Skill Vertex - Mini Project

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- **Date:** 5th July 2022

Project Topic: Loan Prediction

In [1]:

```
#Step 1, importing libraries
import  pandas as pd
import  numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
import seaborn as sns

from sklearn.model_selection import train_test_split
from sklearn import feature_selection
from sklearn import model_selection
from sklearn.metrics import accuracy_score

#ML algos to create the Models
from sklearn.linear_model import LogisticRegression
from sklearn.svm import SVC
from sklearn.naive_bayes import GaussianNB
from sklearn.ensemble import RandomForestClassifier
from sklearn.ensemble import GradientBoostingClassifier
from sklearn.neighbors import KNeighborsClassifier
```

Loading our data,

DataSet link:

- https://datahack.analyticsvidhya.com/contest/practice-problem-loan-prediction-iii/,
- https://www.kaggle.com/datasets/altruistdelhite04/loan-prediction-problem-dataset

In [12]:

```
data_trn=pd.read_csv("C:/Users/SSD/VITc_SSD1125_Progms/Training
SkillVertex_py/MinProj/LoanPred_train.csv")
```

In [13]:

```
data_trn
```

Out[13]:

	Loan_ID	Gender	Married	Dependents	Education	Self_Employed	ApplicantIncome	CoapplicantIncome
0	LP001002	Male	No	0	Graduate	No	5849	0.0
1	LP001003	Male	Yes	1	Graduate	No	4583	1508.0
2	LP001005	Male	Yes	0	Graduate	Yes	3000	0.0

	Loan_ID	Gender	Married	Dependents	Education	Self_Employed	ApplicantIncome	CoapplicantIncome
3	LP001006	Male	Yes	0	Not Graduate	No	2583	2358.0
4	LP001008	Male	No	0	Graduate	No	6000	0.0
...	...	...	...	...	...	...	...	...
609	LP002978	Female	No	0	Graduate	No	2900	0.0
610	LP002979	Male	Yes	3+	Graduate	No	4106	0.0
611	LP002983	Male	Yes	1	Graduate	No	8072	240.0
612	LP002984	Male	Yes	2	Graduate	No	7583	0.0
613	LP002990	Female	No	0	Graduate	Yes	4583	0.0

614 rows × 13 columns

In [15]:

```
data_trn.shape
```

Out[15]:

```
(614, 13)
```

In [16]:

```
data_trn.info
```

Out[16]:

```
<bound method DataFrame.info of       Loan_ID  Gender Married Dependents     Educ
ation 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
```

```
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]>
```

In [17]:

```
data_trn.describe()
```

Out[17]:

	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

In [18]:

```
# Test data
data_tst=pd.read_csv('C:/Users/SSD/VITc_SSD1125_Progms/Training
SkillVertex_py/MinProj/LoanPred_test.csv')
```

In [19]:

```
print (data_trn.shape, data_tst.shape)
```

```
(614, 13) (367, 12)
```

Exploratory Data Analysis

In [20]:

```
data_trn.head()
```

Out[20]:

	Loan_ID	Gender	Married	Dependents	Education	Self_Employed	ApplicantIncome	CoapplicantIncome
0	LP001002	Male	No	0	Graduate	No	5849	0.0
1	LP001003	Male	Yes	1	Graduate	No	4583	1508.0
2	LP001005	Male	Yes	0	Graduate	Yes	3000	0.0
3	LP001006	Male	Yes	0	Not Graduate	No	2583	2358.0
4	LP001008	Male	No	0	Graduate	No	6000	0.0

In [21]:

```
data_tst.head()
```

Out[21]:

	Loan_ID	Gender	Married	Dependents	Education	Self_Employed	ApplicantIncome	CoapplicantIncome
0	LP001015	Male	Yes	0	Graduate	No	5720	0
1	LP001022	Male	Yes	1	Graduate	No	3076	1500
2	LP001031	Male	Yes	2	Graduate	No	5000	1800
3	LP001035	Male	Yes	2	Graduate	No	2340	2546
4	LP001051	Male	No	0	Not Graduate	No	3276	0

In [22]:

```
# Checking for any null NaN values
data_trn.isnull()
```

Out[22]:

	Loan_ID	Gender	Married	Dependents	Education	Self_Employed	ApplicantIncome	CoapplicantIncome
0	False	False	False	False	False	False	False	False
1	False	False	False	False	False	False	False	False
2	False	False	False	False	False	False	False	False
3	False	False	False	False	False	False	False	False
4	False	False	False	False	False	False	False	False
...	...	...	...	...	...	...	...	...
609	False	False	False	False	False	False	False	False
610	False	False	False	False	False	False	False	False
611	False	False	False	False	False	False	False	False
612	False	False	False	False	False	False	False	False
613	False	False	False	False	False	False	False	False

614 rows × 13 columns

In [23]:

```
data_trn.isnull().sum()
```

Out[23]:

```
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
```

In [24]:

```
data_trn.isnull().sum().sum()
```

Out[24]:

```
149
```

Interference:

It can be observed that there are null values, so Removing them, later we'll instead add the Mode values

In [26]:

```
data_trn1=data_trn.dropna()
```

In [27]:

```
data_trn1.isnull().sum().sum()
```

Out[27]:

```
0
```

In [25]:

```
data_tst.isnull().sum().sum()
```

Out[25]:

```
84
```

In [33]:

```
data_trn.dtypes
```

Out[33]:

```
Loan_ID                object
Gender                 object
Married                object
Dependents             object
Education              object
Self_Employed          object
ApplicantIncome         int64
CoapplicantIncome     float64
LoanAmount            float64
Loan_Amount_Term      float64
Credit_History        float64
Property_Area          object
Loan_Status          category
dtype: object
```

In [38]:

```
#Converting the 'object' datatypes, into 'category'
dat=data_trn
dat['Loan_Status']=dat['Loan_Status'].astype("category")
dat.dtypes
```

Out[38]:

```
Loan_ID                  object
Gender                   object
Married                  object
Dependents               object
Education                object
Self_Employed            object
ApplicantIncome           int64
CoapplicantIncome       float64
LoanAmount              float64
Loan_Amount_Term        float64
Credit_History          float64
Property_Area            object
Loan_Status            category
dtype: object
```

In [50]:

```
### Visualization
import seaborn as sns
sns.set_style("whitegrid")
#sns.pairplot(data_trn[["ApplicantIncome","CoapplicantIncome","LoanAmount","Loan_
unt_Term"]],hue="smoker",height=3,palette="Set1")
```

Data Visualization

Observing the frequency of each Features

In [41]:

```
data = [data_trn,data_tst]
for dataset in data:
    #Filter categorical variables
    categorical_columns = [x for x in dataset.dtypes.index if dataset.dtypes[x]==
'object']
    # Exclude ID cols and source:
    categorical_columns = [x for x in categorical_columns if x not in ['Loan_ID'
]]
    #Print frequency of categories

for col in categorical_columns:
    print ('\nFrequency of Categories for variable %s'%col)
    print (data_trn[col].value_counts())
```

```
Frequency of Categories for variable Gender
Male      489
Female    112
Name: Gender, dtype: int64

Frequency of Categories for variable Married
Yes    398
No     213
Name: Married, dtype: int64

Frequency of Categories for variable Dependents
```

```
Frequency of Categories for variable Dependents
0     345
1     102
2     101
3+     51
Name: Dependents, dtype: int64

Frequency of Categories for variable Education
Graduate        480
Not Graduate    134
Name: Education, dtype: int64

Frequency of Categories for variable Self_Employed
No      500
Yes      82
Name: Self_Employed, dtype: int64

Frequency of Categories for variable Property_Area
Semiurban    233
Urban        202
Rural        179
Name: Property_Area, dtype: int64
```

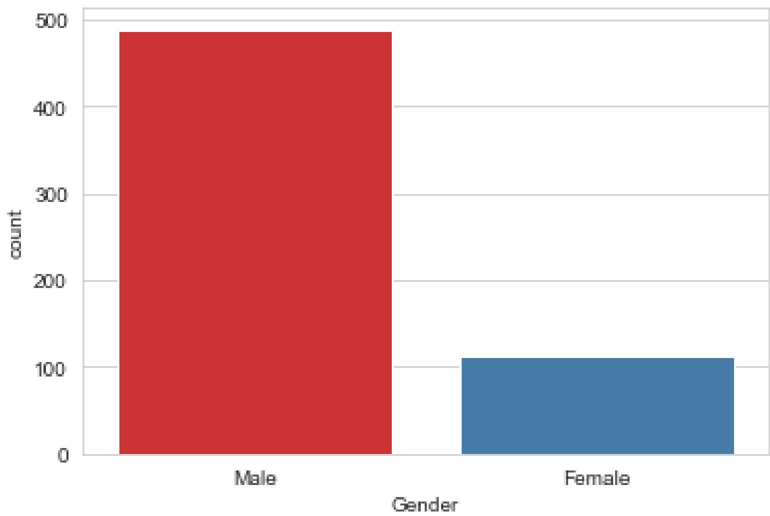
In [49]:

```
import seaborn as sns
sns.countplot(data_trn['Gender'],palette = "Set1")
plt.show
```

```
C:\Users\SSD\anaconda3\lib\site-packages\seaborn\_decorators.py:36:
FutureWarning: Pass the following variable as a keyword arg: x. From version 0.1
2, the only valid positional argument will be `data`, and passing other
arguments without an explicit keyword will result in an error or
misinterpretation.
  warnings.warn(
```

Out[49]:

```
<function matplotlib.pyplot.show(close=None, block=None)>
```



In [52]:

```
pd.crosstab(data_trn.Gender, data_trn.Loan_Status, margins = True)
# Seeing the approval of loans b/w Males & Females
```

Out[52]:

Loan_Status	N	Y	All

Loan_Status Gender	N	Y	All
Gender Female	37	75	112
Male	150	339	489
All	187	414	601

In [53]:

```
print("Original data shape: ",data_trn.shape)
print("Removad Na data shape: ",data_trn1.shape)
```

```
Original data shape:  (614, 13)
Removad Na data shape:  (480, 13)
```

It can be observed that 134 reading are being dropped, when we directly remove the NaN, which may decrease the Accuracy of our model. So, we'll add the Mode in those Null values.

