Python Case Study

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Problem Statement :

Automate the loan eligibility process (real-time) based on customer detail provided while filling

the online application form. These details are Gender, Marital Status, Education, Number of Dependents, Income, Loan Amount, Credit History, and others.

The major aim of this notebook is to predict which of the customers will have their loan approved.

● Loading Data in Pandas DataFrame

```
import pandas as pd

df = pd.read_csv("/content/sample_data/LoanData.csv")

df.head()
```

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

● Printing rows of the Data

```
df.columns
```

```
Index(['Loan_ID', 'Gender', 'Married', 'Dependents', 'Education',
       'Self_Employed', 'ApplicantIncome', 'CoapplicantIncome', 'LoanAmount',
       'Loan_Amount_Term', 'Credit_History', 'Property_Area', 'Loan_Status'],
      dtype='object')
```

● Summary of Data Frame

```
df.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
```

● Descriptive Statistical Measures of a DataFrame

df.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

● Missing Data Handing

df.isnull().sum()

	0
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

● Sorting DataFrame values

df.sort_values(by='ApplicantIncome', ascending=False)

	Loan_ID	Gender	Married	Dependents	Education	Self_Employed	ApplicantIncome	CoapplicantIncome	LoanAmount	Loan_Amount_Term	Credit_History	Property_Area	Loan_Status
409	LP002317	Male	Yes	3+	Graduate	No	81000	0.0	360.0	360.0	0.0	Rural	N
333	LP002101	Male	Yes	0	Graduate	NaN	63337	0.0	490.0	180.0	1.0	Urban	Y
171	LP001585	Male	Yes	3+	Graduate	No	51763	0.0	700.0	300.0	1.0	Urban	Y
155	LP001536	Male	Yes	3+	Graduate	No	39999	0.0	600.0	180.0	0.0	Semiurban	Y
185	LP001640	Male	Yes	0	Graduate	Yes	39147	4750.0	120.0	360.0	1.0	Semiurban	Y
...	...	...	...	...	...	...	...	...	...	...	...	...	...
188	LP001644	Male	Yes	0	Graduate	Yes	674	5296.0	168.0	360.0	1.0	Rural	Y
500	LP002603	Female	No	0	Graduate	No	645	3683.0	113.0	480.0	1.0	Rural	Y
600	LP002949	Female	No	3+	Graduate	NaN	416	41667.0	350.0	180.0	NaN	Urban	N
468	LP002502	Female	Yes	2	Not Graduate	NaN	210	2917.0	98.0	360.0	1.0	Semiurban	Y
216	LP001722	Male	Yes	0	Graduate	No	150	1800.0	135.0	360.0	1.0	Rural	N

614 rows × 13 columns

● Merge Data Frames

df1 = pd.read_csv("/content/sample_data/LoanData.csv")

df2 = pd.read_csv("/content/sample_data/LoanData.csv")

df = pd.merge(df1, df2)

print(df)

```
       Loan_ID  Gender Married Dependents     Education Self_Employed
0     LP001002    Male      No          0      Graduate            No
1     LP001003    Male     Yes          1      Graduate            No
2     LP001005    Male     Yes          0      Graduate           Yes
3     LP001006    Male     Yes          0  Not Graduate            No
4     LP001008    Male      No          0      Graduate            No
..         ...     ...     ...        ...           ...           ...
609   LP002978  Female      No          0      Graduate            No
610   LP002979    Male     Yes         3+      Graduate            No
611   LP002983    Male     Yes          1      Graduate            No
612   LP002984    Male     Yes          2      Graduate            No
613   LP002990  Female      No          0      Graduate           Yes

     ApplicantIncome  CoapplicantIncome  LoanAmount  Loan_Amount_Term
0               5849                0.0         NaN             360.0
1               4583             1508.0       128.0             360.0
2               3000                0.0        66.0             360.0
3               2583             2358.0       120.0             360.0
4               6000                0.0       141.0             360.0
..               ...                ...         ...               ...
609             2900                0.0        71.0             360.0
610             4106                0.0        40.0             180.0
611             8072              240.0       253.0             360.0
612             7583                0.0       187.0             360.0
613             4583                0.0       133.0             360.0

     Credit_History Property_Area Loan_Status
0               1.0         Urban           Y
1               1.0         Rural           N
2               1.0         Urban           Y
3               1.0         Urban           Y
4               1.0         Urban           Y
..              ...           ...         ...
609             1.0         Rural           Y
610             1.0         Rural           Y
611             1.0         Urban           Y
612             1.0         Urban           Y
613             0.0     Semiurban           N

[614 rows x 13 columns]
```

