d41> in <cell line: 1>()
----> 1 compareModel(x_train,x_test,y_train,y_test)
NameError: name 'x_train' is not defined
SEARCH STACK OVERFLOW
yPred = classifier.predict(x_test)
print(accuracy_score(y_pred,y_test))
print("ANN Model")
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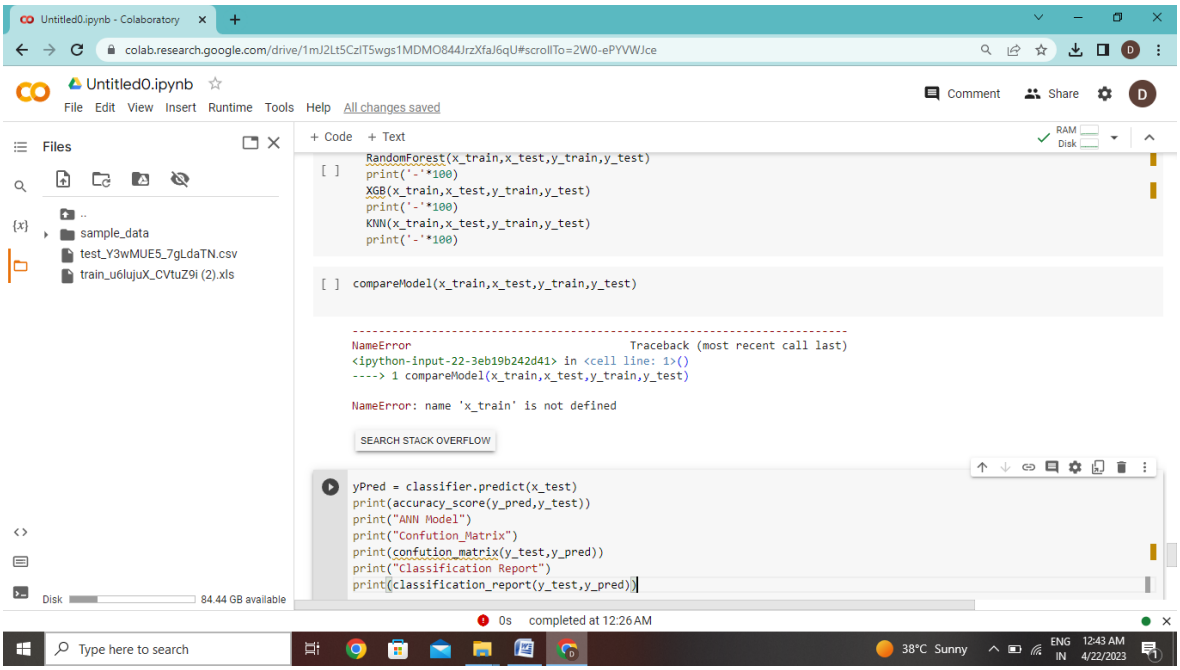


4. ADVANTAGES & DISADVANTAGES

ADVANTAGE:

Accuracy—one of the primary benefits of using machine learning for credit scoring is **its accuracy**. Unlike human manual processing, ML-based models are automated and less likely to make mistakes. This means that loan processing becomes not only faster but more accurate, too, cutting costs on the whole.

DISADVANTAGE:

- damage Interest rates can be higher than alternatives.
- More eligibility requirements.
- Fees and penalties can be high.
- Additional monthly payment.
- Increased debt load.
- Higher payments than credit cards.

5. APPLICATIONS

The objective of the data is to use Gender, Marital Status, Education, Number of Dependents, Income, Loan Amount, Credit History, and other factors and predict the approval probability of each application.

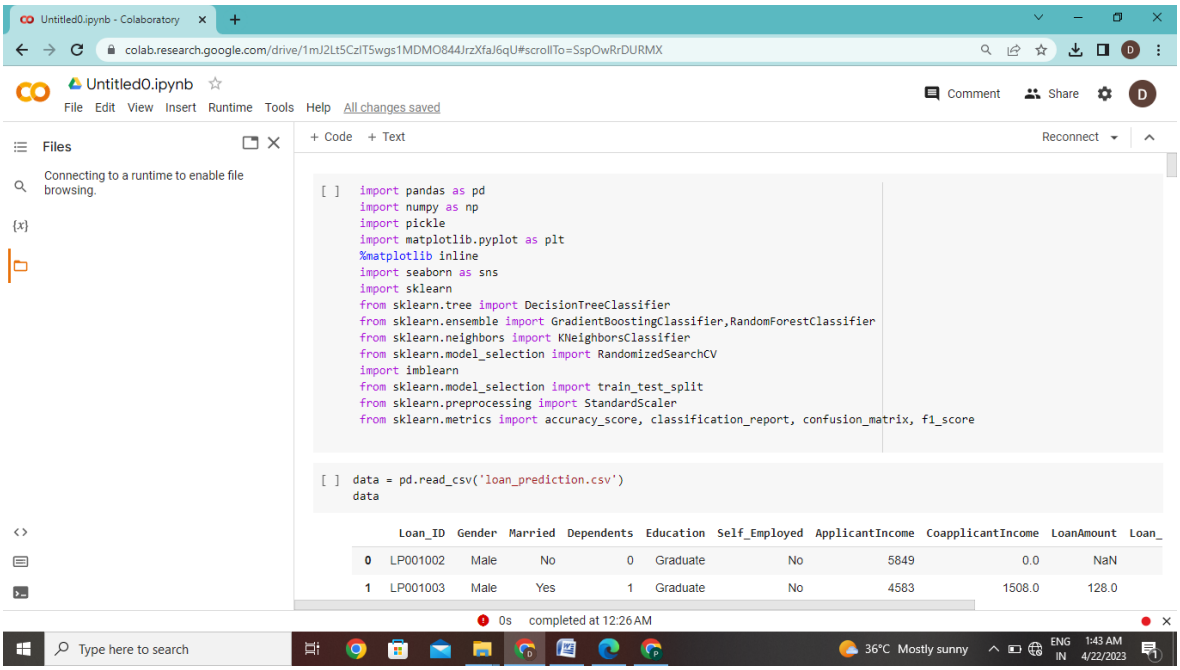
6.CONCLUSION

From a proper analysis of positive points and constraints on the member, it can be safely concluded that the product is a considerably productive member. This use is working duly and meeting to all Banker requisites. This member can be freely plugged in numerous other systems. There have been mathematics cases of computer glitches, violations in content and most important weight of features is fixed in automated prophecy system, so in the near future the so – called software could be made more secure, trustworthy and dynamic weight conformation. In near future this module of prophecy can be integrated with the module of automated processing system. The system is trained on old training dataset in future software can be made resembling that new testing date should also take part in training data after some fix time.

7.FUTURE SCOPE

In this report author has used Random Forest approach for building a model. In this report two or more classifiers are combined together and identify a perfect model for loan prediction. Ensemble method compares two or more models and identifies a perfect model from two or more models for better loan prediction which makes banking sector to make a right choice for approval of loan application.