In [137]:

```
data_trn=pd.read_csv("C:/Users/SSD/VITc_SSD1125_Progms/Training
SkillVertex_py/MinProj/LoanPred_train.csv")
```

In [138]:

```
data_tst=pd.read_csv("C:/Users/SSD/VITc_SSD1125_Progms/Training
SkillVertex_py/MinProj/LoanPred_test.csv")
```

In [139]:

```
data_t=data_trn
dtest=data_tst
data_t.Gender = data_t.Gender.fillna(data_t.Gender.mode())
dtest.Gender = dtest.Gender.fillna(dtest.Gender.mode())
```

In [141]:

```
#Converting 'M', 'F'(i.e., Categorical Var) to, (0,1)numerical variables
gendr=pd.get_dummies(data_t['Gender'] , drop_first = True )
data_t.drop(['Gender'], axis = 1 , inplace =True)
data_t = pd.concat([data_t , gend ] , axis = 1)
# For test
gendr1 = pd.get_dummies(dtest['Gender'] , drop_first = True )
dtest.drop(['Gender'], axis = 1 , inplace =True)
dtest = pd.concat([dtest , gendr1 ] , axis = 1)
```

In [143]:

```
data_t.head()
```

Out[143]:

	Loan_ID	Married	Dependents	Education	Self_Employed	ApplicantIncome	CoapplicantIncome	LoanAmo
0	LP001002	No	0	Graduate	No	5849	0.0	N
1	LP001003	Yes	1	Graduate	No	4583	1508.0	12
2	LP001005	Yes	0	Graduate	Yes	3000	0.0	6
3	LP001006	Yes	0	Not Graduate	No	2583	2358.0	12

	Loan_ID	Married	Dependents	Education	Self_Employed	ApplicantIncome	CoapplicantIncome	LoanAmo
4	LP001008	No	0	Graduate	No	6000	0.0	14

In [144]:

```
data_t.isnull().sum()
```

Out[144]:

```
Loan_ID               0
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
Male                  0
dtype: int64
```

Now, filling the 'Married','Dependantas', 'Self_Employed', 'Credit_History', etc values with the Mode values.

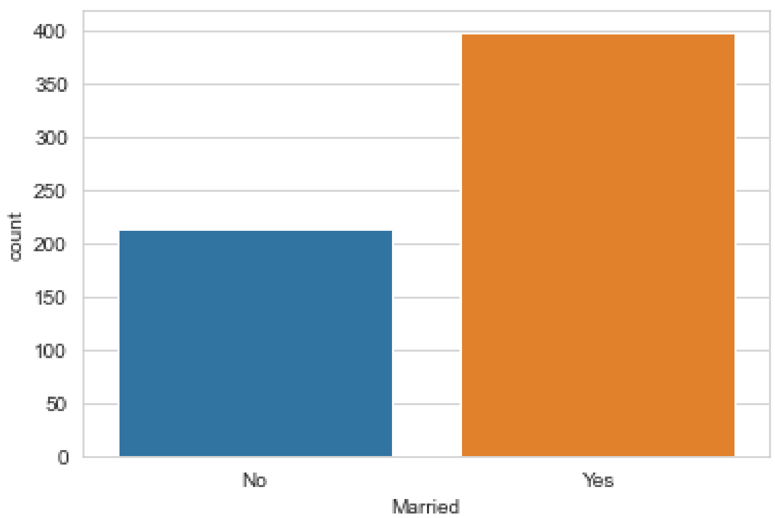
In [145]:

```
# For, Married column,
sns.countplot(data_t.Married)
```

```
C:\Users\SSD\anaconda3\lib\site-packages\seaborn\_decorators.py:36:
FutureWarning: Pass the following variable as a keyword arg: x. From version 0.1
2, the only valid positional argument will be `data`, and passing other
arguments without an explicit keyword will result in an error or
misinterpretation.
  warnings.warn(
```

Out[145]:

```
<AxesSubplot:xlabel='Married', ylabel='count'>
```



In [146]:

```python
# Checking approval rate
pd.crosstab(data_t.Married , data_t.Loan_Status,margins = True)
```

Out[146]:

Loan_Status	N	Y	All
Married			
No	79	134	213
Yes	113	285	398
All	192	419	611

In [147]:

```python
# Now, filling the NaN values with Mode
data_t.Married = data_t.Married.fillna(data_t.Married.mode())
dtest.Married = dtest.Married.fillna(dtest.Married.mode())

married = pd.get_dummies(data_t['Married'] , prefix = 'married',drop_first = True
)
data_t.drop(['Married'], axis = 1 , inplace =True)
data_t = pd.concat([data_t , married ] , axis = 1)

married = pd.get_dummies(dtest['Married'] , prefix = 'married', drop_first = True
)
dtest.drop(['Married'], axis = 1 , inplace =True)
dtest = pd.concat([dtest , married ] , axis = 1)
```

In [150]:

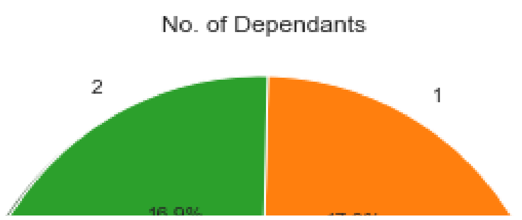
```python
# Visualizing No. of dependents
depnd=data_trn['Dependents']
depnd.value_counts()
```

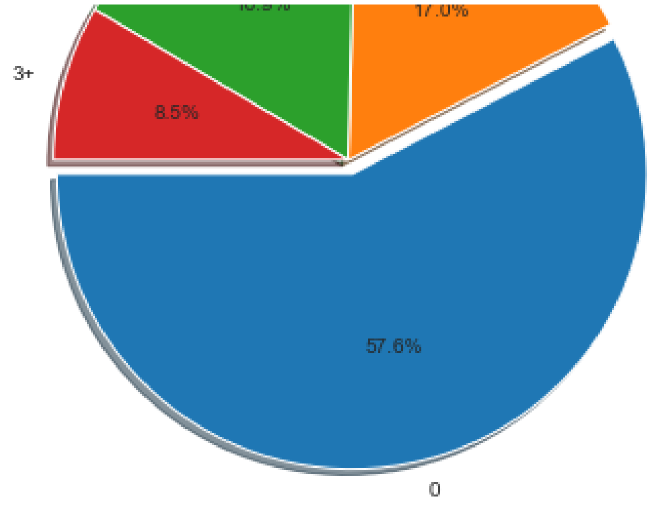
Out[150]:

```
0      345
1      102
2      101
3+      51
Name: Dependents, dtype: int64
```

In [151]:

```python
plt.figure(figsize=(6,6))
explode = (0.05, 0, 0, 0)
labels = ['0' , '1', '2' , '3+']
size = [345 , 102 , 101 , 51]

plt.pie(size, explode=explode, labels=labels,
        autopct='%1.1f%%', shadow = True, startangle = 180)
plt.axis('equal')
plt.title('No. of Dependants')
plt.show()
```





In [152]:

```python
print("Approval of loans b/w diff. sizes of families")
pd.crosstab(data_t.Dependents , data_t.Loan_Status, margins = True)
```

```
Approval of loans b/w diff. sizes of families
```

Out[152]:

Loan_Status	N	Y	All
Dependents			
0	107	238	345
1	36	66	102
2	25	76	101
3+	18	33	51
All	186	413	599

In [153]:

```python
# Filling the NaN Values
data_t.Dependents = data_t.Dependents.fillna("0")
dtest.Dependents = dtest.Dependents.fillna("0")
# Converting categorial to Numerical variables
size = {'0':'0', '1':'1', '2':'2', '3+':'3'}

data_t.Dependents = data_t.Dependents.replace(size).astype(int)
dtest.Dependents = dtest.Dependents.replace(size).astype(int)
```

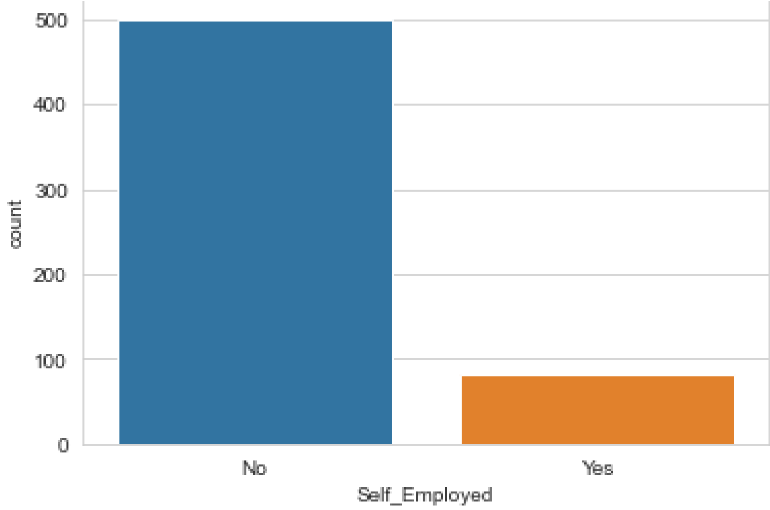
In [154]:

```python
# For self employed
sns.countplot(data_t['Self_Employed'])
```

```
C:\Users\SSD\anaconda3\lib\site-packages\seaborn\_decorators.py:36:
FutureWarning: Pass the following variable as a keyword arg: x. From version 0.1
2, the only valid positional argument will be `data`, and passing other
arguments without an explicit keyword will result in an error or
misinterpretation.
  warnings.warn(
```

Out[154]:

```
<AxesSubplot:xlabel='Self_Employed', ylabel='count'>
```



In [155]:

```
pd.crosstab(data_t.Self_Employed , data_t.Loan_Status,margins = True)
```

Out[155]:

