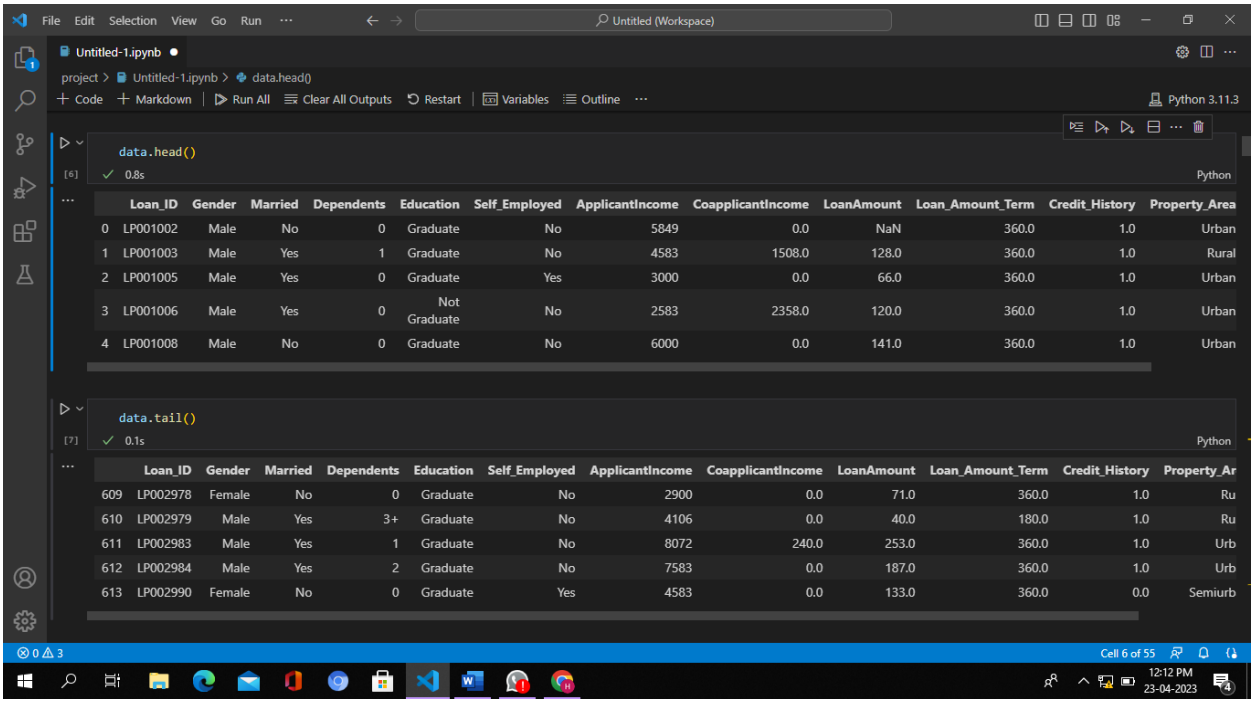
OUTPUT SCREEN



Untitled-1.ipynb

project > Untitled-1.ipynb > data.head()

+ Code + Markdown | Run All | Clear All Outputs | Restart | Variables | Outline | Python 3.11.3

```
data.head()
```

[6] ✓ 0.8s Python

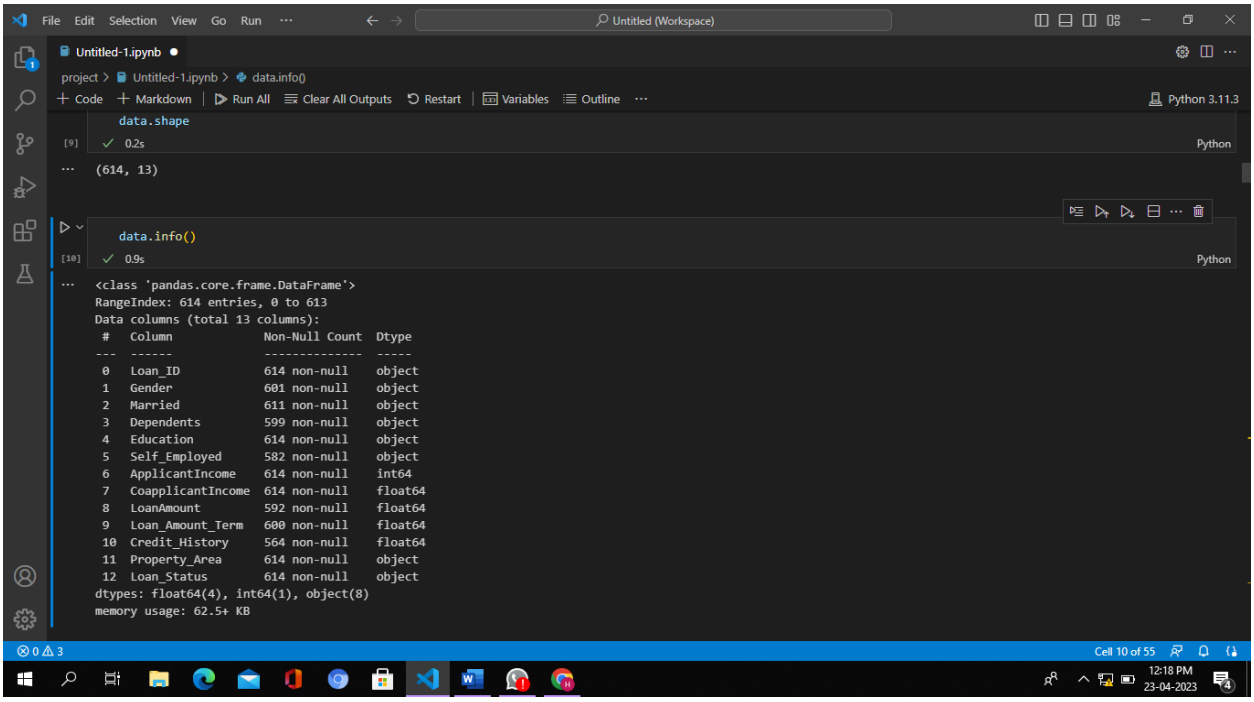
	Loan_ID	Gender	Married	Dependents	Education	Self_Employed	ApplicantIncome	CoapplicantIncome	LoanAmount	Loan_Amount_Term	Credit_History	Property_Area
0	LP001002	Male	No	0	Graduate	No	5849	0.0	NaN	360.0	1.0	Urban
1	LP001003	Male	Yes	1	Graduate	No	4583	1508.0	128.0	360.0	1.0	Rural
2	LP001005	Male	Yes	0	Graduate	Yes	3000	0.0	66.0	360.0	1.0	Urban
3	LP001006	Male	Yes	0	Not Graduate	No	2583	2358.0	120.0	360.0	1.0	Urban
4	LP001008	Male	No	0	Graduate	No	6000	0.0	141.0	360.0	1.0	Urban

```
data.tail()
```