8.APPENDIX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File Edit View Insert Runtime Tools Help All changes saved
Comment Share
Files
Connecting to a runtime to enable file browsing.
+ Code + Text
Reconnect
[ ] import pandas as pd
import numpy as np
import pickle
import matplotlib.pyplot as plt
%matplotlib inline
import seaborn as sns
import sklearn
from sklearn.tree import DecisionTreeClassifier
from sklearn.ensemble import GradientBoostingClassifier,RandomForestClassifier
from sklearn.neighbors import KNeighborsClassifier
from sklearn.model_selection import RandomizedSearchCV
import imblearn
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
from sklearn.metrics import accuracy_score, classification_report, confusion_matrix, f1_score
[ ] data = pd.read_csv('loan_prediction.csv')
data
Loan_ID Gender Married Dependents Education Self_Employed ApplicantIncome CoapplicantIncome LoanAmount Loan_
0 LP001002 Male No 0 Graduate No 5849 0.0 NaN
1 LP001003 Male Yes 1 Graduate No 4583 1508.0 128.0
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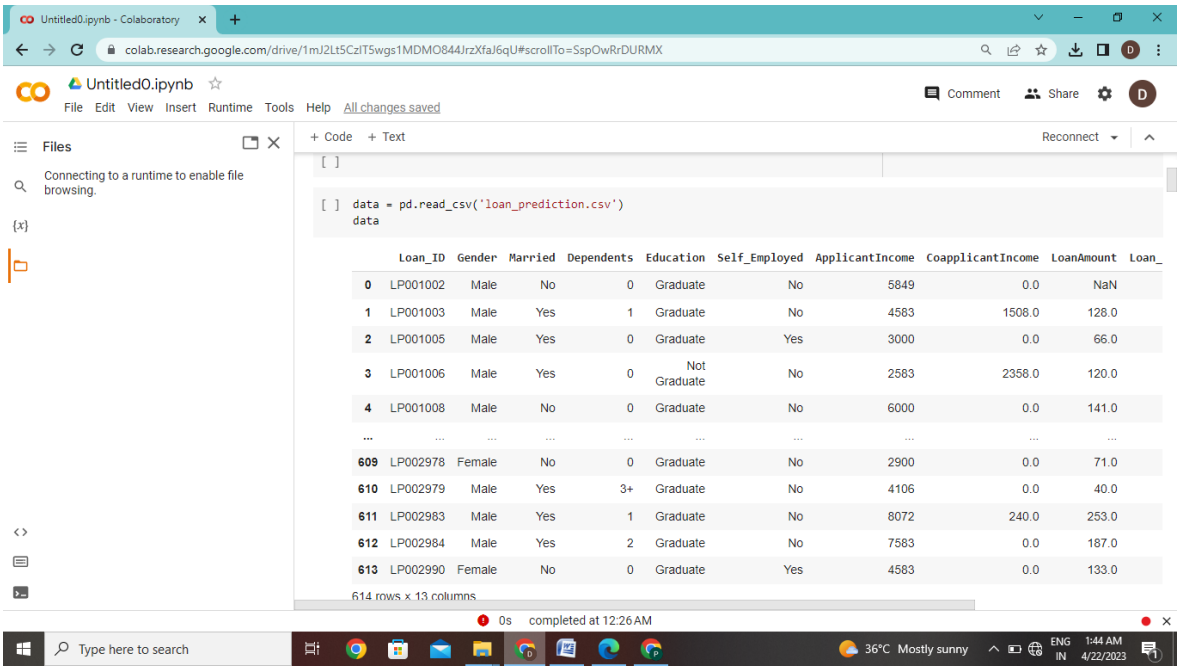
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Files
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[ ]
[ ] data = pd.read_csv('loan_prediction.csv')
data
Loan_ID Gender Married Dependents Education Self_Employed ApplicantIncome CoapplicantIncome LoanAmount Loan_
0 LP001002 Male No 0 Graduate No 5849 0.0 NaN
1 LP001003 Male Yes 1 Graduate No 4583 1508.0 128.0
2 LP001005 Male Yes 0 Graduate Yes 3000 0.0 66.0
3 LP001006 Male Yes 0 Not Graduate No 2583 2358.0 120.0
4 LP001008 Male No 0 Graduate No 6000 0.0 141.0
... ...
609 LP002978 Female No 0 Graduate No 2900 0.0 71.0
610 LP002979 Male Yes 3+ Graduate No 4106 0.0 40.0
611 LP002983 Male Yes 1 Graduate No 8072 240.0 253.0
612 LP002984 Male Yes 2 Graduate No 7583 0.0 187.0
613 LP002990 Female No 0 Graduate Yes 4583 0.0 133.0
614 rows x 13 columns
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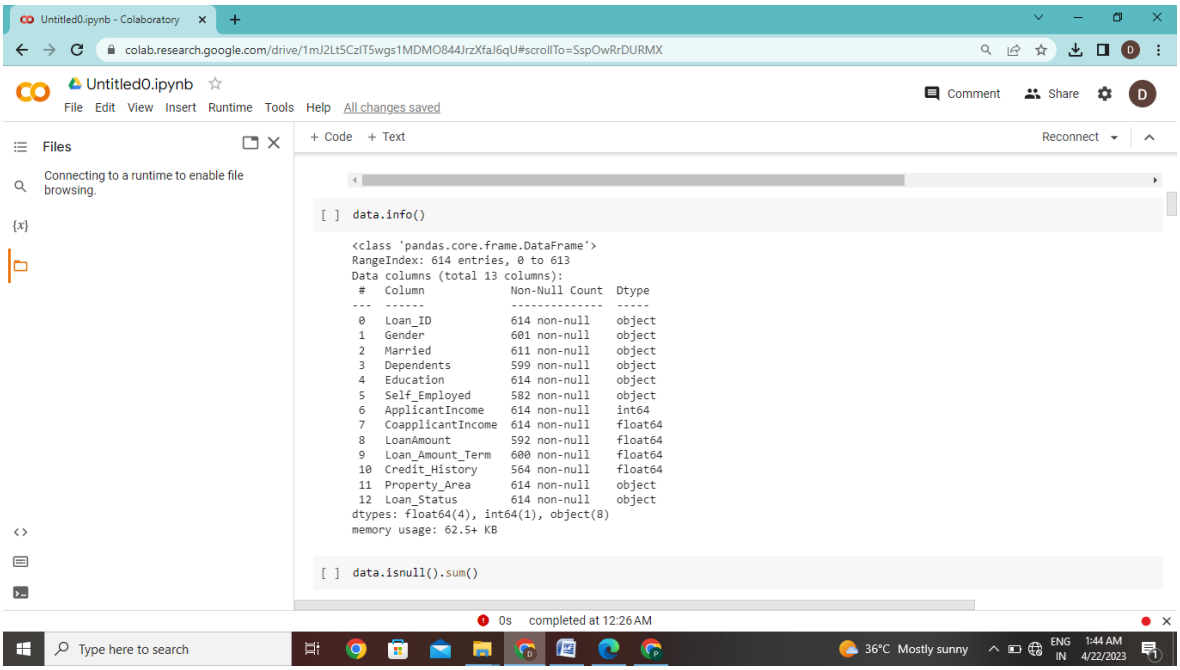