Loan_Status	N	Y	All
Self_Employed			
No	157	343	500
Yes	26	56	82
All	183	399	582

In [157]:

```
data_t.Self_Employed = data_t.Self_Employed.fillna(data_t.Self_Employed.mode())
dtest.Self_Employed = dtest.Self_Employed.fillna(dtest.Self_Employed.mode())

self_Employed = pd.get_dummies(data_t['Self_Employed'] ,prefix = 'employed' ,drop
_first = True )
data_t.drop(['Self_Employed'], axis = 1 , inplace =True)
data_t = pd.concat([data_t , self_Employed ] , axis = 1)

self_Employed = pd.get_dummies(dtest['Self_Employed'] , prefix = 'employed' ,drop
_first = True )
dtest.drop(['Self_Employed'], axis = 1 , inplace =True)
dtest = pd.concat([dtest , self_Employed ] , axis = 1)
```

In [158]:

```
# For Loan amt term
data_t.drop(['Loan_Amount_Term'], axis = 1 , inplace =True)
dtest.drop(['Loan_Amount_Term'], axis = 1 , inplace =True)

data_t.LoanAmount = data_t.LoanAmount.fillna(data_t.LoanAmount.mean()).astype(int
)
dtest.LoanAmount = dtest.LoanAmount.fillna(dtest.LoanAmount.mean()).astype(int)
```

In [159]:

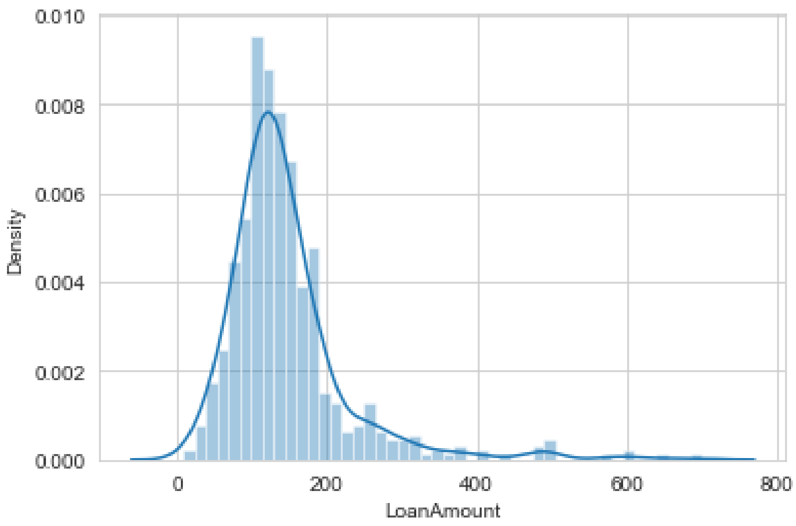
```
sns.distplot(data_t['LoanAmount'])
# It can be onserver that there are no outliners
```

```
C:\Users\SSD\anaconda3\lib\site-packages\seaborn\distributions.py:2619:
FutureWarning: `distplot` is a deprecated function and will be removed in a
```

```
future version. Please adapt your code to use either `displot` (a figure-level f
unction with similar flexibility) or `histplot` (an axes-level function for hist
ograms).
  warnings.warn(msg, FutureWarning)
```

Out[159]:

```
<AxesSubplot:xlabel='LoanAmount', ylabel='Density'>
```



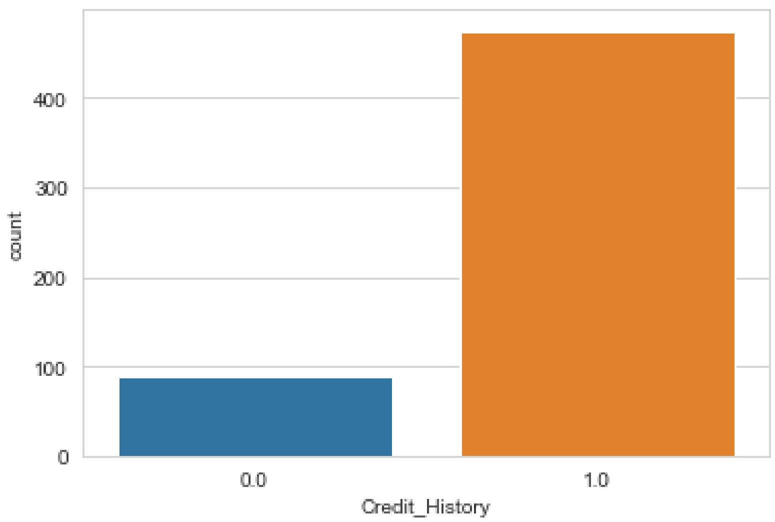
In [160]:

```python
# For, Credit Histrory
sns.countplot(data_t['Credit_History'])
```

```
C:\Users\SSD\anaconda3\lib\site-packages\seaborn\_decorators.py:36:
FutureWarning: Pass the following variable as a keyword arg: x. From version 0.1
2, the only valid positional argument will be `data`, and passing other
arguments without an explicit keyword will result in an error or
misinterpretation.
  warnings.warn(
```

Out[160]:

```
<AxesSubplot:xlabel='Credit_History', ylabel='count'>
```



In [161]:

```python
# CHecking the no. of people who have Credit history or not
pd.crosstab(data_t.Credit_History , data_t.Loan_Status, margins = True)
```

Out[161]:

Loan_Status	N	Y	All
Credit_History			
0.0	82	7	89
1.0	97	378	475
All	179	385	564

In [162]:

```
# Removing the NaN values, and adding the Mode insted
data_t.Credit_History = data_t.Credit_History.fillna(data_t.Credit_History.mode()
[0])
dtest.Credit_History  = dtest.Credit_History.fillna(dtest.Credit_History.mode()[0
])
```

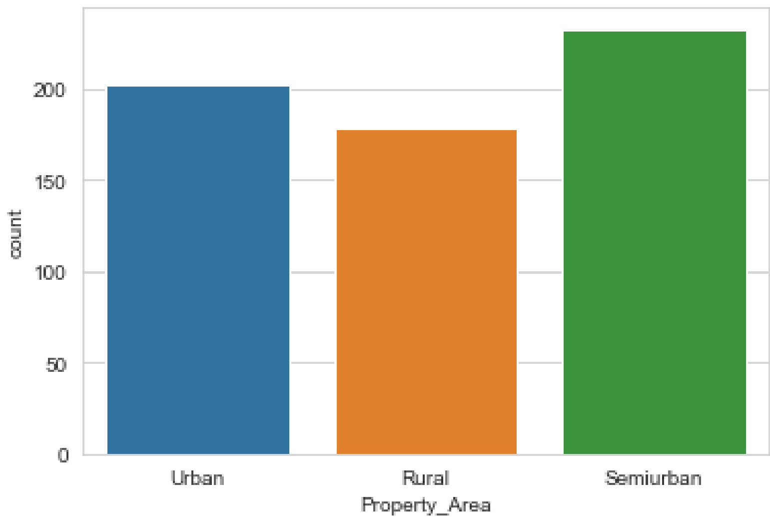
In [166]:

```
## Observing the Property Area
sns.countplot(data_t.Property_Area)
```

```
C:\Users\SSD\anaconda3\lib\site-packages\seaborn\_decorators.py:36:
FutureWarning: Pass the following variable as a keyword arg: x. From version 0.1
2, the only valid positional argument will be `data`, and passing other
arguments without an explicit keyword will result in an error or
misinterpretation.
  warnings.warn(
```

Out[166]:

<AxesSubplot:xlabel='Property_Area', ylabel='count'>



In [167]:

```
# Converting to Numerical variables, to better train our models
data_t['Property_Area'] = data_t['Property_Area'].map( {'Urban': 0, 'Semiurban':
1 ,'Rural': 2  } ).astype(int)

dtest.Property_Area = dtest.Property_Area.fillna(dtest.Property_Area.mode())
dtest['Property_Area'] = dtest['Property_Area'].map( {'Urban': 0, 'Semiurban': 1
,'Rural': 2  } ).astype(int)
```

In [170]:

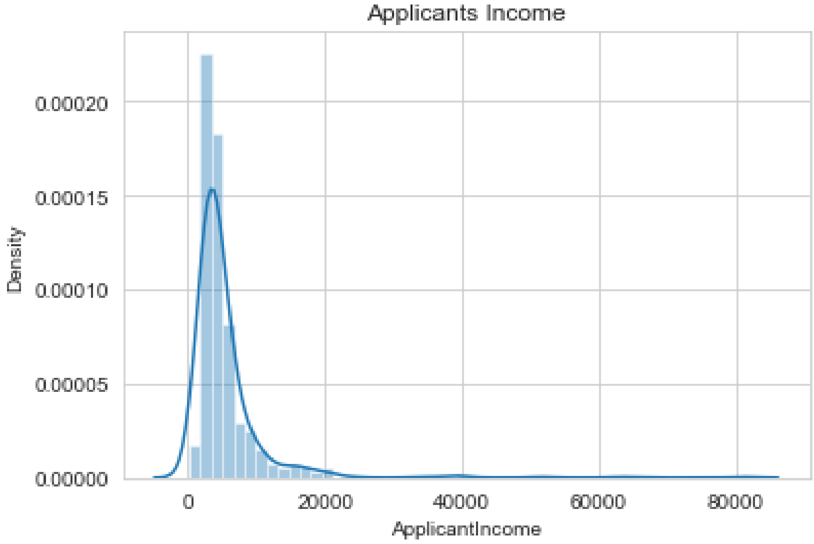
```
sns.distplot(data_t['ApplicantIncome'])
plt.title("Applicants Income")
```

```
C:\Users\SSD\anaconda3\lib\site-packages\seaborn\distributions.py:2619:
```

```
C:\Users\SSD\anaconda3\lib\site-packages\seaborn\distributions.py:2619:
FutureWarning: `distplot` is a deprecated function and will be removed in a
future version. Please adapt your code to use either `displot` (a figure-level f
unction with similar flexibility) or `histplot` (an axes-level function for hist
ograms).
  warnings.warn(msg, FutureWarning)
```