[7] ✓ 0.1s Python

	Loan_ID	Gender	Married	Dependents	Education	Self_Employed	ApplicantIncome	CoapplicantIncome	LoanAmount	Loan_Amount_Term	Credit_History	Property_Ar
609	LP002978	Female	No	0	Graduate	No	2900	0.0	71.0	360.0	1.0	Ru
610	LP002979	Male	Yes	3+	Graduate	No	4106	0.0	40.0	180.0	1.0	Ru
611	LP002983	Male	Yes	1	Graduate	No	8072	240.0	253.0	360.0	1.0	Urb
612	LP002984	Male	Yes	2	Graduate	No	7583	0.0	187.0	360.0	1.0	Urb
613	LP002990	Female	No	0	Graduate	Yes	4583	0.0	133.0	360.0	0.0	Semiurb

Cell 6 of 55 | 12:12 PM 23-04-2023



Untitled-1.ipynb

project > Untitled-1.ipynb > data.info()

+ Code + Markdown | Run All | Clear All Outputs | Restart | Variables | Outline | Python 3.11.3

```
data.shape
```

[9] ✓ 0.2s Python

```
(614, 13)
```

```
data.info()
```

[10] ✓ 0.9s Python

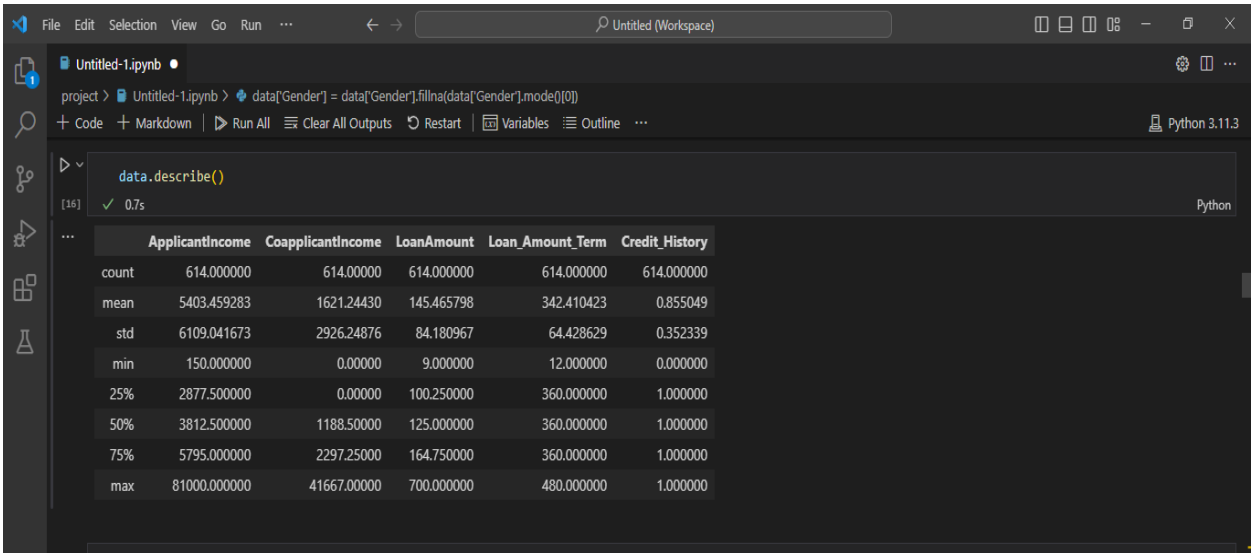
```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 614 entries, 0 to 613
Data columns (total 13 columns):
 #   Column             Non-Null Count  Dtype
---  ------             --------------  -----
 0   Loan_ID            614 non-null    object
 1   Gender             601 non-null    object
 2   Married            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
```