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Comment
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Files
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Reconnect
[ ] data.info()
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 614 entries, 0 to 613
Data columns (total 13 columns):
Column Non-Null Count Dtype
0 Loan_ID 614 non-null object
1 Gender 601 non-null object
2 Married 611 non-null object
3 Dependents 599 non-null object
4 Education 614 non-null object
5 Self_Employed 582 non-null object
6 ApplicantIncome 614 non-null int64
7 CoapplicantIncome 614 non-null float64
8 LoanAmount 592 non-null float64
9 Loan_Amount_Term 600 non-null float64
10 Credit_History 564 non-null float64
11 Property_Area 614 non-null object
12 Loan_Status 614 non-null object
dtypes: float64(4), int64(1), object(8)
memory usage: 62.5+ KB
[ ] data.isnull().sum()
0s completed at 12:26 AM
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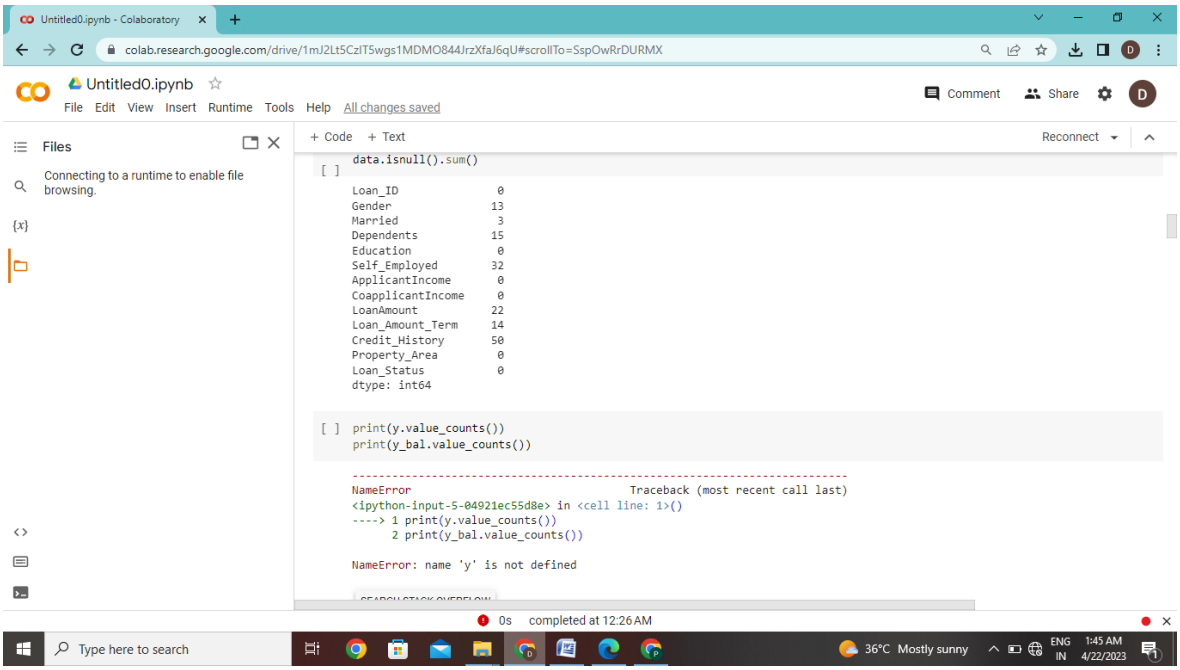
ENG IN
1:44 AM 4/22/2023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colab.research.google.com/drive/1mJ2Lt5CzIT5wgs1MDMO844JrzXfaJ6qU#scrollTo=SspOwRrDURMX
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File Edit View Insert Runtime Tools Help All changes saved
Comment
Share
Files
Connecting to a runtime to enable file browsing.
+ Code + Text
Reconnect
[ ] data.isnull().sum()
Loan_ID 0
Gender 13
Married 3
Dependents 15
Education 0
Self_Employed 32
ApplicantIncome 0
CoapplicantIncome 0
LoanAmount 22
Loan_Amount_Term 14
Credit_History 50
Property_Area 0
Loan_Status 0
dtype: int64
[ ] print(y.value_counts())
print(y_bal.value_counts())
NameError Traceback (most recent call last)
<ipython-input-5-04921ec55d8e> in <cell line: 1>()
----> 1 print(y.value_counts())
2 print(y_bal.value_counts())
NameError: name 'y' is not defined
0s completed at 12:26 AM
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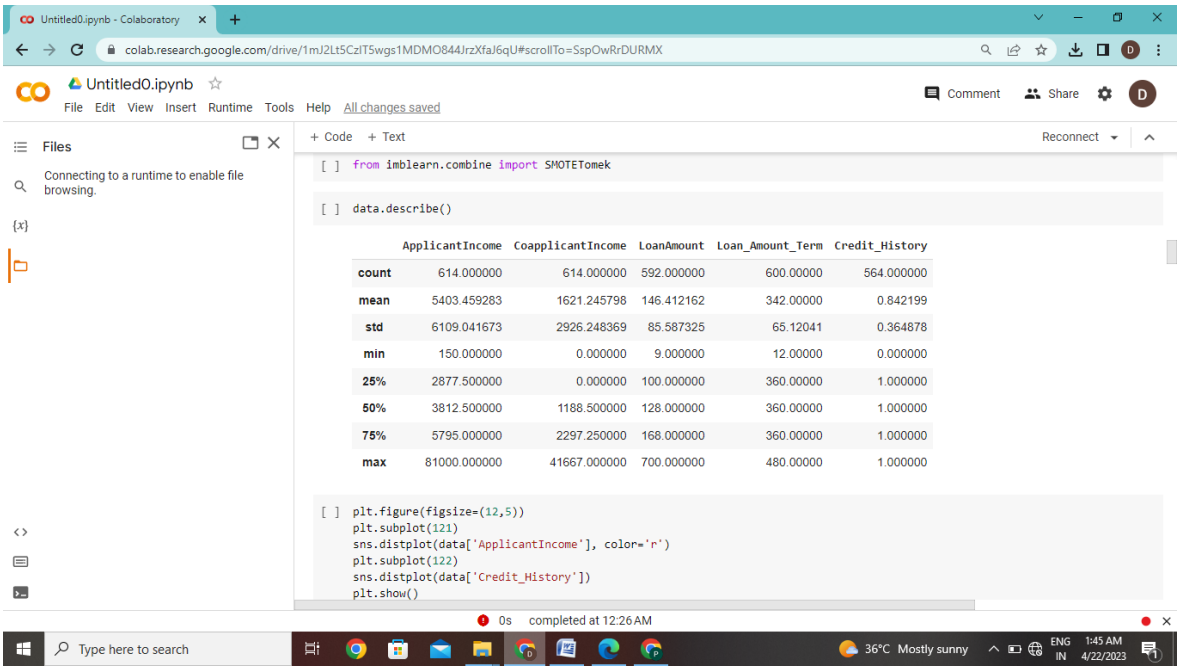
36°C Mostly sunny
ENG IN
1:45 AM 4/22/2023