Out[170]:

```
Text(0.5, 1.0, 'Applicants Income')
```



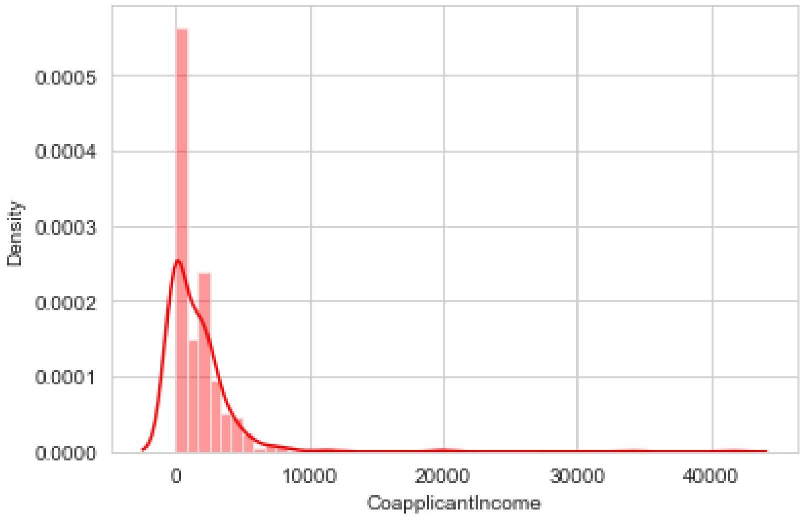
In [171]:

```
sns.distplot(data_t['CoapplicantIncome'],color="r")
```

```
C:\Users\SSD\anaconda3\lib\site-packages\seaborn\distributions.py:2619:
FutureWarning: `distplot` is a deprecated function and will be removed in a
future version. Please adapt your code to use either `displot` (a figure-level f
unction with similar flexibility) or `histplot` (an axes-level function for hist
ograms).
  warnings.warn(msg, FutureWarning)
```

Out[171]:

```
<AxesSubplot:xlabel='CoapplicantIncome', ylabel='Density'>
```



Observing the Education Column

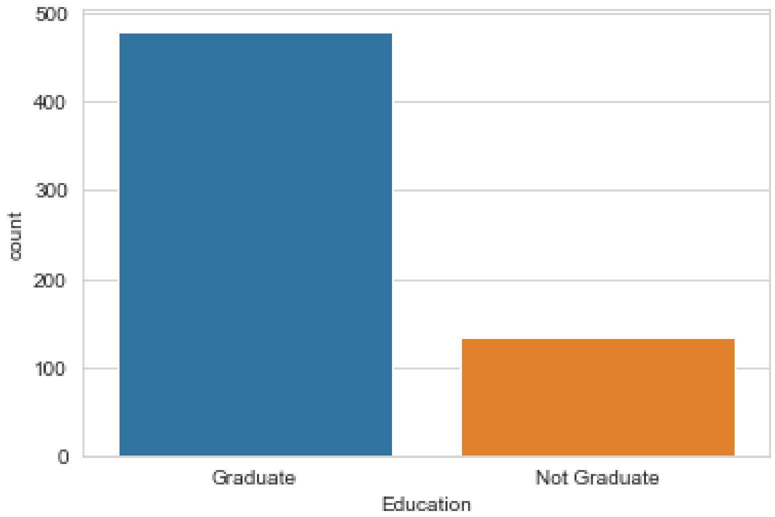
In [163]:

```
sns.countplot(data_t.Education)
```

```
C:\Users\SSD\anaconda3\lib\site-packages\seaborn\_decorators.py:36:
FutureWarning: Pass the following variable as a keyword arg: x. From version 0.1
2, the only valid positional argument will be `data`, and passing other
arguments without an explicit keyword will result in an error or
misinterpretation.
  warnings.warn(
```

Out[163]:

```
<AxesSubplot:xlabel='Education', ylabel='count'>
```



In [164]:

```
# Converting to Numerical variables, to better train our models
data_t['Education'] = data_t['Education'].map( {'Graduate': 0, 'Not Graduate': 1}
).astype(int)
dtest['Education'] = dtest['Education'].map( {'Graduate': 0, 'Not Graduate': 1} )
.astype(int)
```

In [173]:

```
# Converting our Dependent/Target variable, from Categorial to Numerical
data_t['Loan_Status'] = data_t['Loan_Status'].map( {'N': 0, 'Y': 1 } ).astype(int
)
```

In [175]:

```
data_t.dtypes
```

Out[175]:

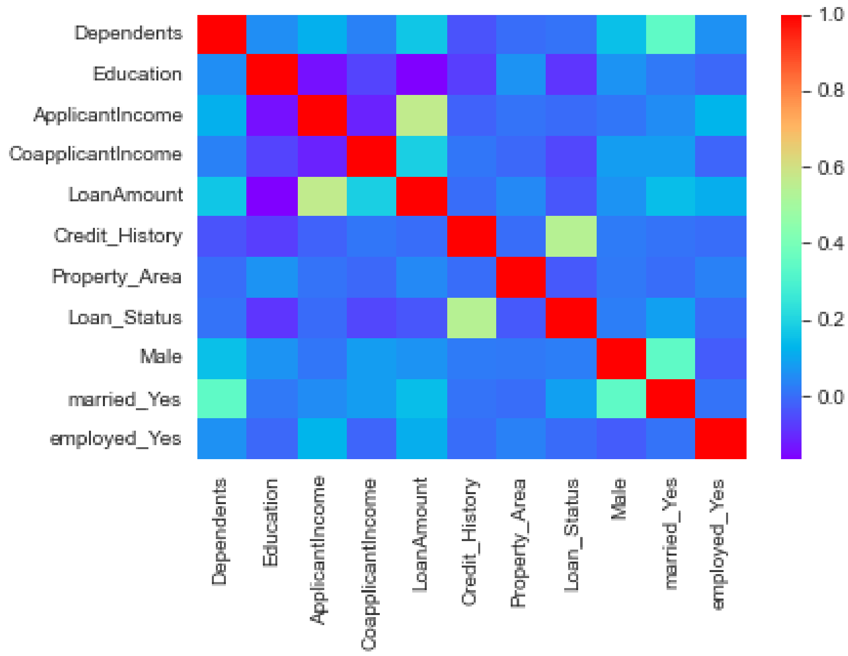
```
Loan_ID               object
Dependents             int32
Education              int32
ApplicantIncome        int64
CoapplicantIncome    float64
LoanAmount             int32
Credit_History       float64
Property_Area          int32
Loan_Status            int32
Male                   uint8
married_Yes            uint8
employed_Yes           uint8
dtype: object
```

In [184]:

```
sns.heatmap(data_t.corr(),cmap='rainbow')
```

Out[184]:

```
<AxesSubplot:>
```



Correlation between the explanatory variables and the response/target variable(y)

In [192]:

```
y=data_t['employed_Yes']
d=data_t[["Dependents","Education","ApplicantIncome","CoapplicantIncome","LoanAmount","Credit_History","Property_Area","Loan_Status","Male","employed_Yes"]]
d.corr()['employed_Yes']
```

Out[192]:

```
Dependents           0.056798
Education           -0.010383
ApplicantIncome      0.127180
CoapplicantIncome   -0.016100
LoanAmount           0.115259
Credit_History      -0.001550
Property_Area        0.030860
Loan_Status         -0.003700
Male                -0.027421
employed_Yes         1.000000
Name: employed_Yes, dtype: float64
```

In [193]:

```
#In sorted order, for our convenience
d.corr()["employed_Yes"].abs().sort_values(ascending=False)
```

Out[193]:

```
employed_Yes         1.000000
ApplicantIncome      0.127180
LoanAmount           0.115259
Dependents           0.056798
Property_Area        0.030860
Male                 0.027421
```

```
CoapplicantIncome     0.016100
Education             0.010383
Loan_Status           0.003700
Credit_History        0.001550
Name: employed_Yes, dtype: float64
```

From above, It can be oberved that, althoug negligible, but still all are correlated to the Dependent variable.

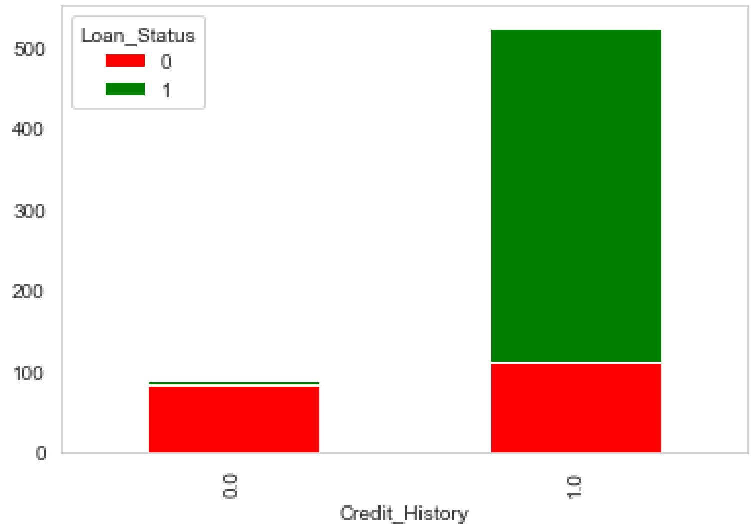
So, removing the insisgnificant varaible, 'Loan_ID', and checking the signigficance of Credit HIstory,

In [202]:

```
lc = pd.crosstab(data_t['Credit_History'], data_t['Loan_Status'])
lc.plot(kind='bar', stacked=True, color=['red','green'], grid=False)
# It can be observed that Credit history is related, so not removing it
```

