

BANK LOAN DATA ANALYST PROJECT

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PROBLEM STATEMENT

SUMMARY

- In order to monitor and assess our bank's lending activities and performance, we need to create a comprehensive Bank Loan Report. This report aims to provide insights into key loan-related metrics and their changes over time.
- The report will help us make data-driven decisions, track our loan portfolio's health, and identify trends that can inform our lending strategies.

Key Performance Indicators (KPIs)

1. Total Loan Applications

- Calculate total loan applications received during a specified period.
- Monitor Month-to-Date (MTD) Loan Applications and track Month-over-Month (MoM) changes.

2. Total Funded Amount

- Track the total funds disbursed as loans.
- Analyze MTD Total Funded Amount and MoM changes.

3. Total Amount Received

- Assess the total amount received from borrowers for cash flow and loan repayment analysis.
- Evaluate MTD Total Amount Received and observe MoM changes.

Key Performance Indicators (KPIs)

4. Average Interest Rate

- Compute the average interest rate across all loans and monitor MTD and MoM variations.

5. Average Debt-to-Income Ratio (DTI)

- Calculate the average DTI for borrowers to gauge financial health.
- Track MTD and MoM fluctuations in average DTI.

Good Loan vs. Bad Loan KPIs

Good Loan KPIs

1. Good Loan Application Percentage

Calculate the percentage of loan applications classified as 'Good Loans' (Fully Paid and Current).

2. Good Loan Applications

Identify the total number of 'Good Loan' applications.

3. Good Loan Funded Amount

Determine the total funded amount for 'Good Loans.'

4. Good Loan Total Received Amount

Track the total amount received from borrowers for 'Good Loans.'

Bad Loan KPIs

1. Bad Loan Application Percentage

Calculate the percentage of loan applications categorized as 'Bad Loans' (Charged Off).

2. Bad Loan Applications

Identify the total number of 'Bad Loan' applications.

3. Bad Loan Funded Amount

Determine the total funded amount for 'Bad Loans.'

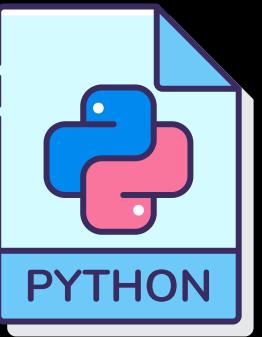
4. Bad Loan Total Received Amount

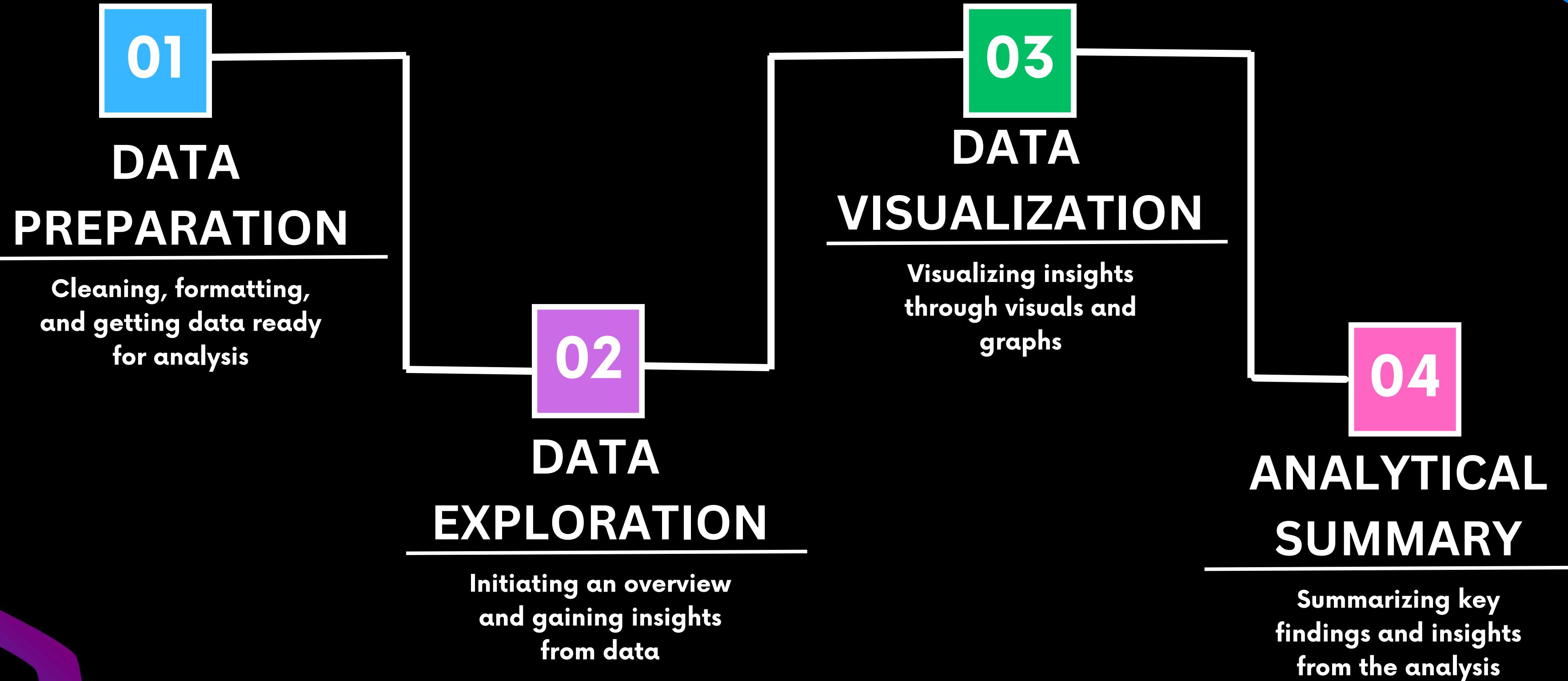
Track the total amount received from borrowers for 'Bad Loans.'