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Files

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```
[ ] from imblearn.combine import SMOTETomek
```

```
[ ] data.describe()
```

	ApplicantIncome	CoapplicantIncome	LoanAmount	Loan_Amount_Term	Credit_History
count	614.000000	614.000000	592.000000	600.00000	564.000000
mean	5403.459283	1621.245798	146.412162	342.00000	0.842199
std	6109.041673	2926.248369	85.587325	65.12041	0.364878
min	150.000000	0.000000	9.000000	12.00000	0.000000
25%	2877.500000	0.000000	100.000000	360.00000	1.000000
50%	3812.500000	1188.500000	128.000000	360.00000	1.000000
75%	5795.000000	2297.250000	168.000000	360.00000	1.000000
max	81000.000000	41667.000000	700.000000	480.00000	1.000000

```
[ ] plt.figure(figsize=(12,5))
    plt.subplot(121)
    sns.distplot(data['ApplicantIncome'], color='r')
    plt.subplot(122)
    sns.distplot(data['Credit_History'])
    plt.show()
```

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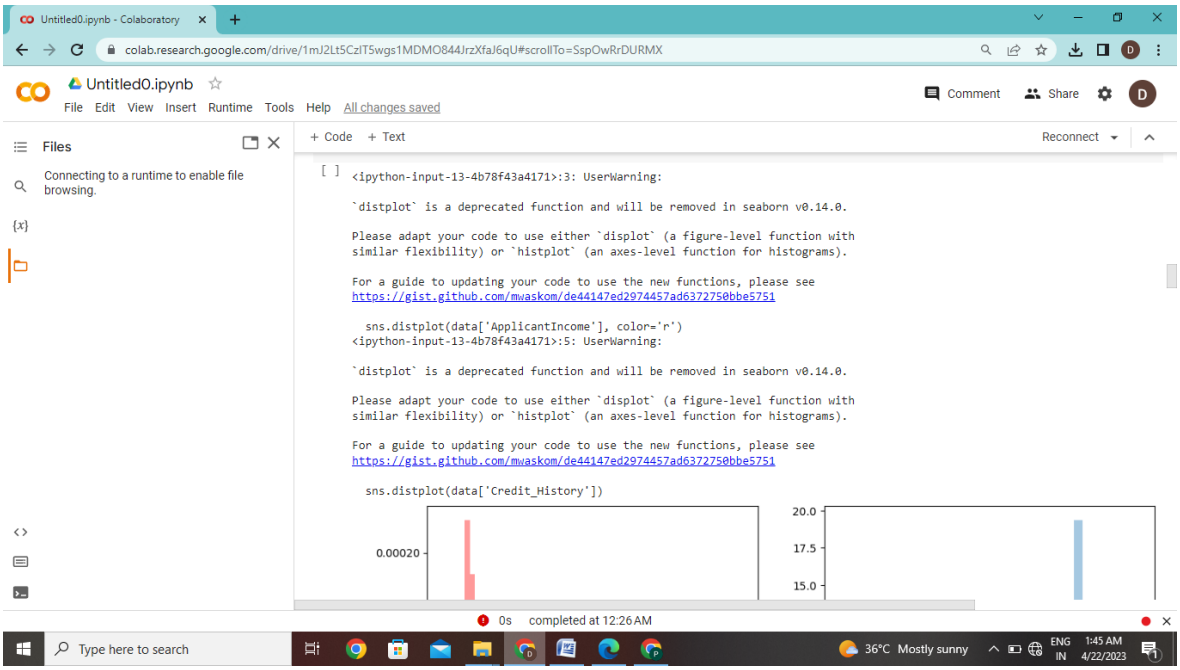

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Files

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```
[ ] <ipython-input-13-4b78f43a4171>:3: UserWarning:

`distplot` is a deprecated function and will be removed in seaborn v0.14.0.

Please adapt your code to use either `displot` (a figure-level function with
similar flexibility) or `histplot` (an axes-level function for histograms).

For a guide to updating your code to use the new functions, please see
https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751

  sns.distplot(data['ApplicantIncome'], color='r')
<ipython-input-13-4b78f43a4171>:5: UserWarning:

`distplot` is a deprecated function and will be removed in seaborn v0.14.0.

Please adapt your code to use either `displot` (a figure-level function with
similar flexibility) or `histplot` (an axes-level function for histograms).

For a guide to updating your code to use the new functions, please see
https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751

  sns.distplot(data['Credit_History'])
```