Out[202]:

```
<AxesSubplot:xlabel='Credit_History'>
```

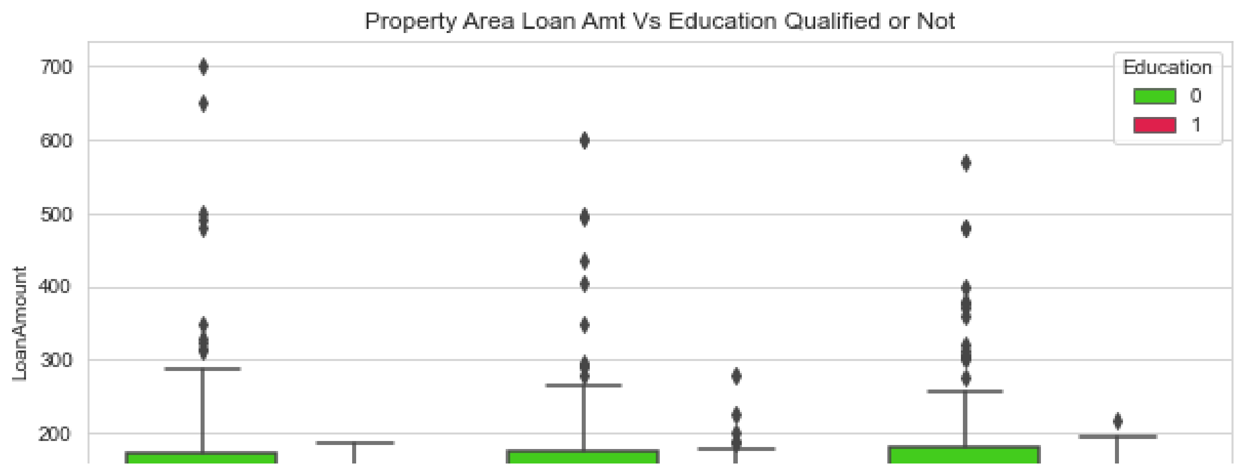


In [195]:

```
data_t.drop(['Loan_ID'], axis = 1 , inplace =True)
```

In [199]:

```
plt.figure(figsize=(10,5))
sns.boxplot(x="Property_Area", y="LoanAmount", hue="Education",data=data_t, palet
te="prism")
plt.title("Property Area Loan Amt Vs Education Qualified or Not")
plt.show()
```

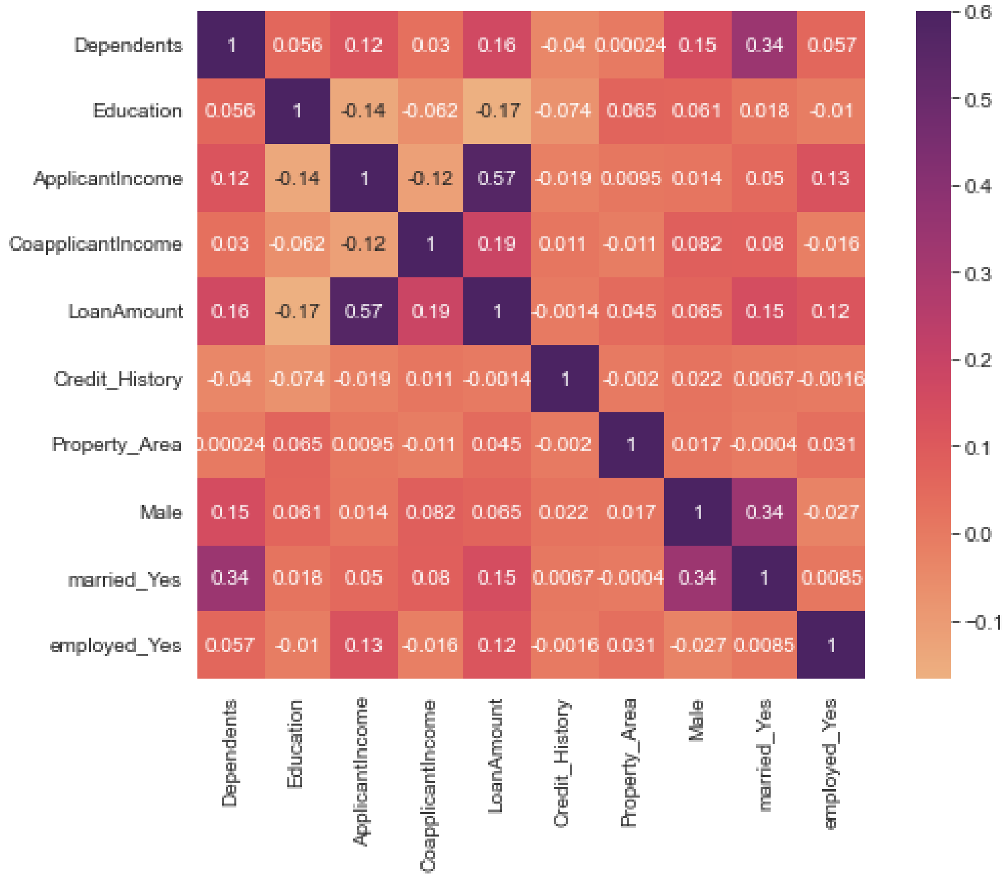


In [206]:

```
plt.figure(figsize=(9,6))
sns.heatmap(data_t.drop('Loan_Status',axis=1).corr(), vmax=0.6, square=True, anno
t=True, cmap='flare')
```

Out[206]:

```
<AxesSubplot:>
```



Building a Model

In [224]:

```
# Since it's classification problem(0,1)
#Firstly trying only one the train data
from sklearn.model_selection import train_test_split
X = data_t.drop('Loan_Status' , axis = 1 )
y = data_t['Loan_Status']
#20% train data
X_train ,X_test , y_train , y_test = train_test_split(X , y , test_size = 0.20 ,
random_state =10)
```

In [482]:

```
#Building the model, firstly we'll use Logistic Regression
from sklearn.linear_model import LogisticRegression
logreg = LogisticRegression()
```

```
logreg.fit(x_train , y_train)
```

Out[482]:

```
LogisticRegression()
```

Step 6: Model Evaluation

In [226]:

```
pred1 = logreg.predict(X_test)
acc_log = accuracy_score(y_test , pred1)*100
acc_log
```

Out[226]:

```
79.67479674796748
```

In [227]:

```
logreg.score(X_test,y_test).round(3)
#It's not bad, but not that good
```

Out[227]:

```
0.797
```

In [232]:

```
# Trying different Train test split
X_train ,X_test , y_train , y_test = train_test_split(X , y , test_size = 0.25 ,
random_state =10)
```

In [233]:

```
pred1 = logreg.predict(X_test)
acc_log = accuracy_score(y_test , pred1)*100
acc_log
```

Out[233]:

```
81.16883116883116
```

Still, not that better accuracy, so Normalizing it, to increase the accuracy

Trying with MinMax

In [251]:

```
# Normalization method used - sklearn library and MinMaxScaler()
from sklearn import preprocessing
normalised = preprocessing.MinMaxScaler().fit_transform(data_t)
data1 = pd.DataFrame(normalised, columns = data_t.columns)
data1.head()
```

Out[251]:

	Dependents	Education	ApplicantIncome	CoapplicantIncome	LoanAmount	Credit_History	Property_Area
0	0.000000	0.0	0.070489	0.000000	0.198263	1.0	0.0
1	0.333333	0.0	0.054830	0.036192	0.172214	1.0	1.0

	Dependents	Education	ApplicantIncome	CoapplicantIncome	LoanAmount	Credit_History	Property_Area
2	0.000000	0.0	0.035250	0.000000	0.082489	1.0	0.0
3	0.000000	1.0	0.030093	0.056592	0.160637	1.0	0.0
4	0.000000	0.0	0.072356	0.000000	0.191027	1.0	0.0

In [253]:

```
x=data1.drop('employed_Yes',axis=1)
y=data1['employed_Yes']
```

In [256]:

```
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.20)
model2=LogisticRegression()
model2.fit(x_train,y_train)
y_predicted2=model2.predict(x_test)
accuracy_score(y_test,y_predicted2)
```

Out[256]:

0.8373983739837398

In [258]:

```
random_forest = RandomForestClassifier(n_estimators= 100)
random_forest.fit(x_train, y_train)
pred_rf = random_forest.predict(x_test)
acc_rf = accuracy_score(y_test , pred_rf)*100
acc_rf
```

Out[258]:

82.92682926829268

Still not that better even with Random Forest,

Now, Trying another pre-processing technique

In [321]:

```
df=data_t
from sklearn import preprocessing
le = preprocessing.LabelEncoder()
df['Male']=le.fit_transform(df['Male'])
df['married_Yes']=le.fit_transform(df['married_Yes'])
df['Education']=le.fit_transform(df['Education'])
#df['Self_Employed']=le.fit_transform(df['Self_Employed'])
df['Property_Area']=le.fit_transform(df['Property_Area'])
df['employed_Yes']=le.fit_transform(df['employed_Yes'])
df
```

Out[321]:

	Dependents	Education	ApplicantIncome	CoapplicantIncome	LoanAmount	Credit_History	Property_Area
0	0	0	5849	0.0	146	1.0	0
1	1	0	4583	1508.0	128	1.0	2
2	0	0	3000	0.0	66	1.0	0
3	0	1	2583	2358.0	120	1.0	0

	Dependents	Education	ApplicantIncome	CoapplicantIncome	LoanAmount	Credit_History	Property_Area
3	0	1	2583	2358.0	120	1.0	0
4	0	0	6000	0.0	141	1.0	0
...	...	...	...	...	...	...	...
609	0	0	2900	0.0	71	1.0	2
610	3	0	4106	0.0	40	1.0	2
611	1	0	8072	240.0	253	1.0	0
612	2	0	7583	0.0	187	1.0	0
613	0	0	4583	0.0	133	0.0	1

614 rows × 11 columns

In [322]:

```
df.reset_index(inplace=True)
```

In [323]:

```
df.drop('index',axis=1,inplace=True)
df
```

Out[323]:

	Dependents	Education	ApplicantIncome	CoapplicantIncome	LoanAmount	Credit_History	Property_Area
0	0	0	5849	0.0	146	1.0	0
1	1	0	4583	1508.0	128	1.0	2
2	0	0	3000	0.0	66	1.0	0
3	0	1	2583	2358.0	120	1.0	0
4	0	0	6000	0.0	141	1.0	0
...	...	...	...	...	...	...	...
609	0	0	2900	0.0	71	1.0	2
610	3	0	4106	0.0	40	1.0	2
611	1	0	8072	240.0	253	1.0	0
612	2	0	7583	0.0	187	1.0	0
613	0	0	4583	0.0	133	0.0	1

