Credit Risk Management

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Details of the project :

Dataset Overview

Train Data Volume	80K
Test Data Volume	20K
Type of Problem	Classification

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Understanding the Data

```
data.describe()
```

✓ 0.1s Python

	annual_inc	emp_length	fico_range_high	fico_range_low	int_rate	loan_amnt	num_actv_bc_tl	mort_acc	tot_cur_bal	open_acc	
count	8.000000e+04	80000.000000	80000.000000	80000.000000	80000.000000	80000.000000	80000.000000	80000.000000	8.000000e+04	80000.000000	80000
mean	7.604614e+04	6.196537	699.987975	695.987813	13.232898	14403.867813	3.633262	1.670701	1.414381e+05	11.605675	0
std	6.902006e+04	3.698757	31.734840	31.734075	4.771705	8703.826298	2.208597	1.971422	1.554119e+05	5.483362	0
min	0.000000e+00	0.000000	664.000000	660.000000	5.310000	750.000000	0.000000	0.000000	0.000000e+00	1.000000	0
25%	4.600000e+04	3.000000	674.000000	670.000000	9.750000	7925.000000	2.000000	0.000000	3.112450e+04	8.000000	0
50%	6.500000e+04	7.000000	694.000000	690.000000	12.740000	12000.000000	3.000000	1.000000	9.302100e+04	11.000000	0
75%	9.000000e+04	10.000000	714.000000	710.000000	15.990000	20000.000000	5.000000	3.000000	2.036260e+05	14.000000	0
max	7.141778e+06	10.000000	850.000000	845.000000	30.990000	40000.000000	32.000000	32.000000	5.172185e+06	80.000000	24

Understanding the Data

Inference : No any Duplicates Found

```
data.isna().sum()
```

[148] ✓ 0.1s

```
addr_state                0
annual_inc                0
earliest_cr_line          0
emp_length             5846
emp_title              6396
fico_range_high           0
fico_range_low            0
grade                     0
home_ownership            0
application_type          0
initial_list_status       0
int_rate                  0
loan_amnt                 0
num_actv_bc_tl         4959
mort_acc               3475
tot_cur_bal            4959
open_acc                  0
pub_rec                   0
pub_rec_bankruptcies     42
purpose                   0
```

NA Check

Fixing NA

```
data['emp_length'] = data['emp_length'].fillna(data['emp_length'].mode()[0])
```

✓ 0.0s

Title of the column has large number of values and looks it is not significant with the result data hence we are dropping the column from the dataset

```
data.drop(columns="emp_title",inplace=True)
```

✓ 0.0s Python

To fill na for column No. of Active Banks we can go with group by emp_length and then take the mean to arrive at the No. of Active Cards

```
data['num_actv_bc_tl'] = data.groupby(['emp_length'])['num_actv_bc_tl'].transform(lambda x : x.fillna(x.mean()))
```

162] ✓ 0.0s Python

```
data['mort_acc'] = data.groupby(['emp_length'])['mort_acc'].transform(lambda x : x.fillna(x.mean()))
```
✓ 0.0s

```
data['tot_cur_bal'] = data.groupby(['emp_length'])['tot_cur_bal'].transform(lambda x : x.fillna(x.mean()))
```
✓ 0.0s

```
data['pub_rec_bankruptcies'] = data['pub_rec_bankruptcies'].fillna(data['pub_rec_bankruptcies'].mode()[0])
```
✓ 0.0s

```
data['revol_util'] = data.groupby(['emp_length'])['revol_util'].transform(lambda x : x.fillna(x.mean()))
```
✓ 0.0s