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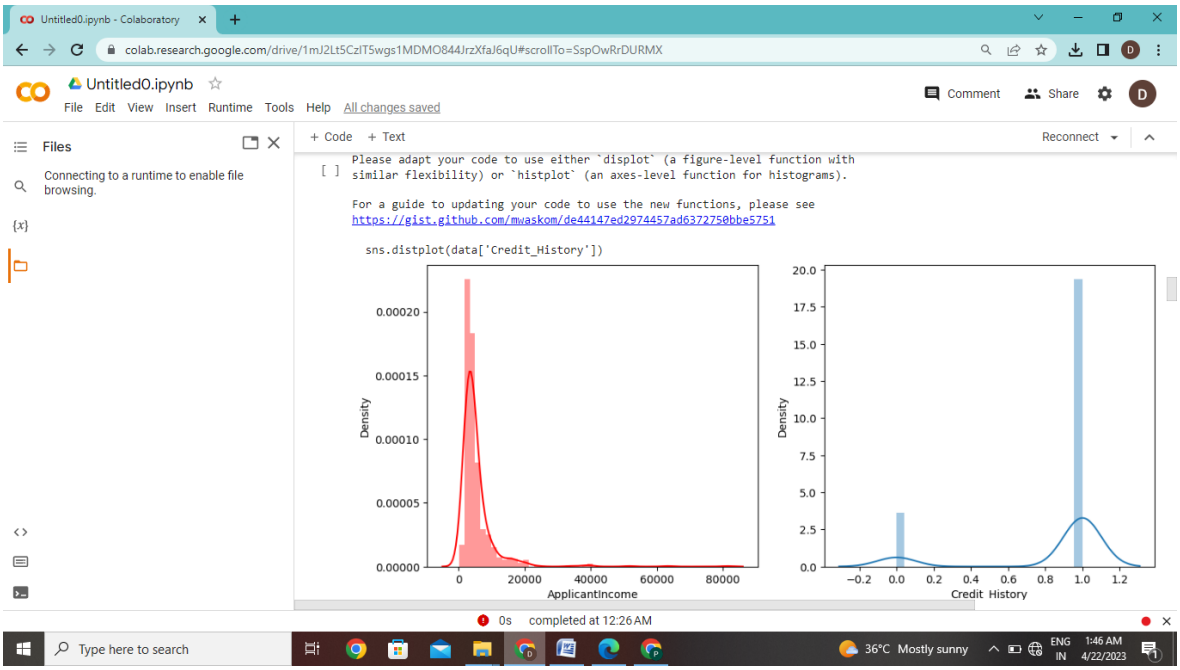
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File Edit View Insert Runtime Tools Help All changes saved
Comment Share
Files
Connecting to a runtime to enable file browsing.
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Reconnect
Please adapt your code to use either `displot` (a figure-level function with similar flexibility) or `histplot` (an axes-level function for histograms).
For a guide to updating your code to use the new functions, please see
https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751
sns.distplot(data['Credit_History'])
Density
ApplicantIncome
Credit_History
0s completed at 12:26 AM
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36°C Mostly sunny
ENG IN
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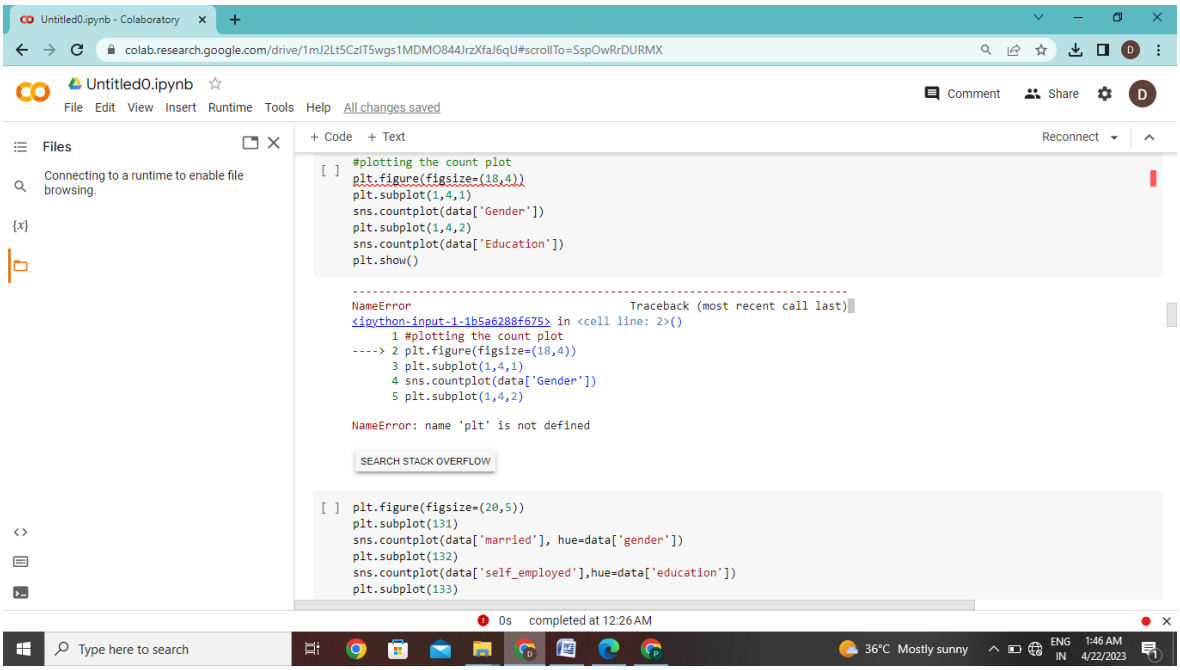
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File Edit View Insert Runtime Tools Help All changes saved
Comment Share
Files
Connecting to a runtime to enable file browsing.
+ Code + Text
Reconnect
#plotting the count plot
plt.figure(figsize=(18,4))
plt.subplot(1,4,1)
sns.countplot(data['Gender'])
plt.subplot(1,4,2)
sns.countplot(data['Education'])
plt.show()
NameError Traceback (most recent call last)
<ipython-input-1-1b5a6288f675> in <cell line: 2>()
1 #plotting the count plot
----> 2 plt.figure(figsize=(18,4))
3 plt.subplot(1,4,1)
4 sns.countplot(data['Gender'])
5 plt.subplot(1,4,2)
NameError: name 'plt' is not defined
SEARCH STACK OVERFLOW
plt.figure(figsize=(20,5))
plt.subplot(131)
sns.countplot(data['married'], hue=data['gender'])
plt.subplot(132)
sns.countplot(data['self_employed'],hue=data['education'])
plt.subplot(133)
0s completed at 12:26 AM
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36°C Mostly sunny
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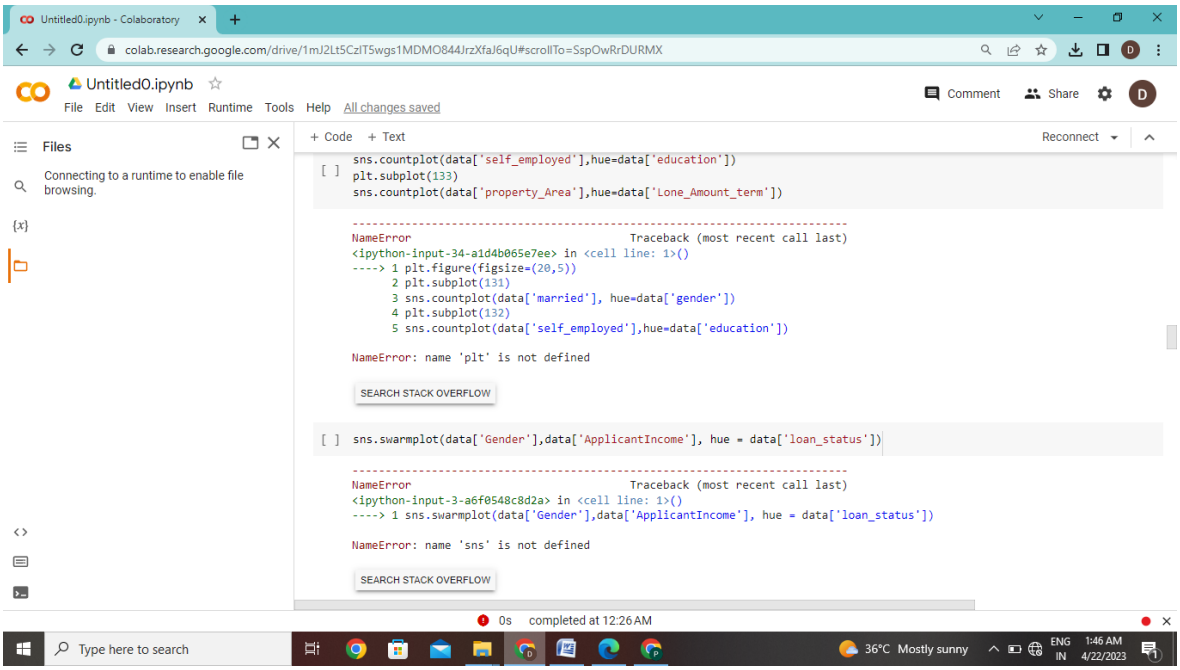