614 rows × 11 columns

In [324]:

```
x=df.drop('employed_Yes',axis=1)
y=df['employed_Yes']
```

In [366]:

```
x_train1,x_test1,y_train1,y_test1=train_test_split(x,y,test_size=0.20)
model11=LogisticRegression()
model11.fit(x_train1,y_train1)
y_predicted11=model11.predict(x_test1)
from sklearn.metrics import accuracy_score
```

```
acc_log1=accuracy_score(y_test1,y_predicted11)
acc_log1
```

Out[366]:

```
0.8699186991869918
```

In [341]:

```
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.20)
```

In [342]:

```
model1=LogisticRegression()
model1.fit(x_train,y_train)
```

Out[342]:

```
LogisticRegression()
```

In [343]:

```
y_predicted1=model1.predict(x_test)
```

In [312]:

```
from sklearn.metrics import accuracy_score
acc_log=accuracy_score(y_test,y_predicted1)
acc_log
```

Out[312]:

```
0.8702702702702703
```

KNN

In [358]:

```
from sklearn.neighbors import KNeighborsClassifier
knn = KNeighborsClassifier(n_neighbors = 3)
knn.fit(x_train, y_train)
pred_knn = knn.predict(x_test)
acc_knn = accuracy_score(y_test , pred_knn)*100
acc_knn
```

Out[358]:

```
86.99186991869918
```

Checking with other neighbours, to get the best KNN accuracy

In [367]:

```
for i in range(1,12):
    knn = KNeighborsClassifier(n_neighbors = i)
    knn.fit(x_train1, y_train1)
    pred_knn = knn.predict(x_test1)
    acc_knn = accuracy_score(y_test1 , pred_knn)*100
    print("Neighbours: ",i,", Accuracy: ",acc_knn)
```

```
Neighbours:  1 , Accuracy:  82.11382113821138
Neighbours:  2 , Accuracy:  88.6178861788618
Neighbours:  3 , Accuracy:  87.8048780487805
```

```
Neighbours:  4 , Accuracy:  86.99186991869918
Neighbours:  5 , Accuracy:  86.99186991869918
Neighbours:  6 , Accuracy:  86.99186991869918
Neighbours:  7 , Accuracy:  86.99186991869918
Neighbours:  8 , Accuracy:  86.99186991869918
Neighbours:  9 , Accuracy:  87.8048780487805
Neighbours:  10 , Accuracy:  88.6178861788618
Neighbours:  11 , Accuracy:  88.6178861788618
```

Naive Bayes

In [369]:

```
from sklearn.naive_bayes import GaussianNB
gaussian = GaussianNB()
gaussian.fit(x_train1, y_train1)
pred_gb = gaussian.predict(x_test1)
acc_nb = accuracy_score(y_test1 , pred_gb)*100
acc_nb
```

Out[369]:

```
84.5528455284553
```

Random Forest

In [345]:

```
from sklearn.ensemble import RandomForestClassifier
rf_model = RandomForestClassifier(n_estimators= 100)
rf_model.fit(x_train1, y_train1)
pred_rf = rf_model.predict(x_test1)
acc_rf = accuracy_score(y_test1 , pred_rf)*100
acc_rf
```

Out[345]:

```
92.6829268292683
```

In [375]:

```
gbk = GradientBoostingClassifier()
gbk.fit(x_train1, y_train1)
pred_gbc = gbk.predict(x_test1)
acc_gbc = accuracy_score(y_test1 , pred_gbc)*100
acc_gbc
```

Out[375]:

```
86.1788617886179
```

SVM

In [371]:

```
svc = SVC()
svc.fit(x_train1, y_train1)
pred_svm = svc.predict(x_test1)
acc_svm = accuracy_score(y_test1 , pred_svm)*100
```

```
acc_svm
```

Out[371]:

87.8048780487805

In [387]:

```
## Accuracy Results, best to worst
models = pd.DataFrame({
    'Model': ['Logistic Regression', 'K- Nearest Neighbour' ,'Naive Bayes' ,
              'Random Forrest','Gradient Boosting Classifier', 'SVM',],
    'Score': [acc_log , acc_knn , acc_nb, acc_rf, acc_gbc ,acc_svm]})
models.sort_values(by='Score', ascending=False)
```

Out[387]:

	Model	Score
3	Random Forrest	91.869919
1	K- Nearest Neighbour	88.617886
5	SVM	87.804878
0	Logistic Regression	87.027027
4	Gradient Boosting Classifier	86.178862
2	Naive Bayes	84.552846

In [389]:

```
# Checking the importance of each Columns
importances = pd.DataFrame({'Features':x_train.columns,'Importance':np.round(ran
dom_forest.feature_importances_,3)})
importances =
importances.sort_values('Importance',ascending=False).set_index('Features')
importances.head(11)
```

Out[389]:

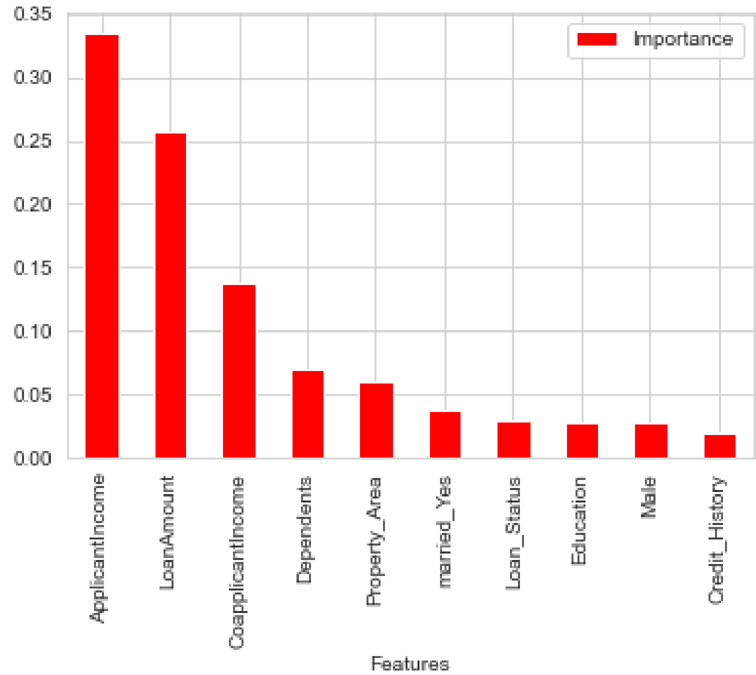
	Importance
Features	
ApplicantIncome	0.335
LoanAmount	0.257
CoapplicantIncome	0.137
Dependents	0.069
Property_Area	0.060
married_Yes	0.037
Loan_Status	0.030
Education	0.028
Male	0.027
Credit_History	0.020

In [391]:

```
importances.plot.bar(color='red')
```

Out[391]:

```
<AxesSubplot:xlabel='Features'>
```

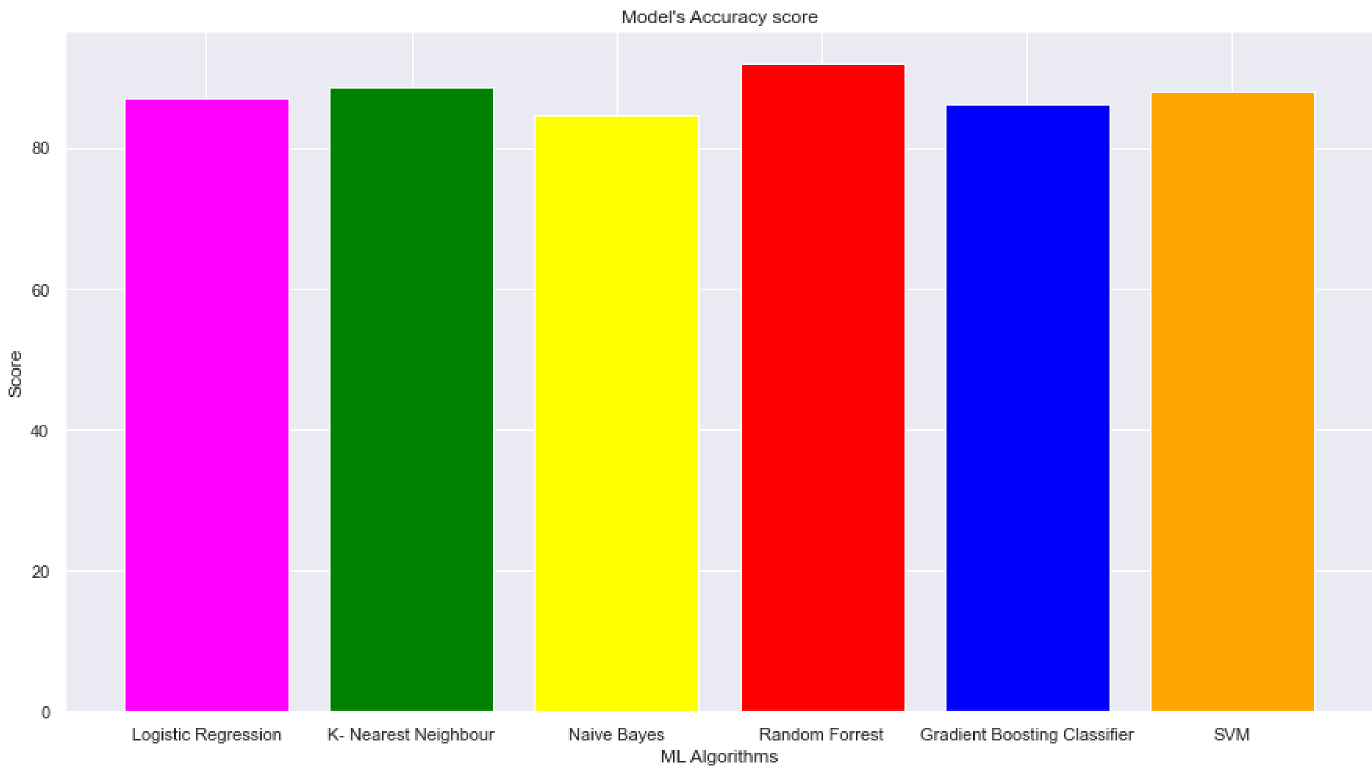


In [393]:

```
nam=['Logistic Regression', 'K- Nearest Neighbour', 'Naive Bayes', 'Random
Forrest','Gradient Boosting Classifier', 'SVM']
val=[acc_log , acc_knn , acc_nb, acc_rf, acc_gbc ,acc_svm]
sns.set(rc={'figure.figsize':(15,8)})
plt.bar(nam,val,color=["magenta","green","yellow","red","blue","orange"])
plt.xlabel("ML Algorithms")
plt.title("Model's Accuracy score")
plt.ylabel("Score")
```