● Apply Function

df['LoanAmount_k'] = df['LoanAmount'].apply(lambda x: x / 1000)

df.head()

	Loan_ID	Gender	Married	Dependents	Education	Self_Employed	ApplicantIncome	CoapplicantIncome	LoanAmount	Loan_Amount_Term	Credit_History	Property_Area	Loan_Status	LoanAmount_k
0	LP001002	Male	No	0	Graduate	No	5849	0.0	NaN	360.0	1.0	Urban	Y	NaN
1	LP001003	Male	Yes	1	Graduate	No	4583	1508.0	128.0	360.0	1.0	Rural	N	0.128
2	LP001005	Male	Yes	0	Graduate	Yes	3000	0.0	66.0	360.0	1.0	Urban	Y	0.066
3	LP001006	Male	Yes	0	Not Graduate	No	2583	2358.0	120.0	360.0	1.0	Urban	Y	0.120
4	LP001008	Male	No	0	Graduate	No	6000	0.0	141.0	360.0	1.0	Urban	Y	0.141

● By using the lambda operator

df['IncomeLevel'] = df['ApplicantIncome'].apply(lambda x: 'High' if x > 5000 else 'Low')

df.head()

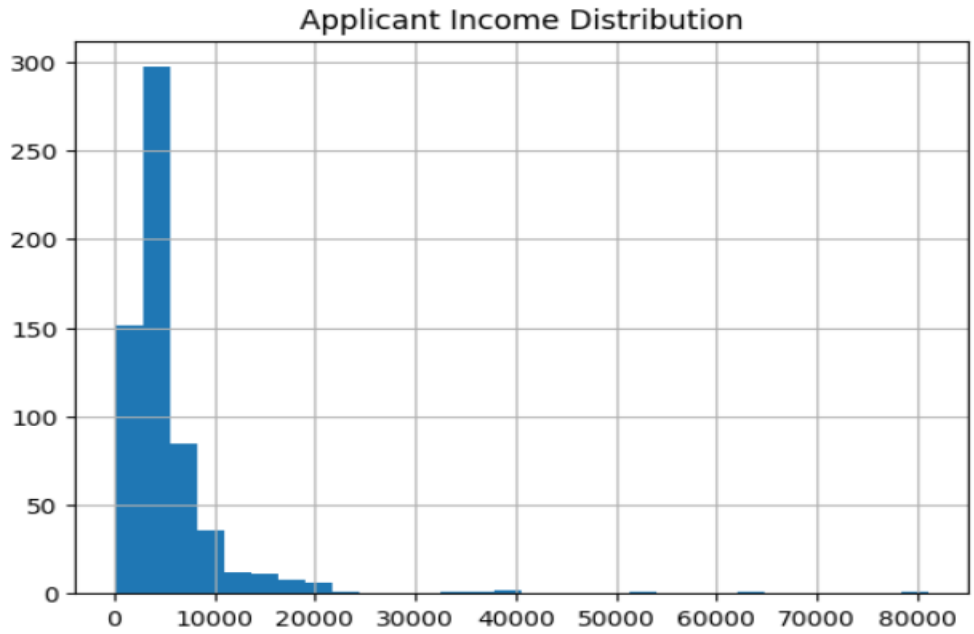
	Loan_ID	Gender	Married	Dependents	Education	Self_Employed	ApplicantIncome	CoapplicantIncome	LoanAmount	Loan_Amount_Term	Credit_History	Property_Area	Loan_Status	LoanAmount_k	IncomeLevel
0	LP001002	Male	No	0	Graduate	No	5849	0.0	NaN	360.0	1.0	Urban	Y	NaN	High
1	LP001003	Male	Yes	1	Graduate	No	4583	1508.0	128.0	360.0	1.0	Rural	N	0.128	Low
2	LP001005	Male	Yes	0	Graduate	Yes	3000	0.0	66.0	360.0	1.0	Urban	Y	0.066	Low
3	LP001006	Male	Yes	0	Not Graduate	No	2583	2358.0	120.0	360.0	1.0	Urban	Y	0.120	Low
4	LP001008	Male	No	0	Graduate	No	6000	0.0	141.0	360.0	1.0	Urban	Y	0.141	High