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sns.countplot(data['self_employed'],hue=data['education'])
plt.subplot(133)
sns.countplot(data['property_Area'],hue=data['Lone_Amount_term'])
NameError Traceback (most recent call last)
<ipython-input-34-a1d4b065e7ee> in <cell line: 1>()
----> 1 plt.figure(figsize=(20,5))
2 plt.subplot(131)
3 sns.countplot(data['married'], hue=data['gender'])
4 plt.subplot(132)
5 sns.countplot(data['self_employed'],hue=data['education'])
NameError: name 'plt' is not defined
SEARCH STACK OVERFLOW
sns.swarmplot(data['Gender'],data['ApplicantIncome'], hue = data['loan_status'])
NameError Traceback (most recent call last)
<ipython-input-3-a6f0548c8d2a> in <cell line: 1>()
----> 1 sns.swarmplot(data['Gender'],data['ApplicantIncome'], hue = data['loan_status'])
NameError: name 'sns' is not defined
SEARCH STACK OVERFLOW
0s completed at 12:26 AM
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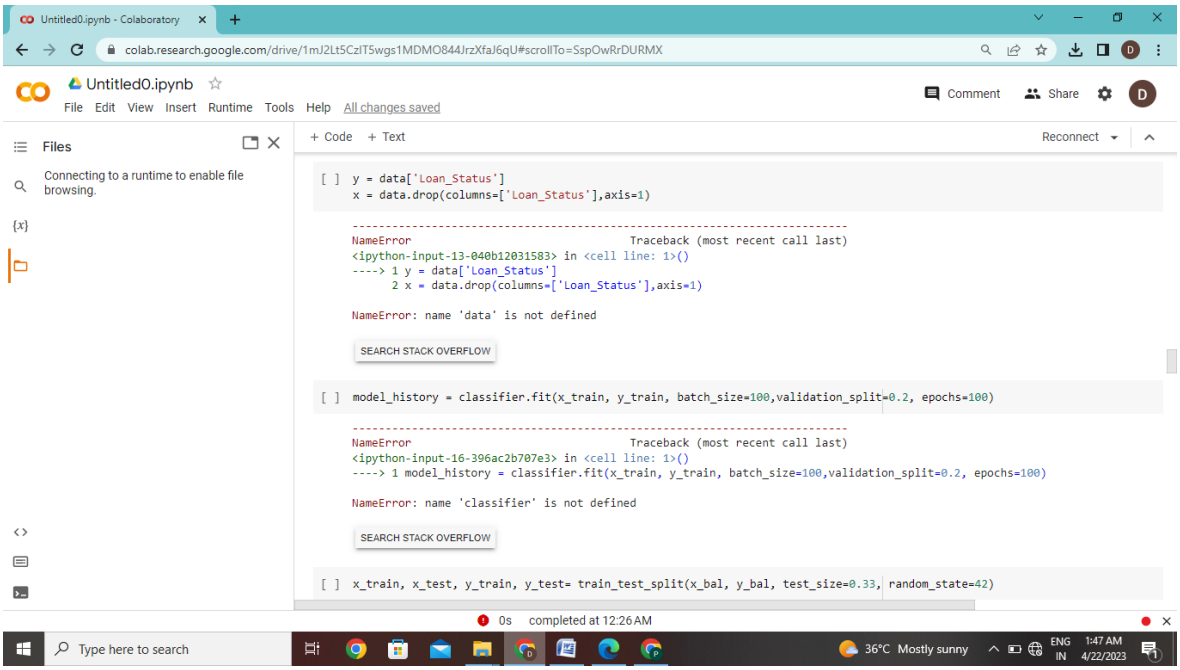
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y = data['Loan_Status']
x = data.drop(columns=['Loan_Status'],axis=1)
NameError Traceback (most recent call last)
<ipython-input-13-040b12031583> in <cell line: 1>()
----> 1 y = data['Loan_Status']
2 x = data.drop(columns=['Loan_Status'],axis=1)
NameError: name 'data' is not defined
SEARCH STACK OVERFLOW
model_history = classifier.fit(x_train, y_train, batch_size=100,validation_split=0.2, epochs=100)
NameError Traceback (most recent call last)
<ipython-input-16-396ac2b707e3> in <cell line: 1>()
----> 1 model_history = classifier.fit(x_train, y_train, batch_size=100,validation_split=0.2, epochs=100)
NameError: name 'classifier' is not defined
SEARCH STACK OVERFLOW
x_train, x_test, y_train, y_test= train_test_split(x_bal, y_bal, test_size=0.33, random_state=42)
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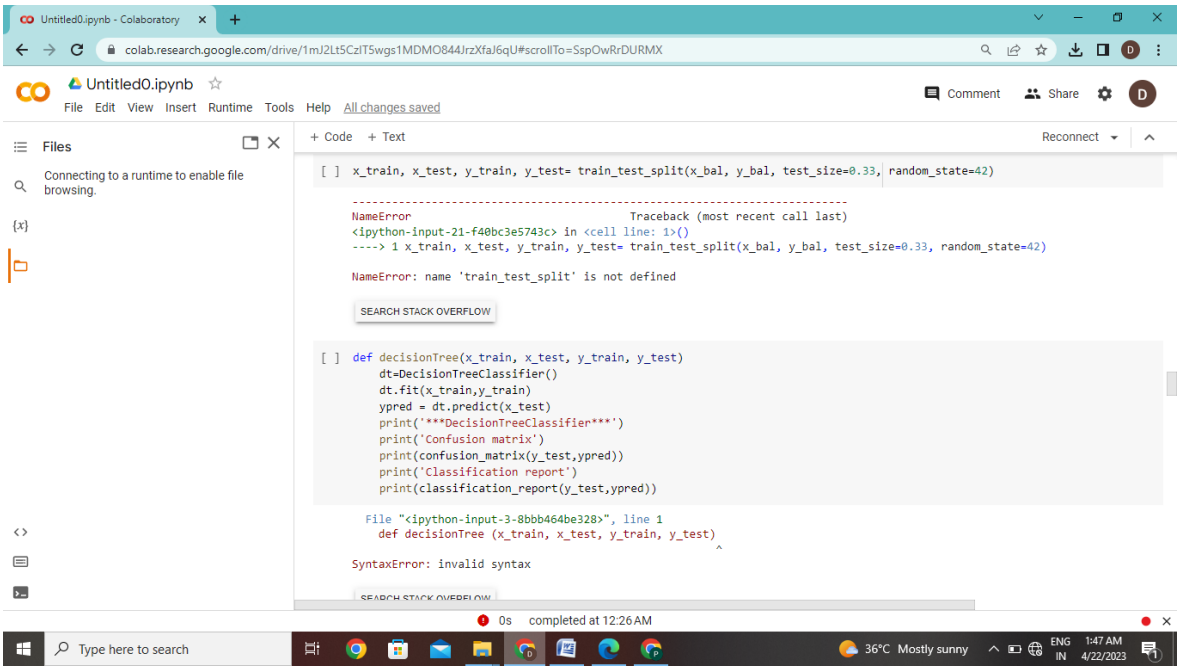
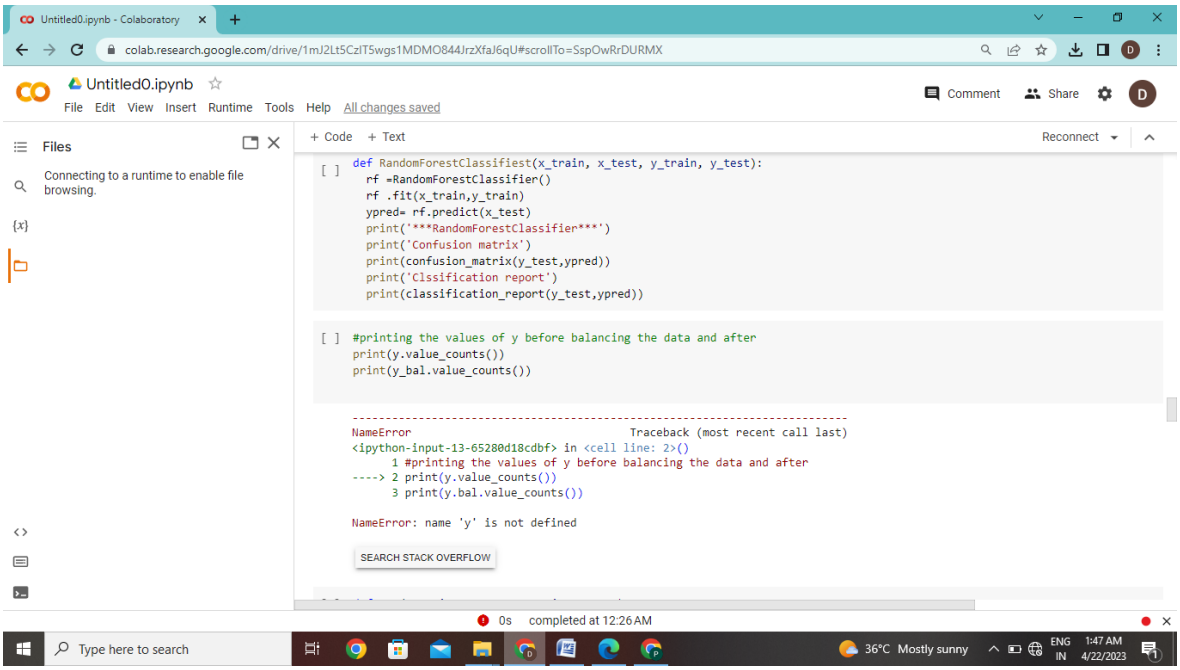
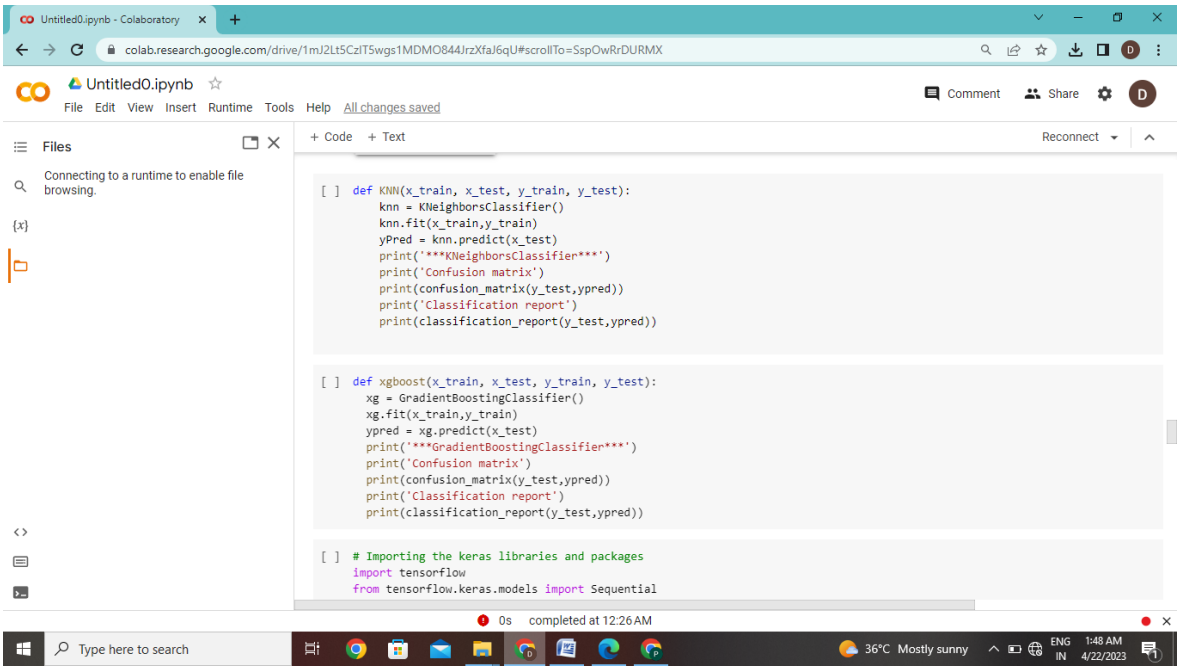
Project Report Template