Out[393]:

```
Text(0, 0.5, 'Score')
```



From the above bar plot, We can conclude that,

- **Random Foest performed the best for our model.**
- **And, Naive Bayes was not that accurate as compared to the others**

Conclusion:

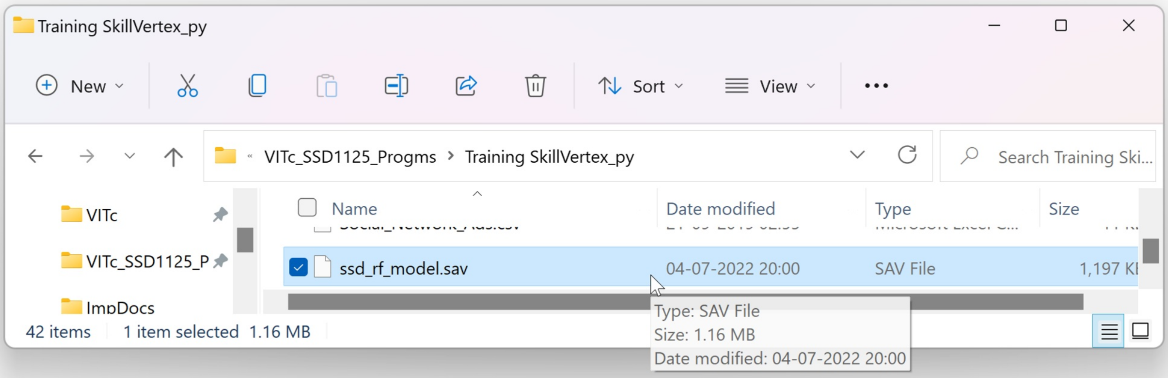
- **We were successfully able to create an accurate model with somewhat a great accuracy of 92%.**
- **We have even compared many ML models, and found that Random Forest worked best for this case.**
- **This model can be very useful for real life Loan allowance scenarios, and so, We have save it.**
- **The model has been used in the later part of this pdf/pynb file.**

In [468]:

```
# Saving our best model
import pickle
filename = 'ssd_rf_model.sav'
pickle.dump(rf_model, open(filename, 'wb'))

# for loading the model from disk
"""
loaded_model = pickle.load(open(filename, 'rb'))
result = loaded_model.score(X_test, Y_test)
"""
```

Out[468]:

```
"\nloaded_model = pickle.load(open(filename, 'rb'))\nresult =
loaded_model.score(X_test, Y_test)\n"
```



Predicting the Loan approval Prediction for a Customer

In [408]:

```
Factors=[0]*x.shape[1]
np.array(Factors)
```

```
colm=np.array(x.columns)
Factors
```

Out[408]:

```
[0, 0, 0, 0, 0, 0, 0, 0, 0, 0]
```

In [409]:

```
#print("Welcome to SSD's□Bank □")
#print("Kinkly enter the details to ")
for i in range(0, x.shape[1]):
    Factors[i]=int(input(print(f'Enter the value for',colm[i] ,": ")))
Factors=np.reshape(Factors,[1,10])
customer= pd.DataFrame(Factors, index=range(1), columns=x.columns)
loan_Status=rf_model.predict(customer)
if loan_Status[0]==1:
    print('\n\n Congratulations: The Loan is approved for you')
else:
    print('\n\n Sorry: The Loan is not approved for you')
```

```
Enter the value for Dependents :
None1
Enter the value for Education :
None1
Enter the value for ApplicantIncome :
None456389
Enter the value for CoapplicantIncome :
None82726
Enter the value for LoanAmount :
None100
Enter the value for Credit_History :
None10
Enter the value for Property_Area :
None231
Enter the value for Loan_Status :
None0
Enter the value for Male :
None0
Enter the value for married_Yes :
None1


 Congratulations: The Loan is approved for you
```

For our comfort, making the columns more understandable

In [452]:

```
# For our comfort, making the columns more understandable
ssd=x
ssd.rename(columns={'Dependents':'No. Of Dependets□',
                    'Education':'Education□□(Graduated: 1, Not Graduated: 0)',
                    'Loan_Status':'Self_Employed□(0: No, 1: Yes)',
                    'Male':"Gender(Male□: 1, Female□: 0)",
                    'married_Yes':'Married□(0 for No, 1 for Yes)'},inplace = True
)
ssd
```

Out[452]:

No. Of Education□□(Graduated:

	No. Of Dependets□	Education□□(Graduated: 1, Not Graduated: 0)	ApplicantIncome	CoapplicantIncome	LoanAmount	Credit_History
0	0	0	5849	0.0	146	1.0
1	1	0	4583	1508.0	128	1.0
2	0	0	3000	0.0	66	1.0
3	0	1	2583	2358.0	120	1.0
4	0	0	6000	0.0	141	1.0
...	...	...	...	...	...	...
609	0	0	2900	0.0	71	1.0
610	3	0	4106	0.0	40	1.0
611	1	0	8072	240.0	253	1.0
612	2	0	7583	0.0	187	1.0
613	0	0	4583	0.0	133	0.0

614 rows × 10 columns

In [459]:

```
Factors=[0]*ssd.shape[1]
np.array(Factors)
cols=np.array(x.columns)
org=df.drop('employed_Yes',axis=1)
Factors
```

Out[459]:

```
[0, 0, 0, 0, 0, 0, 0, 0, 0, 0]
```

In [463]:

```
print("Welcome to SSD's□Bank □")
print("Kindly enter the details to know if you are applicable for a loan or not.
")
n=input("Enter your name: ")
for i in range(0, ssd.shape[1]):
    print("Enter the value for, ",cols[i],": ",end=" ")
    inf=int(input(": "))
    #Factors[i]=int(input(print(f'Enter the value for',colm[i] ,": ")))
    Factors[i]=inf
Factors=np.reshape(Factors,[1,10])
customer= pd.DataFrame(Factors, index=range(1), columns=org.columns)
# Predicting the output
loan_Status=rf_model.predict(customer)
if loan_Status[0]==1:
    print('\n Congratulations□',n,", The Loan is approved for you □")
else:
    print('\n Sorry 😞',n,", The Loan is not approved for you😞")
```

```
Welcome to SSD's□Bank □
Kindly enter the details to know if you are applicable for a loan or not.
Enter your name: SiddharthSD
Enter the value for,  No. Of Dependets□ :  : 2
Enter the value for,  Education□□(Graduated: 1, Not Graduated: 0) :  : 1
Enter the value for,  ApplicantIncome :  : 2500000
Enter the value for,  CoapplicantIncome :  : 100000
Enter the value for,  LoanAmount :  : 100000
```

```
Enter the value for,  Credit_History :  : 5
Enter the value for,  Property_Area :  : 320500
Enter the value for,  Self_Employed (0: No, 1: Yes) :  : 1
Enter the value for,  Gender(Male : 1, Female : 0) :  : 1
Enter the value for,  Married (0 for No, 1 for Yes) :  : 0

 Congratulations  SiddharthSD , The Loan is approved for you 
```

In [469]:

```
# Checking the model on another Real life situation
```

In [464]:

```
Factors=[0]*ssd.shape[1]
np.array(Factors)
cols=np.array(ssd.columns)
org=df.drop('employed_Yes',axis=1)
```

In [466]:

```
print("Welcome to SSD's Bank ")
print("Kindly enter the details to know if you are applicable for a loan or not.
")
n=input("Enter your name: ")
for i in range(0, ssd.shape[1]):
    print("Enter the value for, ",cols[i],": ",end=" ")
    inf=int(input(": "))
    #Factors[i]=int(input(print(f'Enter the value for',colm[i] ,": ")))
    Factors[i]=inf
Factors=np.reshape(Factors,[1,10])
customer= pd.DataFrame(Factors, index=range(1), columns=org.columns)
# Predicting the output
loan_Status=rf_model.predict(customer)
if loan_Status[0]==1:
    print('\n Congratulations ',n,", The Loan is approved for you ")
else:
    print('\n Sorry 😔',n,", The Loan is not approved for you😩")
```