● Visualizing DataFrame

```
df['ApplicantIncome'].hist(bins=30)

plt.title("Applicant Income Distribution")

plt.show()
```



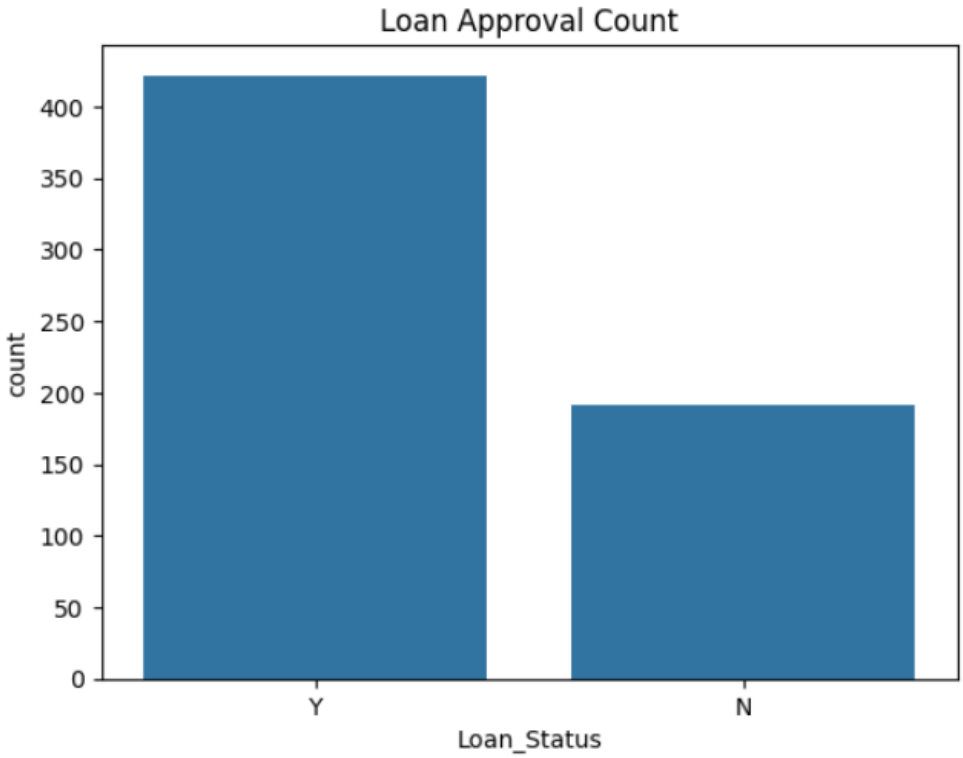

```
import matplotlib.pyplot as plt

import seaborn as sns

sns.countplot(x='Loan_Status', data=df)

plt.title('Loan Approval Count')

plt.show()
```


Loan Approval Count
count
400
350
300
250
200
150
100
50
0
Y
N
Loan_Status