Importing the Dependencies

```
import numpy as np
import pandas as pd
import seaborn as sns
from sklearn.model_selection import train_test_split
from sklearn import svm
from sklearn.metrics import accuracy_score
```

Data Collection and Processing

```
# loading the dataset to pandas DataFrame
loan_dataset = pd.read_csv('/content/dataset.csv')
```

```
type(loan_dataset)
```

```
pandas.core.frame.DataFrame
```

```
# printing the first 5 rows of the dataframe
loan_dataset.head()
```

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

```
# number of rows and columns
loan_dataset.shape
```

```
(614, 13)
```

```
# statistical measures
loan_dataset.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

```
# number of missing values in each column
loan_dataset.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
```

```
# dropping the missing values
loan_dataset = loan_dataset.dropna()
```

```
# number of missing values in each column
loan_dataset.isnull().sum()
```

```
Loan_ID             0
Gender              0
Married             0
Dependents          0
Education           0
Self_Employed       0
ApplicantIncome     0
CoapplicantIncome   0
LoanAmount          0
Loan_Amount_Term    0
Credit_History      0
Property_Area       0
Loan_Status         0
dtype: int64
```

```
# label encoding
loan_dataset.replace({"Loan_Status":{'N':0,'Y':1}},inplace=True)
```

```
# printing the first 5 rows of the dataframe
loan_dataset.head()
```

	Loan_ID	Gender	Married	Dependents	Education	Self_Employed	ApplicantIncome	CoapplicantIncome	LoanAmount	Loan_Amount_Term
1	LP001003	Male	Yes	1	Graduate	No	4583	1508.0	128.0	360.0
2	LP001005	Male	Yes	0	Graduate	Yes	3000	0.0	66.0	360.0
3	LP001006	Male	Yes	0	Not Graduate	No	2583	2358.0	120.0	360.0
4	LP001008	Male	No	0	Graduate	No	6000	0.0	141.0	360.0
5	LP001011	Male	Yes	2	Graduate	Yes	5417	4196.0	267.0	360.0

```
# Dependent column values
loan_dataset['Dependents'].value_counts()
```

```
0     274
2      85
1      80
3+     41
Name: Dependents, dtype: int64
```

```
# replacing the value of 3+ to 4
loan_dataset = loan_dataset.replace(to_replace='3+', value=4)
```

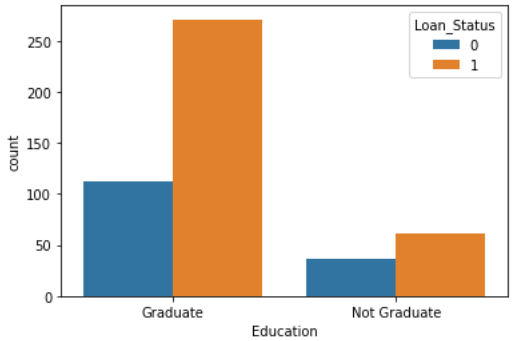
```
# dependent values
loan_dataset['Dependents'].value_counts()
```

```
0    274
2     85
1     80
4     41
Name: Dependents, dtype: int64
```

Data Visualization

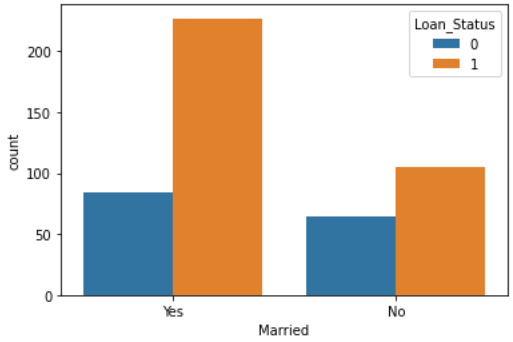
```
# education & Loan Status
sns.countplot(x='Education',hue='Loan_Status',data=loan_dataset)
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f60020a91d0>
```



```
# marital status & Loan Status
sns.countplot(x='Married',hue='Loan_Status',data=loan_dataset)
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f6000f5a650>
```




```
# convert categorical columns to numerical values
loan_dataset.replace({'Married':{'No':0,'Yes':1},'Gender':{'Male':1,'Female':0},'Self_Employed':{'No':0,'Yes':1},
                      'Property_Area':{'Rural':0,'Semiurban':1,'Urban':2},'Education':{'Graduate':1,'Not Graduate':0}},inplace=True)
```

```
loan_dataset.head()
```

	Loan_ID	Gender	Married	Dependents	Education	Self_Employed	ApplicantIncome	CoapplicantIncome	LoanAmount	Loan_Amount_Term
1	LP001003	1	1	1	1	0	4583	1508.0	128.0	360.0
2	LP001005	1	1	0	1	1	3000	0.0	66.0	360.0
3	LP001006	1	1	0	0	0	2583	2358.0	120.0	360.0
4	LP001008	1	0	0	1	0	6000	0.0	141.0	360.0
5	LP001011	1	1	2	1	1	5417	4196.0	267.0	360.0

```
# separating the data and label
X = loan_dataset.drop(columns=['Loan_ID','Loan_Status'],axis=1)
Y = loan_dataset['Loan_Status']
```

```
print(X)
print(Y)
```

```
     Gender  Married  ... Credit_History  Property_Area
1         1        1  ...            1.0              0
2         1        1  ...            1.0              2
3         1        1  ...            1.0              2
4         1        0  ...            1.0              2
5         1        1  ...            1.0              2
..      ...      ...  ...            ...            ...
609       0        0  ...            1.0              0
610       1        1  ...            1.0              0
611       1        1  ...            1.0              2
612       1        1  ...            1.0              2
613       0        0  ...            0.0              1

[480 rows x 11 columns]
1      0
2      1
3      1
4      1
5      1
      ..
609    1
610    1
611    1
612    1
613    0
Name: Loan_Status, Length: 480, dtype: int64
```

Train Test Split

```
X_train, X_test,Y_train,Y_test = train_test_split(X,Y,test_size=0.1,stratify=Y,random_state=2)
```

```
print(X.shape, X_train.shape, X_test.shape)
```

```
(480, 11) (432, 11) (48, 11)
```

Training the model:

Support Vector Machine Model

```
classifier = svm.SVC(kernel='linear')
```

```
#training the support Vector Macine model
classifier.fit(X_train,Y_train)
```

```
SVC(C=1.0, break_ties=False, cache_size=200, class_weight=None, coef0=0.0,
    decision_function_shape='ovr', degree=3, gamma='scale', kernel='linear',
    max_iter=-1, probability=False, random_state=None, shrinking=True,
    tol=0.001, verbose=False)
```

Model Evaluation

```
# accuracy score on training data
X_train_prediction = classifier.predict(X_train)
training_data_accuray = accuracy_score(X_train_prediction,Y_train)
```

```
print('Accuracy on training data : ', training_data_accuray)
```

```
Accuracy on training data :  0.7986111111111112
```

```
# accuracy score on training data
X_test_prediction = classifier.predict(X_test)
test_data_accuray = accuracy_score(X_test_prediction,Y_test)
```

```
print('Accuracy on test data : ', test_data_accuray)
```

```
Accuracy on test data :  0.8333333333333334
```

Making a predictive system