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[ ] def KNN(x_train, x_test, y_train, y_test):
knn = KNeighborsClassifier()
knn.fit(x_train,y_train)
yPred = knn.predict(x_test)
print('***KNeighborsClassifier***')
print('Confusion matrix')
print(confusion_matrix(y_test,ypred))
print('Classification report')
print(classification_report(y_test,ypred))
[ ] def xgboost(x_train, x_test, y_train, y_test):
xg = GradientBoostingClassifier()
xg.fit(x_train,y_train)
ypred = xg.predict(x_test)
print('***GradientBoostingClassifier***')
print('Confusion matrix')
print(confusion_matrix(y_test,ypred))
print('Classification report')
print(classification_report(y_test,ypred))
[ ] # Importing the keras libraries and packages
import tensorflow
from tensorflow.keras.models import Sequential
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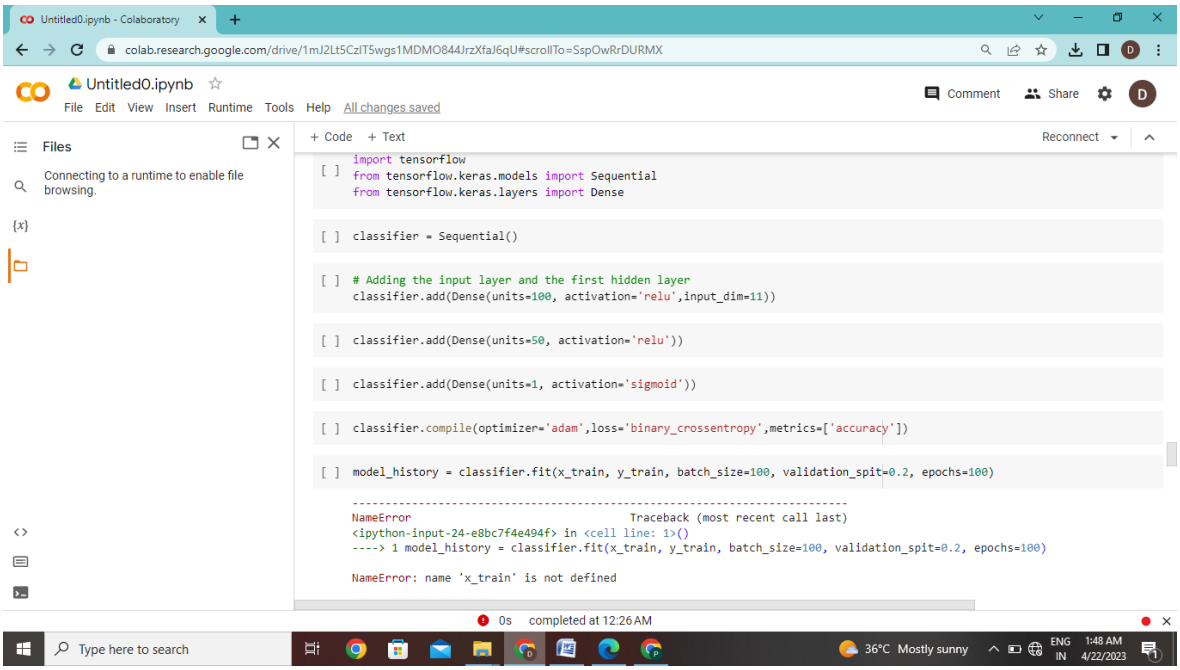
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[ ] import tensorflow
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense
[ ] classifier = Sequential()
[ ] # Adding the input layer and the first hidden layer
classifier.add(Dense(units=100, activation='relu',input_dim=11))
[ ] classifier.add(Dense(units=50, activation='relu'))
[ ] classifier.add(Dense(units=1, activation='sigmoid'))
[ ] classifier.compile(optimizer='adam',loss='binary_crossentropy',metrics=['accuracy'])
[ ] model_history = classifier.fit(x_train, y_train, batch_size=100, validation_spit=0.2, epochs=100)
NameError Traceback (most recent call last)
<ipython-input-24-e8bc7f4e494f> in <cell line: 1>()
----> 1 model_history = classifier.fit(x_train, y_train, batch_size=100, validation_spit=0.2, epochs=100)
NameError: name 'x_train' is not defined
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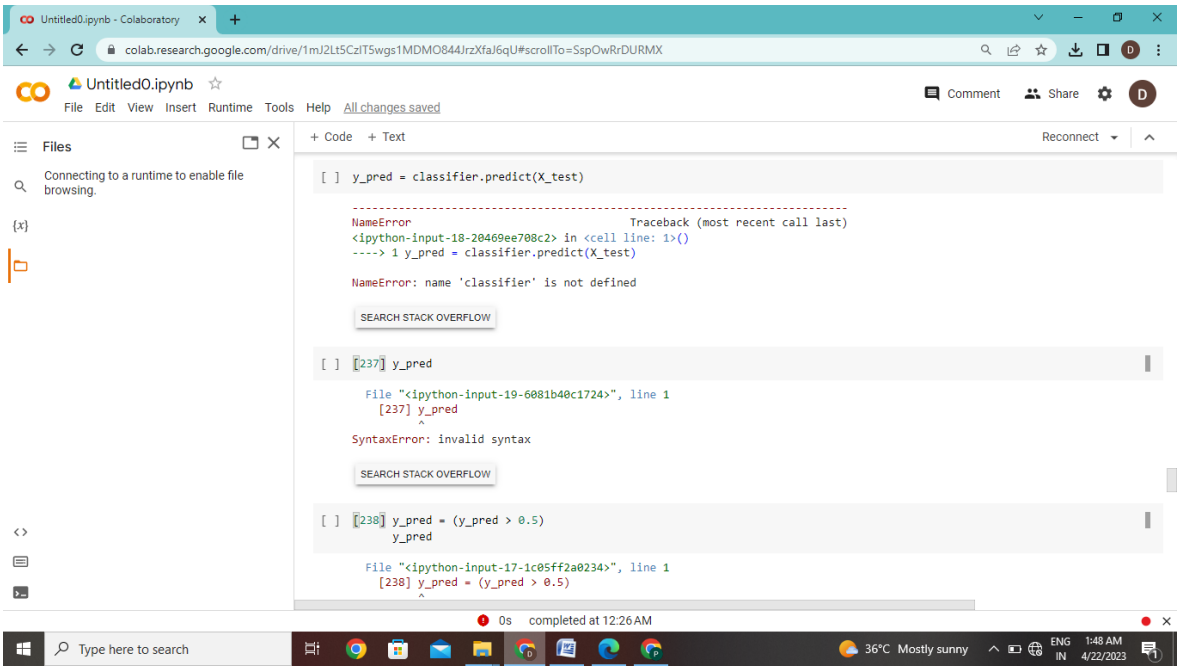
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[ ] y_pred = classifier.predict(X_test)
NameError Traceback (most recent call last)
<ipython-input-18-20469ee708c2> in <cell line: 1>()
----> 1 y_pred = classifier.predict(X_test)
NameError: name 'classifier' is not defined
SEARCH STACK OVERFLOW
[ ] [237] y_pred
File "<ipython-input-19-6081b40c1724>", line 1
[237] y_pred
^
SyntaxError: invalid syntax
SEARCH STACK OVERFLOW
[ ] [238] y_pred = (y_pred > 0.5)
y_pred
File "<ipython-input-17-1c05ff2a0234>", line 1
[238] y_pred = (y_pred > 0.5)
^
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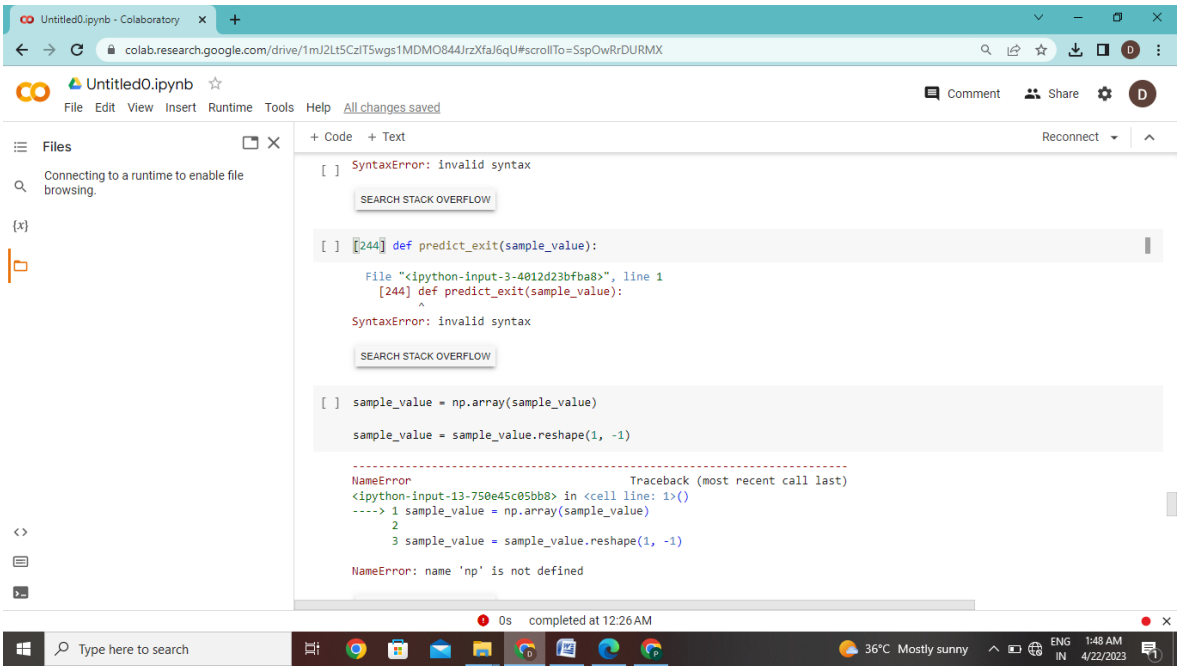
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[ ] SyntaxError: invalid syntax
SEARCH STACK OVERFLOW
[ ] [244] def predict_exit(sample_value):
File "<ipython-input-3-4012d23bfba8>", line 1
[244] def predict_exit(sample_value):
^
SyntaxError: invalid syntax
SEARCH STACK OVERFLOW
[ ] sample_value = np.array(sample_value)
sample_value = sample_value.reshape(1, -1)