Cell 10 of 55 | 12:18 PM 23-04-2023

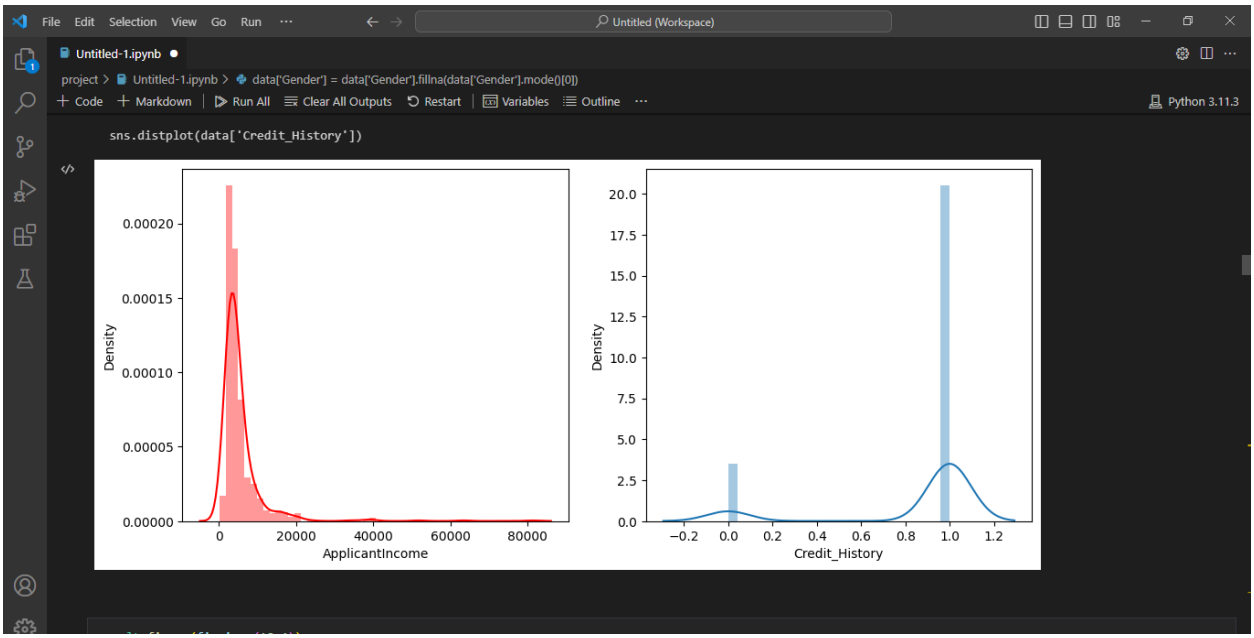
```
data.isnull().sum()
```

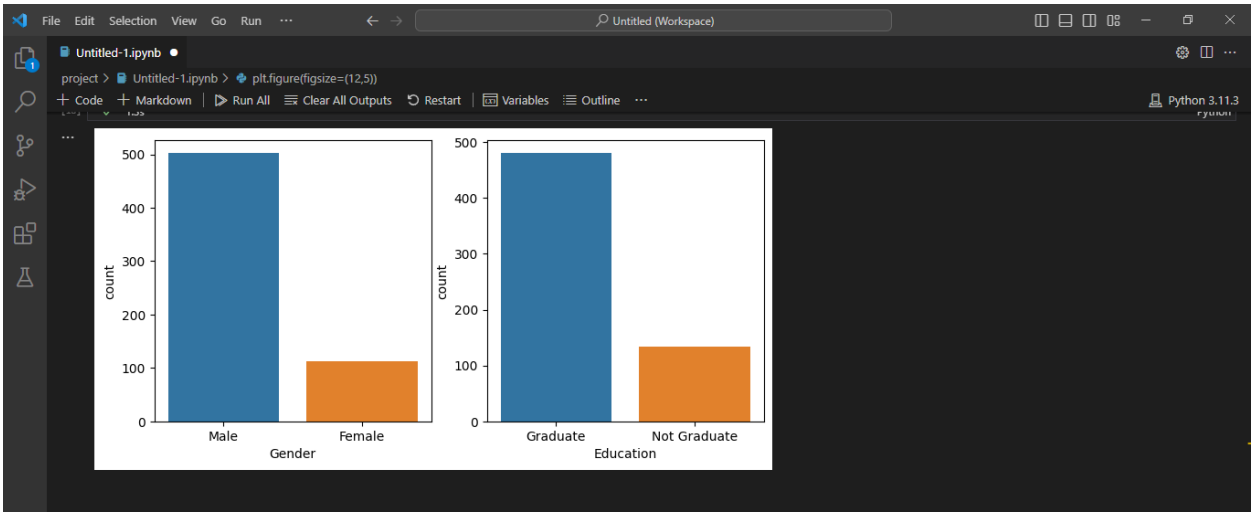
[11] ✓ 0.1s Python

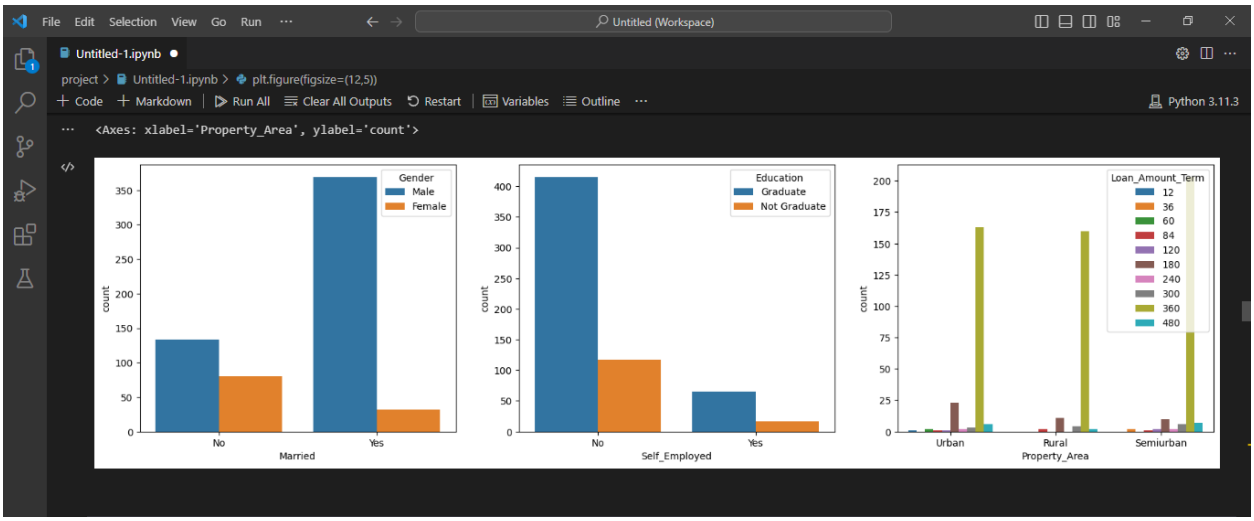
```
Loan_ID               0
Gender               13
Married               3
Dependents           15
Education             0
Self_Employed        32
ApplicantIncome       0
CoapplicantIncome     0
LoanAmount           22
Loan_Amount_Term     14
Credit_History       50
Property_Area         0
Loan_Status           0
dtype: int64
```