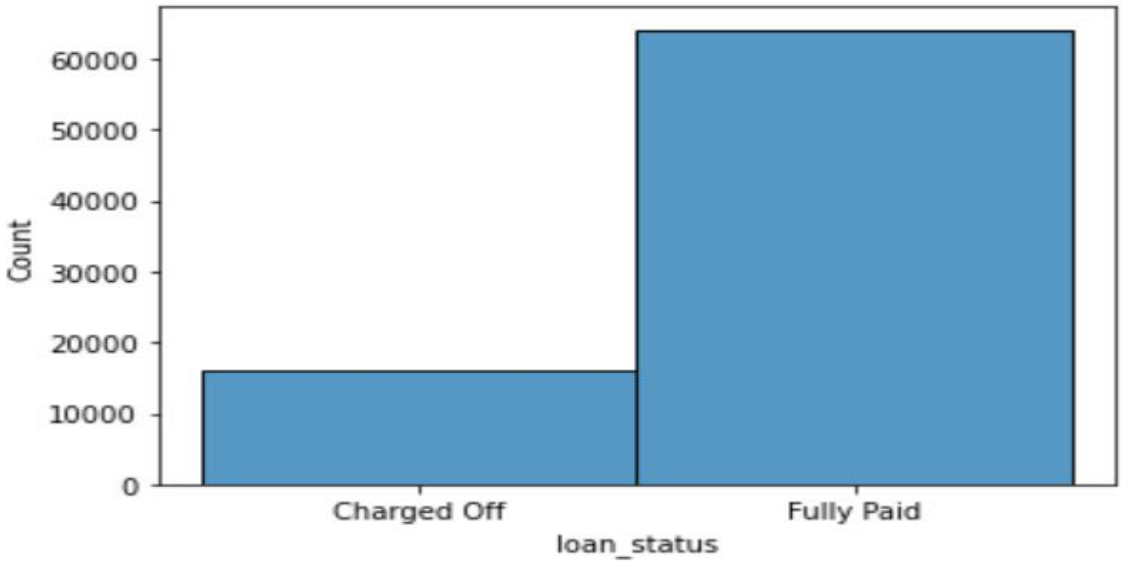
```
data['title'] = data['title'].fillna(data['title'].mode()[0])
```
✓ 0.0s