NameError Traceback (most recent call last)
<ipython-input-13-750e45c05bb8> in <cell line: 1>()
----> 1 sample_value = np.array(sample_value)
2
3 sample_value = sample_value.reshape(1, -1)
NameError: name 'np' is not defined
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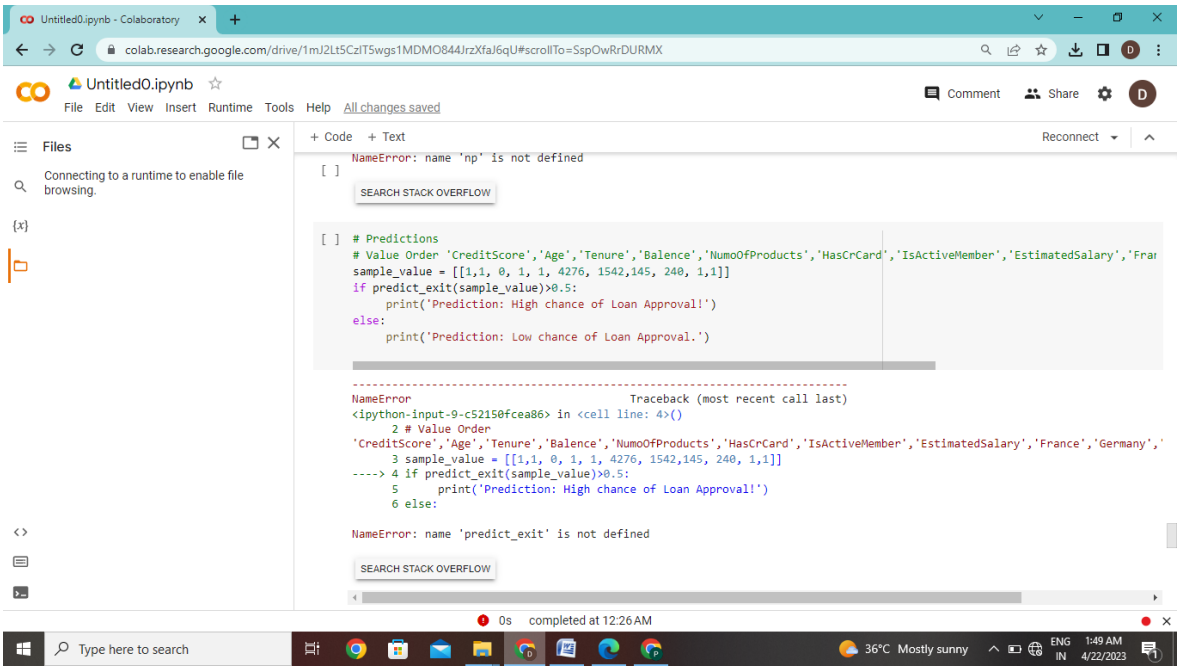
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NameError: name 'np' is not defined
SEARCH STACK OVERFLOW
# Predictions
# Value Order 'CreditScore','Age','Tenure','Balance','NumOfProducts','HasCrCard','IsActiveMember','EstimatedSalary','Frar
sample_value = [[1,1, 0, 1, 1, 4276, 1542,145, 240, 1,1]]
if predict_exit(sample_value)>0.5:
print('Prediction: High chance of Loan Approval!')
else:
print('Prediction: Low chance of Loan Approval.')
NameError Traceback (most recent call last)
<ipython-input-9-c52150fcea86> in <cell line: 4>()
2 # Value Order
'CreditScore','Age','Tenure','Balance','NumOfProducts','HasCrCard','IsActiveMember','EstimatedSalary','France','Germany','
3 sample_value = [[1,1, 0, 1, 1, 4276, 1542,145, 240, 1,1]]
----> 4 if predict_exit(sample_value)>0.5:
5 print('Prediction: High chance of Loan Approval!')
6 else:
NameError: name 'predict_exit' is not defined
SEARCH STACK OVERFLOW
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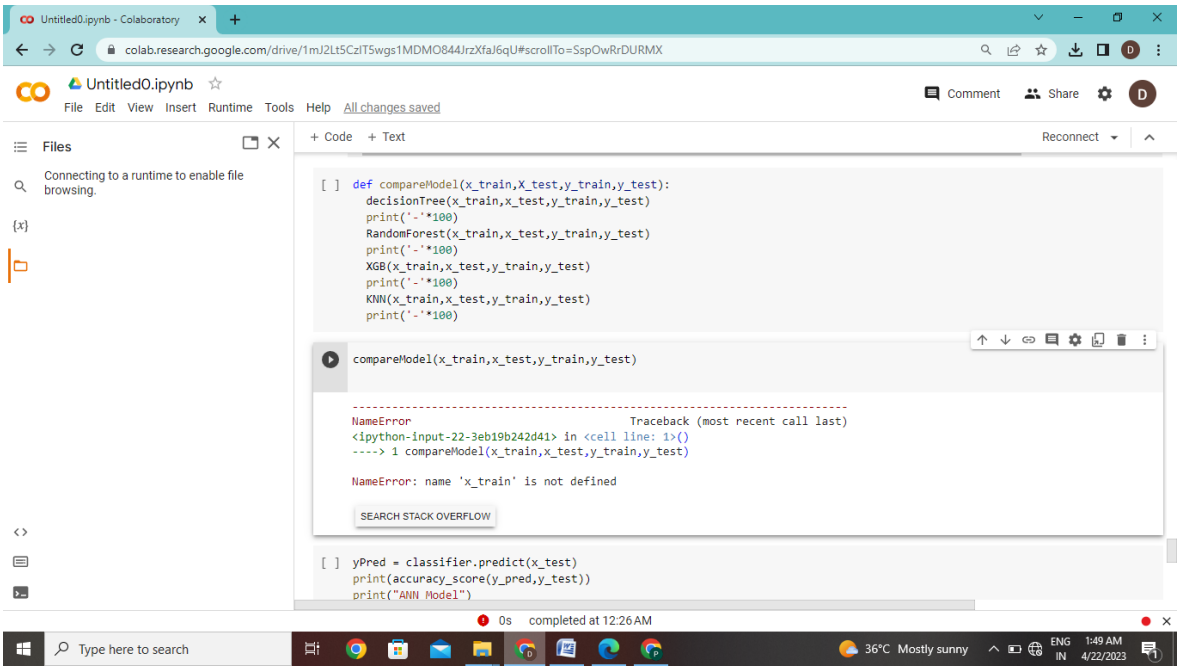
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def compareModel(x_train,X_test,y_train,y_test):
decisionTree(x_train,x_test,y_train,y_test)
print('-'*100)
RandomForest(x_train,x_test,y_train,y_test)
print('-'*100)
XGB(x_train,x_test,y_train,y_test)
print('-'*100)
KNN(x_train,x_test,y_train,y_test)
print('-'*100)
compareModel(x_train,x_test,y_train,y_test)
NameError Traceback (most recent call last)
<ipython-input-22-3eb19b242d41> in <cell line: 1>()
----> 1 compareModel(x_train,x_test,y_train,y_test)
NameError: name 'x_train' is not defined
SEARCH STACK OVERFLOW
yPred = classifier.predict(x_test)
print(accuracy_score(y_pred,y_test))
print("ANN Model")
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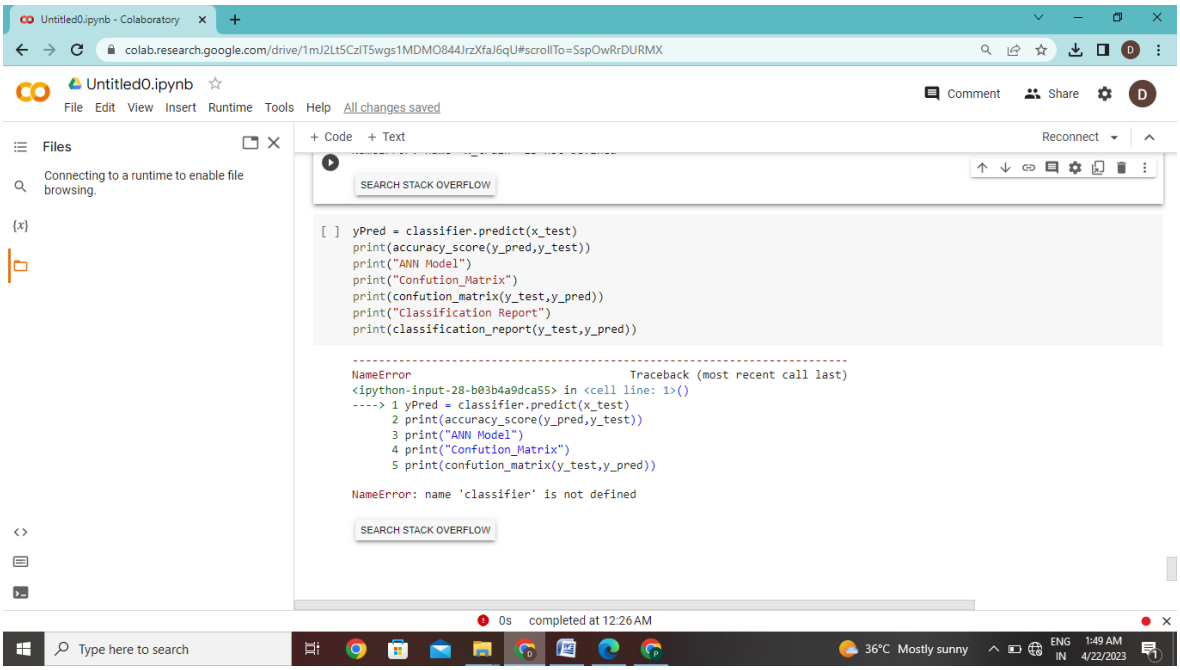
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SEARCH STACK OVERFLOW
[ ] yPred = classifier.predict(x_test)
print(accuracy_score(y_pred,y_test))
print("ANN Model")
print("Confution_Matrix")
print(confution_matrix(y_test,y_pred))
print("Classification Report")
print(classification_report(y_test,y_pred))
NameError Traceback (most recent call last)
<ipython-input-28-b03b4a9dca55> in <cell line: 1>()
----> 1 yPred = classifier.predict(x_test)
2 print(accuracy_score(y_pred,y_test))
3 print("ANN Model")
4 print("Confution_Matrix")
5 print(confution_matrix(y_test,y_pred))
NameError: name 'classifier' is not defined
SEARCH STACK OVERFLOW
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