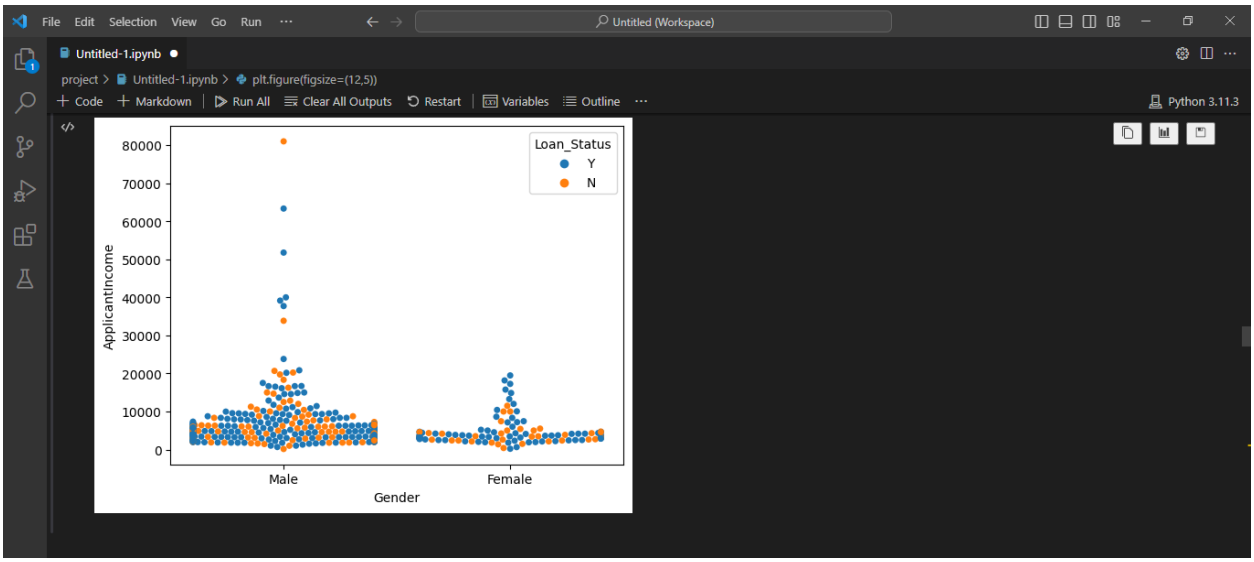


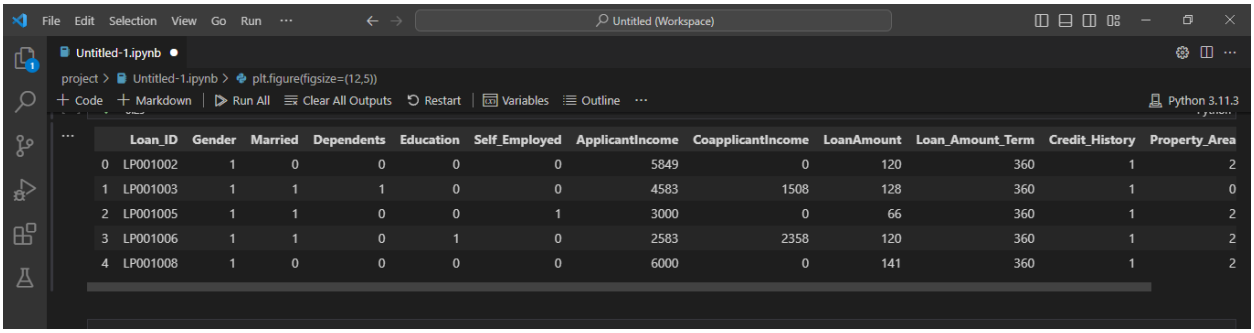
	ApplicantIncome	CoapplicantIncome	LoanAmount	Loan_Amount_Term	Credit_History
count	614.000000	614.00000	614.000000	614.000000	614.000000
mean	5403.459283	1621.24430	145.465798	342.410423	0.855049
std	6109.041673	2926.24876	84.180967	64.428629	0.352339
min	150.000000	0.00000	9.000000	12.000000	0.000000
25%	2877.500000	0.00000	100.250000	360.000000	1.000000
50%	3812.500000	1188.50000	125.000000	360.000000	1.000000
75%	5795.000000	2297.25000	164.750000	360.000000	1.000000
max	81000.000000	41667.00000	700.000000	480.000000	1.000000