Analysis of the Input Data

```
sns.histplot(data['loan_status'])
```

✓ 0.3s

```
<AxesSubplot:xlabel='loan_status', ylabel='Count'>
```

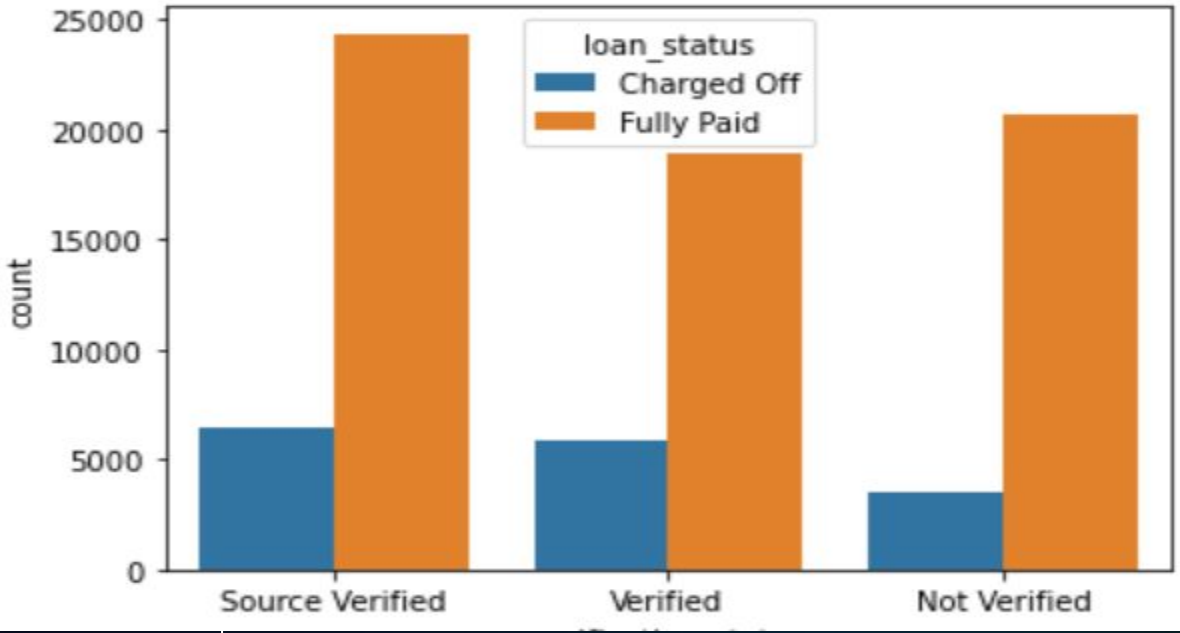


Analysis of the Input Data

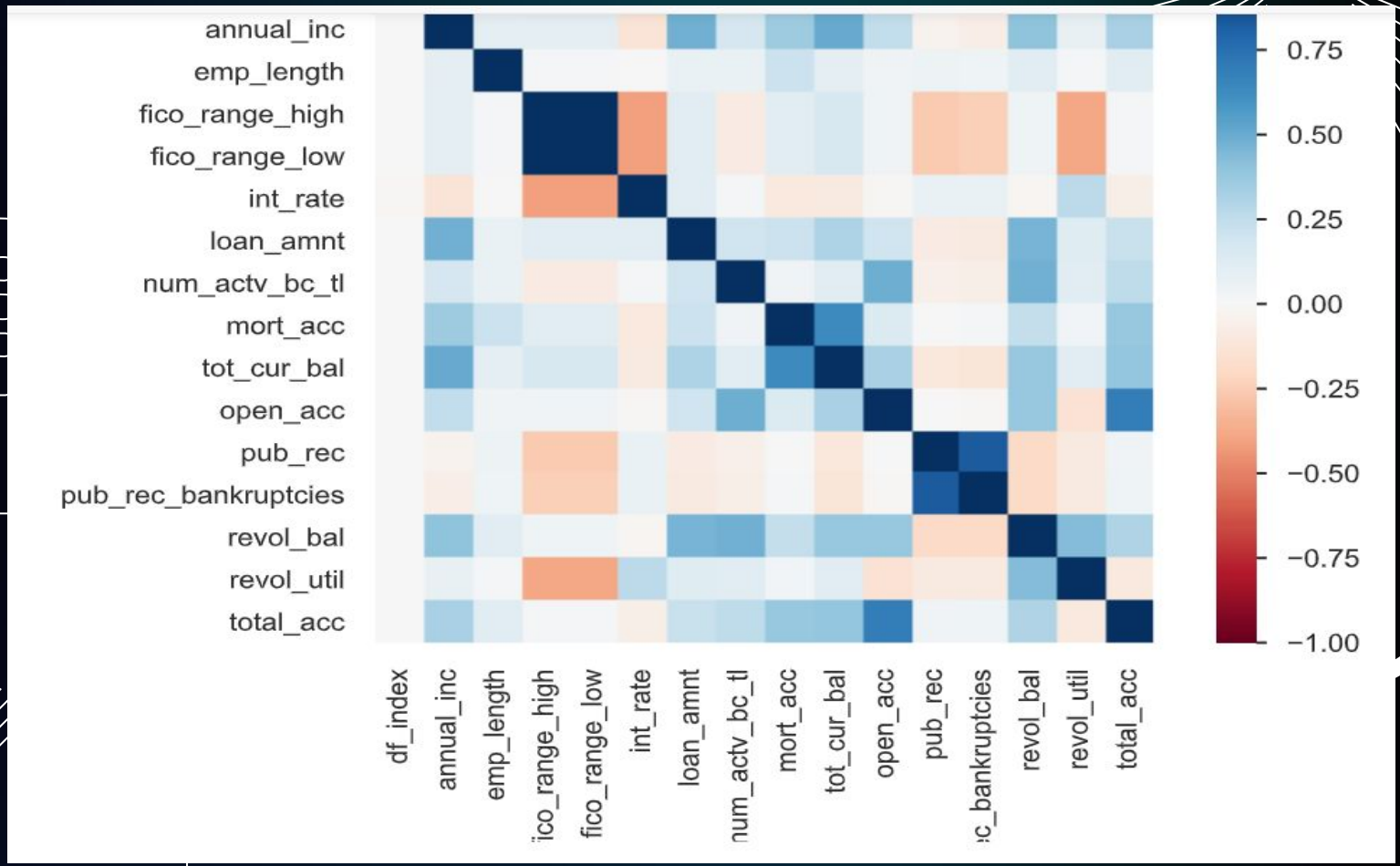
```
sns.countplot(data=data,x='verification_status',hue='loan_status')
```

✓ 0.2s

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



Analysis of the Input Data



PreProcessing

```
[2]  data.drop(columns="title",inplace=True)
     ✓ 0.1s
```

```
[3]  data.drop(columns="addr_state",inplace=True)
     ✓ 0.0s
```

```
[4]  data['earliest_cr_line'].value_counts()
     ✓ 0.0s
```

```
Oct-2001    701
Aug-2001    686
Sep-2003    683
Sep-2004    680
Sep-2002    668
            ...
Jul-2015      1
May-1959      1
Nov-1961      1
Jun-2015      1
Dec-1959      1
Name: earliest_cr_line, Length: 644, dtype: int64
```

PreProcessing

Modification of `earliest_cr_line` Column

```
data['new_earliest_cr_line'] =pd.to_datetime(data["earliest_cr_line"])
```