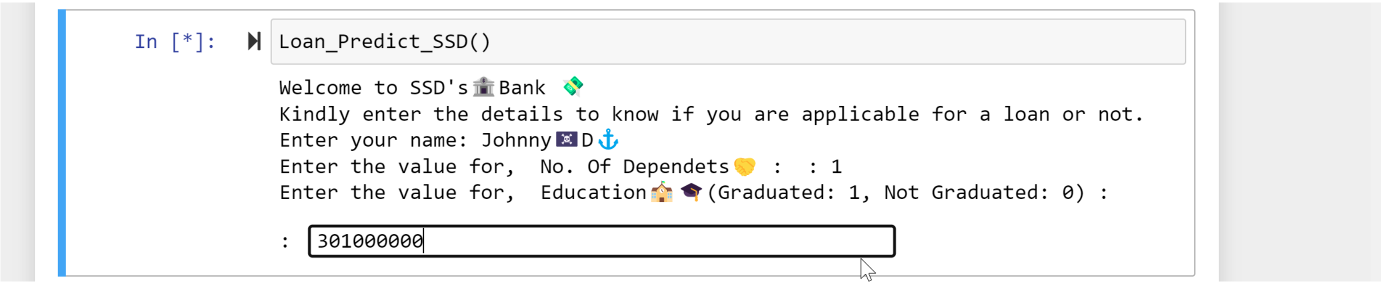
```
Welcome to SSD's Bank 
Kindly enter the details to know if you are applicable for a loan or not.
Enter your name: Amber
Enter the value for,  No. Of Dependets :  : 0
Enter the value for,  Education (Graduated: 1, Not Graduated: 0) :  : 0
Enter the value for,  ApplicantIncome :  : 1000
Enter the value for,  CoapplicantIncome :  : 0
Enter the value for,  LoanAmount :  : 103500000
Enter the value for,  Credit_History :  : 2
Enter the value for,  Property_Area :  : 100000
Enter the value for,  Self_Employed (0: No, 1: Yes) :  : 0
Enter the value for,  Gender(Male : 1, Female : 0) :  : 0
Enter the value for,  Married (0 for No, 1 for Yes) :  : 0

 Sorry 😔 Amber , The Loan is not approved for you😩
```

In [470]:

```
def Loan_Predict_SSD():
    Factors=[0]*ssd.shape[1]
    np.array(Factors)
    cols=np.array(ssd.columns)
    org=df.drop('employed_Yes',axis=1)
```

```
    print("Welcome to SSD's□Bank □")
    print("Kindly enter the details to know if you are applicable for a loan or
not.")
    n=input("Enter your name: ")
    for i in range(0, ssd.shape[1]):
        print("Enter the value for, ",cols[i],": ",end=" ")
        inf=int(input(": "))
        #Factors[i]=int(input(print(f'Enter the value for',colm[i] ,": ")))
        Factors[i]=inf
    Factors=np.reshape(Factors,[1,10])
    customer= pd.DataFrame(Factors, index=range(1), columns=org.columns)
    # Predicting the output
    loan_Status=rf_model.predict(customer)
    if loan_Status[0]==1:
        print('\n Congratulations□',n,", The Loan is approved for you □")
    else:
        print('\n Sorry 😩',n,", The Loan is not approved for you😩")
```

Showing how the Model/Project asks for input:



```
In [*]:  Loan_Predict_SSD()

Welcome to SSD's🏦Bank 💸
Kindly enter the details to know if you are applicable for a loan or not.
Enter your name: Johnny🏴‍☠️D⚓
Enter the value for,  No. Of Dependets🤝  :  : 1
Enter the value for,  Education🏫🎓(Graduated: 1, Not Graduated: 0) :

: 301000000
```

In [476]:

```
Loan_Predict_SSD()
```

```
Welcome to SSD's□Bank □
Kindly enter the details to know if you are applicable for a loan or not.
Enter your name: Johnny□☠D⚓
Enter the value for,  No. Of Dependets□ :  : 2
Enter the value for,  Education□□(Graduated: 1, Not Graduated: 0) :  : 1
Enter the value for,  ApplicantIncome :  : 301000000
Enter the value for,  CoapplicantIncome :  : 100000
Enter the value for,  LoanAmount :  : 100
Enter the value for,  Credit_History :  : 5
Enter the value for,  Property_Area :  : 7460378
Enter the value for,  Self_Employed□(0: No, 1: Yes) :  : 1
Enter the value for,  Gender(Male□: 1, Female□: 0) :  : 1
Enter the value for,  Married□(0 for No, 1 for Yes) :  : 0

 Congratulations□ Johnny□☠D⚓ , The Loan is approved for you □
```

In [480]:

```
Loan_Predict_SSD()
```

```
Welcome to SSD's□Bank □
Kindly enter the details to know if you are applicable for a loan or not.
Enter your name: Elon□ M□⚡
Enter the value for,  No. Of Dependets□ :  : 0
Enter the value for,  Education□□(Graduated: 1, Not Graduated: 0) :  : 0
Enter the value for,  ApplicantIncome :  : 700000000000
Enter the value for,  CoapplicantIncome :  : 100000000000000000000
Enter the value for,  LoanAmount :  : 1000000000000000000000000000000000
Enter the value for,  Credit_History :  : 0
```

```
Enter the value for,  Property_Area :  : 123
Enter the value for,  Self_Employed□(0: No, 1: Yes) :  : 0
Enter the value for,  Gender(Male□: 1, Female□: 0) :  : 1
Enter the value for,  Married□(0 for No, 1 for Yes) :  : 1

 Sorry 😕 Elon□ M□⚡ , The Loan is not approved for you😟
```

In [490]:

```
Loan_Predict_SSD()
```

```
Welcome to SSD's□Bank □
Kindly enter the details to know if you are applicable for a loan or not.
Enter your name: Siddharth Shankar Das
Enter the value for,  No. Of Dependets□ :  : 2
Enter the value for,  Education□□(Graduated: 1, Not Graduated: 0) :  : 1
Enter the value for,  ApplicantIncome :  : 2500000
Enter the value for,  CoapplicantIncome :  : 100000
Enter the value for,  LoanAmount :  : 6000
Enter the value for,  Credit_History :  : 5
Enter the value for,  Property_Area :  : 320500
Enter the value for,  Self_Employed□(0: No, 1: Yes) :  : 1
Enter the value for,  Gender(Male□: 1, Female□: 0) :  : 1
Enter the value for,  Married□(0 for No, 1 for Yes) :  : 0

 Congratulations□ Siddharth Shankar Das , The Loan is approved for you □
```

Mini Project Conclusion:

    Thanks to SkillVertex, and our Mentor Soumya Ma'am, We were successfully
    able to make an accurate model which can predic Loan with given factors,
    and seeing the output, above program, It can be clearly stated that this
    can be used for real life scenarios as well

VITc_SSD1125_ | Mini Project Co | AI_Final - Jupyt | Major Project_

localhost:8888/notebooks/VITc_SSD1125_Progms/Training%20SkillVertex_Si...

jupyter Mini Project Code-Loan Prediction - Siddharth Sha... (autosaved) Logout

File Edit View Insert Cell Kernel Widgets Help Not Trusted Python 3 (ipykernel)

Run Markdown

Showing how the Model/Project asks for input:

In [*]:
```
Loan_Predict_SSD()
```

```
Welcome to SSD's 🏦 Bank 💸
Kindly enter the details to know if you are applicable for a loan or not.
Enter your name: Johnny 🏴‍☠️ D ⚓
Enter the value for,  No. Of Dependets 🤝 :  : 1
Enter the value for,  Education 🏫 🎓 (Graduated: 1, Not Graduated: 0) :
: 301000000
```

In [476]:
```
Loan_Predict_SSD()
```

```
Welcome to SSD's 🏦 Bank 💸
Kindly enter the details to know if you are applicable for a loan or not.
Enter your name: Johnny 🏴‍☠️ D ⚓
Enter the value for,  No. Of Dependets 🤝 :  : 2
Enter the value for,  Education 🏫 🎓 (Graduated: 1, Not Graduated: 0) :  : 1
Enter the value for,  ApplicantIncome :  : 301000000
Enter the value for,  CoapplicantIncome :  : 100000
Enter the value for,  LoanAmount :  : 100
Enter the value for,  Credit_History :  : 5
Enter the value for,  Property_Area :  : 7460378
Enter the value for,  Self_Employed 🏢 (0: No, 1: Yes) :  : 1
Enter the value for,  Gender(Male 👨 : 1, Female 👩 : 0) :  : 1
Enter the value for,  Married 💍 (0 for No, 1 for Yes) :  : 0

 Congratulations 🥳  Johnny 🏴‍☠️ D ⚓  , The Loan is approved for you 👍
```

In [480]:
```
Loan_Predict_SSD()
```

```
Welcome to SSD's 🏦 Bank 💸
Kindly enter the details to know if you are applicable for a loan or not.
Enter your name: Elon 🚀  M 🐐 ⚡
Enter the value for,  No. Of Dependets 🤝 :  : 0
Enter the value for,  Education 🏫 🎓 (Graduated: 1, Not Graduated: 0) :  : 0
Enter the value for,  ApplicantIncome :  : 700000000000
Enter the value for,  CoapplicantIncome :  : 1000000000000000000000
Enter the value for,  LoanAmount :  : 10000000000000000000000000000000000
Enter the value for,  Credit_History :  : 0
Enter the value for,  Property_Area :  : 123
Enter the value for,  Self_Employed 🏢 (0: No, 1: Yes) :  : 0
Enter the value for,  Gender(Male 👨 : 1, Female 👩 : 0) :  : 1
Enter the value for,  Married 💍 (0 for No, 1 for Yes) :  : 1

 Sorry  😔  Elon 🚀  M 🐐 ⚡  , The Loan is not approved for you 😓
```

In [490]:
```
Loan_Predict_SSD()
```

```
Welcome to SSD's 🏦 Bank 💸
Kindly enter the details to know if you are applicable for a loan or not.
Enter your name: Siddharth Shankar Das
Enter the value for,  No. Of Dependets 🤝 :  : 2
Enter the value for,  Education 🏫 🎓 (Graduated: 1, Not Graduated: 0) :  : 1
Enter the value for,  ApplicantIncome :  : 2500000
Enter the value for,  CoapplicantIncome :  : 100000
Enter the value for,  LoanAmount :  : 6000
Enter the value for,  Credit_History :  : 5
Enter the value for,  Property_Area :  : 320500
Enter the value for,  Self_Employed 🏢 (0: No, 1: Yes) :  : 1
Enter the value for,  Gender(Male 👨 : 1, Female 👩 : 0) :  : 1
Enter the value for,  Married 💍 (0 for No, 1 for Yes) :  : 0

 Congratulations 🥳  Siddharth Shankar Das , The Loan is approved for you 👍
```

Mini Project Conclusion:

```
Thanks to SkillVertex, and our Mentor Soumya Ma'am, We were successfully
able to make an accurate model which can predic Loan with given factors,
and seeing the output, above program, It can be clearly stated that this
can be used for real life scenarios as well
```