File Edit Selection View Go Run
Untitled (Workspace)
Untitled-1.ipynb
project > Untitled-1.ipynb > data['Gender'] = data['Gender'].fillna(data['Gender'].mode()[0])
+ Code + Markdown Run All Clear All Outputs Restart Variables Outline
Python 3.11.3
sns.distplot(data['Credit_History'])
Density
ApplicantIncome
Credit_History

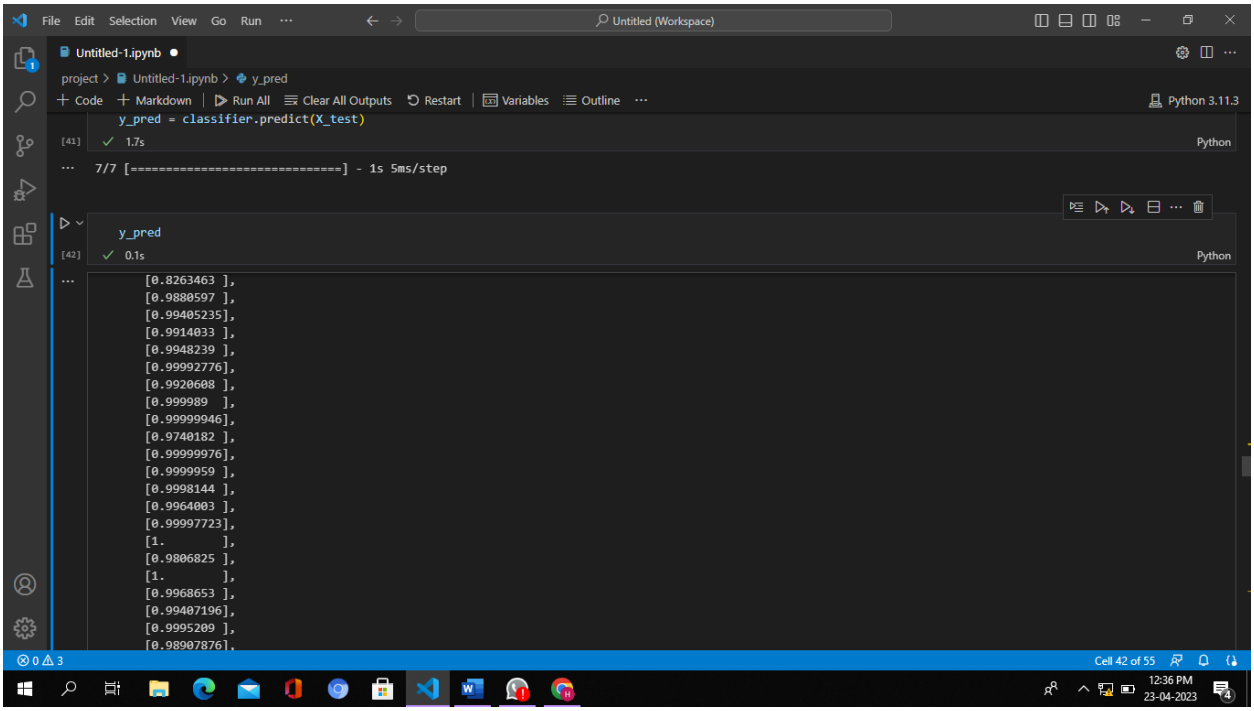

File Edit Selection View Go Run
Untitled (Workspace)
Untitled-1.ipynb
project > Untitled-1.ipynb > plt.figure(figsize=(12,5))
+ Code + Markdown Run All Clear All Outputs Restart Variables Outline
Python 3.11.3
count
Male
Female
Gender
Graduate
Not Graduate
Education