✓ 0.0s

```
data['new_earliest_cr_line'].dtypes
```

✓ 0.0s

```
dtype('<M8[ns]')
```

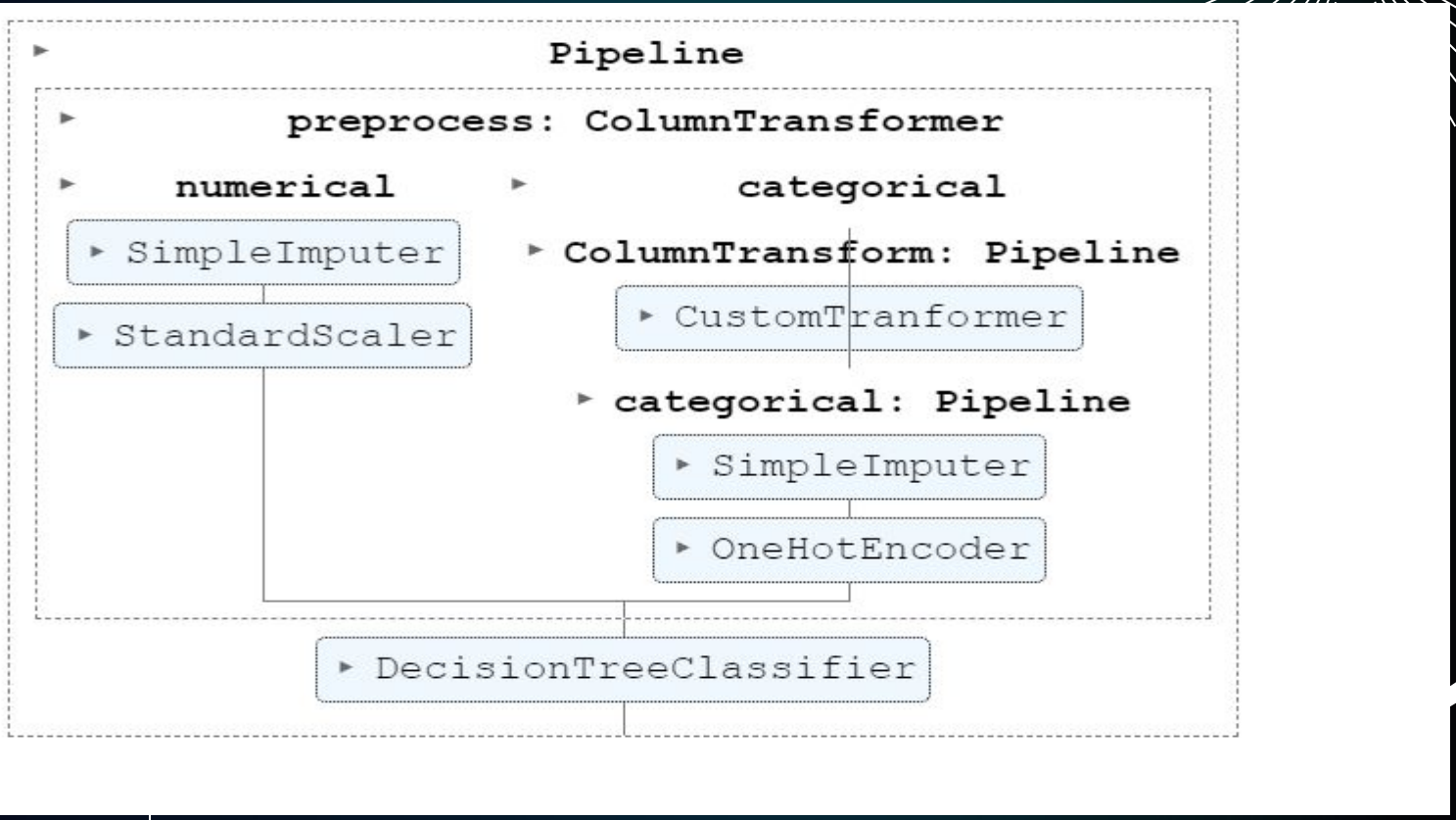
```
data['months'] = (pd.to_datetime('today') - data['new_earliest_cr_line'])/np.timedelta64(1, 'M')
```

✓ 0.0s

```
data['months']
```

✓ 0.0s

PreProcessing



Result by comparing the Results with the Actuals

Note : Algorithm Used : Decision Tree
For Categorical Columns used Simple Imputer and One Hot Encoding
For Numerical Columns used Simple Imputer and Standard Scaler

```
Total matching Records ==13974
Total matching Records with  Fully Paid==12781
Total matching Records with  Charged Off==1193
```

Thank you !