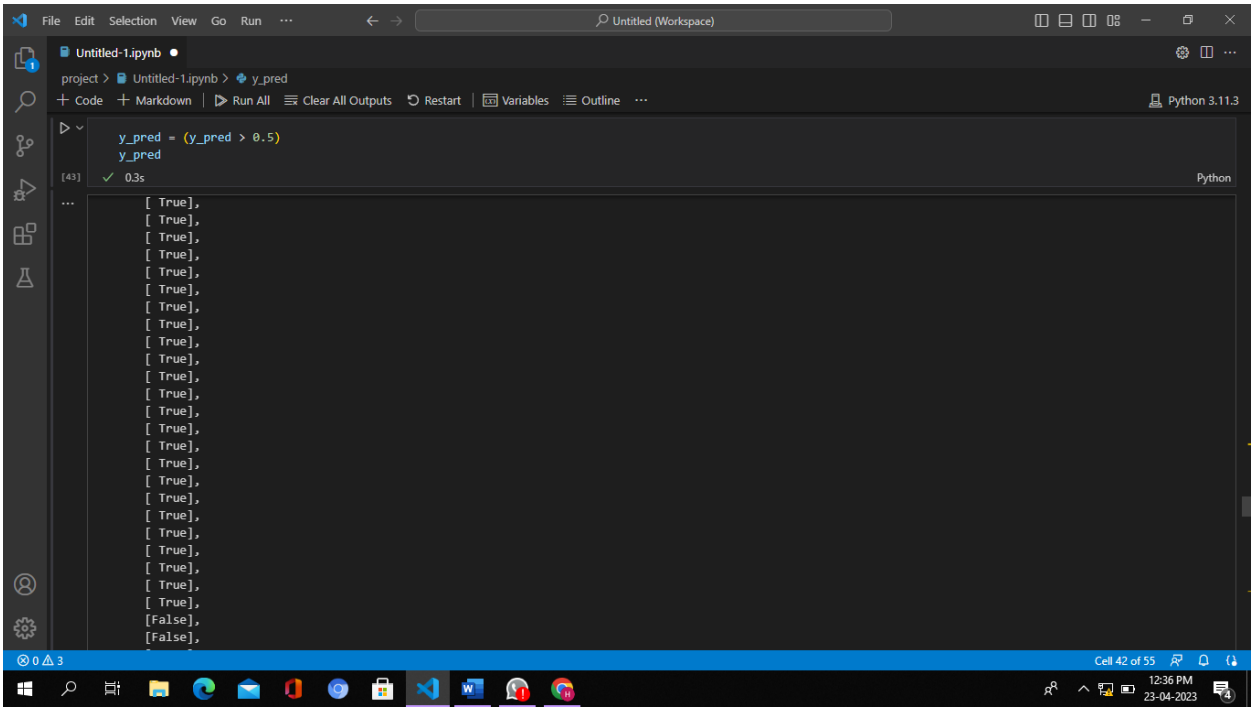


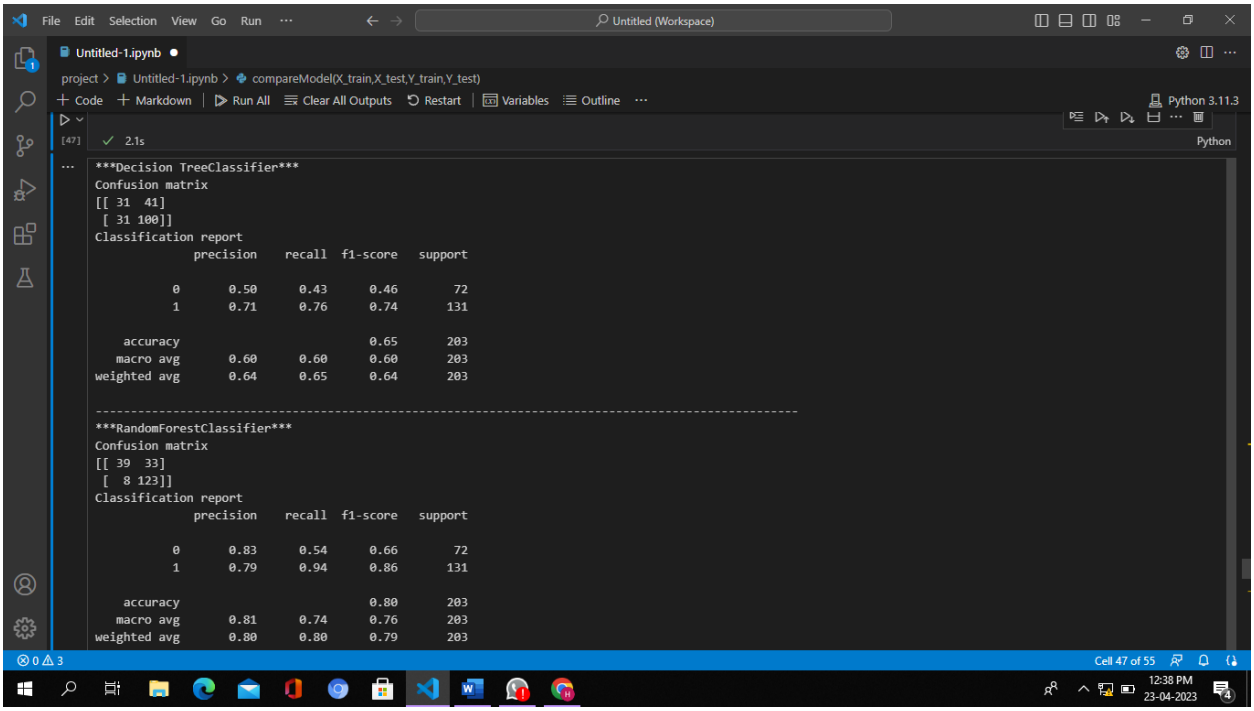




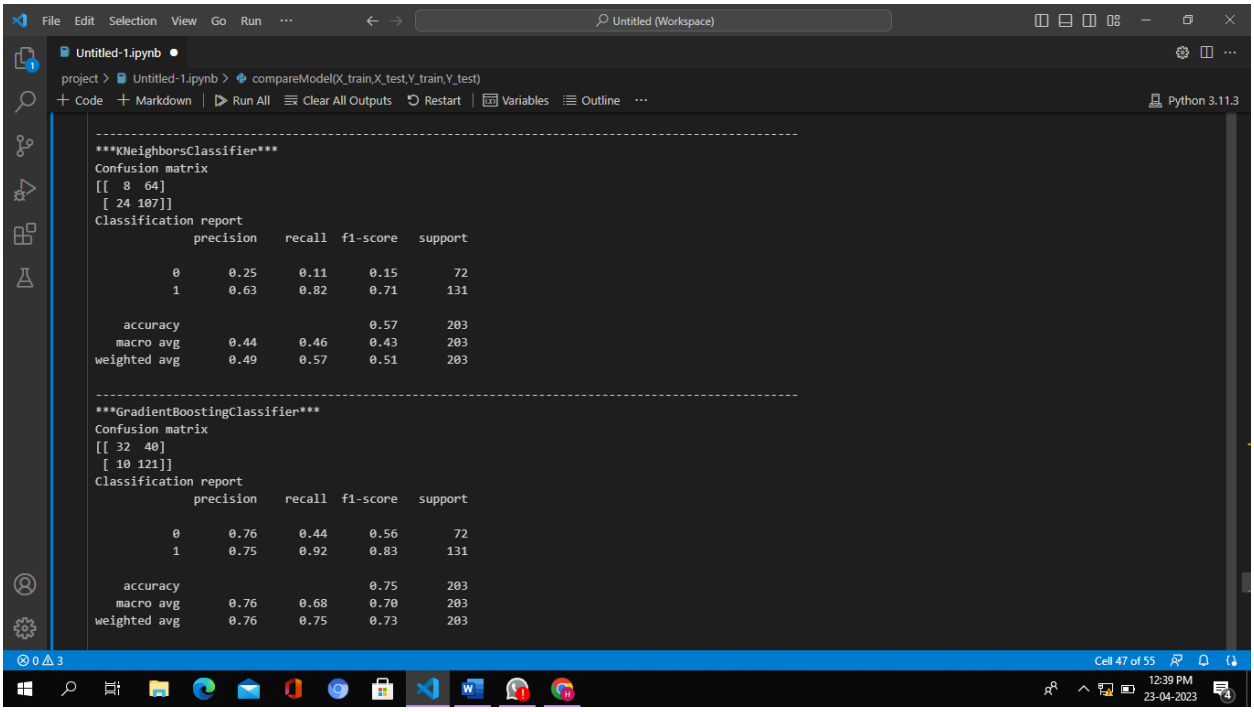
	Loan_ID	Gender	Married	Dependents	Education	Self_Employed	ApplicantIncome	CoapplicantIncome	LoanAmount	Loan_Amount_Term	Credit_History	Property_Area
0	LP001002	1	0	0	0	0	5849	0	120	360	1	2
1	LP001003	1	1	1	0	0	4583	1508	128	360	1	0
2	LP001005	1	1	0	0	1	3000	0	66	360	1	2
3	LP001006	1	1	0	1	0	2583	2358	120	360	1	2
4	LP001008	1	0	0	0	0	6000	0	141	360	1	2


File Edit Selection View Go Run
Untitled (Workspace)
Untitled-1.ipynb
project > Untitled-1.ipynb > y_pred
+ Code + Markdown | Run All Clear All Outputs Restart | Variables Outline
Python 3.11.3
y_pred = classifier.predict(X_test)
[41] ✓ 1.7s
Python
7/7 [==============================] - 1s 5ms/step
y_pred
[42] ✓ 0.1s
Python
[0.8263463],
[0.9880597],
[0.99405235],
[0.9914033],
[0.9948239],
[0.99992776],
[0.9920608],
[0.999989],
[0.99999946],
[0.9740182],
[0.99999976],
[0.9999959],
[0.9998144],
[0.9964003],
[0.99997723],
[1.],
[0.9806825],
[1.],
[0.9968653],
[0.99407196],
[0.9995209],
[0.98907876],
Cell 42 of 55
12:36 PM
23-04-2023


File Edit Selection View Go Run
Untitled (Workspace)
Untitled-1.ipynb
project > Untitled-1.ipynb > y_pred
+ Code + Markdown | Run All Clear All Outputs Restart | Variables Outline
Python 3.11.3
y_pred = (y_pred > 0.5)
y_pred
[43] ✓ 0.3s
Python
[True],
[True],
[True],
[True],
[True],
[True],
[True],
[True],
[True],
[True],
[True],
[True],
[True],
[True],
[True],
[True],
[True],
[True],
[True],
[True],
[True],
[True],
[True],
[True],
[True],
[True],
[False],
[False],
Cell 42 of 55
12:36 PM
23-04-2023

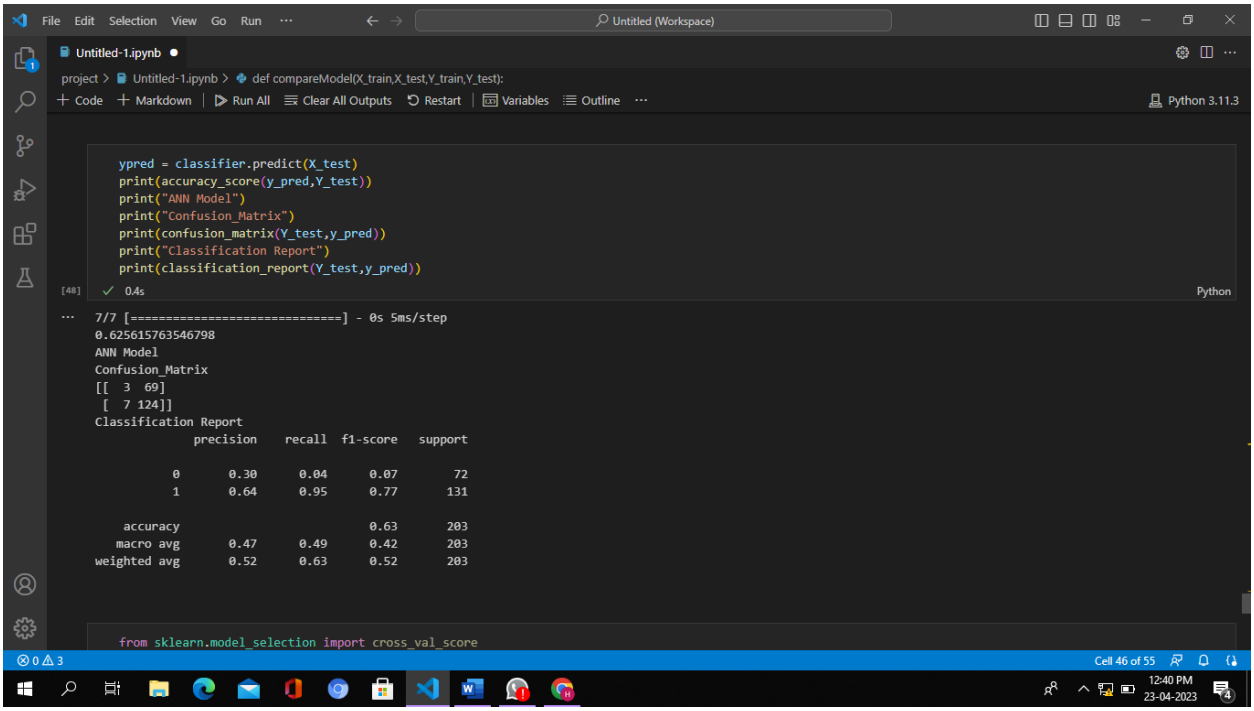

File Edit Selection View Go Run
Untitled (Workspace)
Untitled-1.ipynb
project > Untitled-1.ipynb > compareModel(X_train,X_test,Y_train,Y_test)
+ Code + Markdown Run All Clear All Outputs Restart Variables Outline
Python 3.11.3
[47] 2.1s
Python
Decision TreeClassifier
Confusion matrix
[[31 41]
[31 100]]
Classification report
precision recall f1-score support
0 0.50 0.43 0.46 72
1 0.71 0.76 0.74 131
accuracy 0.65 203
macro avg 0.60 0.60 0.60 203
weighted avg 0.64 0.65 0.64 203

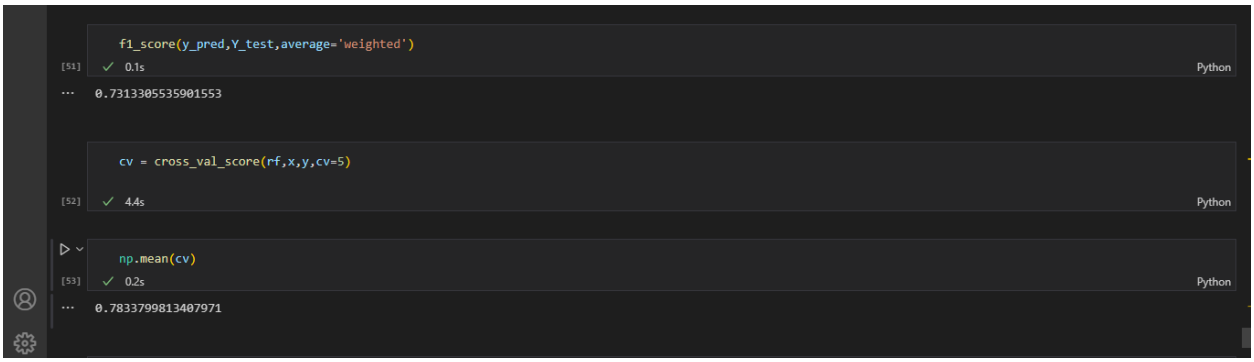
RandomForestClassifier
Confusion matrix
[[39 33]
[8 123]]
Classification report
precision recall f1-score support
0 0.83 0.54 0.66 72
1 0.79 0.94 0.86 131
accuracy 0.80 203
macro avg 0.81 0.74 0.76 203
weighted avg 0.80 0.80 0.79 203
Cell 47 of 55
12:38 PM
23-04-2023


File Edit Selection View Go Run
Untitled (Workspace)
Untitled-1.ipynb
project > Untitled-1.ipynb > compareModel(X_train,X_test,Y_train,Y_test)
+ Code + Markdown Run All Clear All Outputs Restart Variables Outline
Python 3.11.3

KNeighborsClassifier
Confusion matrix
[[8 64]
[24 107]]
Classification report
precision recall f1-score support
0 0.25 0.11 0.15 72
1 0.63 0.82 0.71 131
accuracy 0.57 203
macro avg 0.44 0.46 0.43 203
weighted avg 0.49 0.57 0.51 203

GradientBoostingClassifier
Confusion matrix
[[32 40]
[10 121]]
Classification report
precision recall f1-score support
0 0.76 0.44 0.56 72
1 0.75 0.92 0.83 131
accuracy 0.75 203
macro avg 0.76 0.68 0.70 203
weighted avg 0.76 0.75 0.73 203
Cell 47 of 55
12:39 PM
23-04-2023


File Edit Selection View Go Run
Untitled (Workspace)
Untitled-1.ipynb
project > Untitled-1.ipynb > def compareModel(X_train,X_test,Y_train,Y_test):
+ Code + Markdown Run All Clear All Outputs Restart Variables Outline
Python 3.11.3
ypred = classifier.predict(X_test)
print(accuracy_score(y_pred,Y_test))
print("ANN Model")
print("Confusion_Matrix")
print(confusion_matrix(Y_test,y_pred))
print("Classification Report")
print(classification_report(Y_test,y_pred))
[48] 0.4s
Python
7/7 [==============================] - 0s 5ms/step
0.625615763546798
ANN Model
Confusion_Matrix
[[3 69]
[7 124]]
Classification Report
precision recall f1-score support
0 0.30 0.04 0.07 72
1 0.64 0.95 0.77 131
accuracy 0.63 203
macro avg 0.47 0.49 0.42 203
weighted avg 0.52 0.63 0.52 203
from sklearn.model_selection import cross_val_score
0 3
Cell 46 of 55
12:40 PM
23-04-2023


f1_score(y_pred,Y_test,average='weighted')
[51] 0.1s
Python
0.7313305535901553
cv = cross_val_score(rf,x,y,cv=5)
[52] 4.4s
Python
np.mean(cv)
[53] 0.2s
Python
0.7833799813407971