Loan Status Grid View

In order to gain a comprehensive overview of our lending operations and monitor the performance of loans, we aim to create a grid view report categorized by '**Loan Status**'. This report will serve as a valuable tool for analysing and understanding the key indicators associated with different loan statuses. By providing insights into metrics such as '**Total Loan Applications**,' '**Total Funded Amount**,' '**Total Amount Received**,' '**Month-to-Date (MTD) Funded Amount**,' '**MTD Amount Received**,' '**Average Interest Rate**,' and '**Average Debt-to-Income Ratio (DTI)**,' this grid view will empower us to make data-driven decisions and assess the health of our loan portfolio.

ANALYSING DATASET USING PYTHON





COLUMNS

DATASET

id	address_stat	application_type	emp_length	emp_title	grade
member_id	purpose	sub_grade	term	verification_status	annual_income
installment	int_rate	loan_amount	total_acc	total_payment	
home_ownership	issue_date	last_credit_pull_date	last_payment_date	loan_status	next_payment_da

```
Unique values in application_type: ['INDIVIDUAL']
```

```
Unique values in emp_length: ['< 1 year' '9 years' '4 years' '10+ years' '3 years' '5 years' '1 year'  
'6 years' '2 years' '7 years' '8 years']
```

```
Unique values in grade: ['C' 'E' 'B' 'A' 'D' 'F' 'G']
```

```
Unique values in home_ownership: ['RENT' 'MORTGAGE' 'OWN' 'OTHER' 'NONE']
```

```
Unique values in loan_status: ['Charged Off' 'Fully Paid' 'Current']
```

```
Unique values in purpose: ['car' 'credit card' 'Debt consolidation']
```

```
Unique values in sub_grade: ['C4' 'E1' 'C5' 'B2' 'A1' 'C3' 'C2' 'A4' 'A5' 'B5' 'B4' 'B3' 'B1' 'A2'  
'A3' 'D4' 'D2' 'C1' 'D3' 'D1' 'E3' 'F1' 'E2' 'E5' 'D5' 'E4' 'F2' 'G3'  
'F3' 'G1' 'F4' 'G4' 'G2' 'F5' 'G5']
```

```
Unique values in term: [' 60 months' ' 36 months']
```

```
Unique values in verification status: ['Source Verified' 'Not Verified' 'Verified']
```

DATA PREPARATION

REMOVING NULL VALUES

```
df.isnull().sum()  
id          0  
address_state      0  
application_type    0  
emp_length        0  
emp_title         1438  
grade            0  
home_ownership     0  
issue_date         0  
last_credit_pull_date 0  
last_payment_date   0  
loan_status         0  
next_payment_date   0  
member_id           0  
purpose             0  
sub_grade           0  
term                0  
verification_status 0  
annual_income        0  
dti                 0  
installment          0  
int_rate             0  
loan_amount          0  
total_acc            0  
total_payment        0  
dtype: int64
```



```
df.dropna(inplace=True)  
df.isnull().sum()  
id          0  
address_state      0  
application_type    0  
emp_length        0  
emp_title         0  
grade            0  
home_ownership     0  
issue_date         0  
last_credit_pull_date 0  
last_payment_date   0  
loan_status         0  
next_payment_date   0  
member_id           0  
purpose             0  
sub_grade           0  
term                0  
verification_status 0  
annual_income        0  
dti                 0  
installment          0  
int_rate             0  
loan_amount          0  
total_acc            0  
total_payment        0
```

DATA EXPLORATION



GROUP BY PURPOSE

```
grouped_df_based_purpose = df.groupby('purpose').agg({
    'loan_amount': 'sum',
    'total_payment': 'sum'
}).reset_index()

purpose_sorted_grouped_df = grouped_df_based_purpose.sort_values('loan_amount',
                                                               ascending=False).head(10).reset_index(drop=True)
```

```
print(purpose_sorted_grouped_df)
```

	purpose	loan_amount	total_payment
0	Debt consolidation	226723250	247815578
1	credit card	56981600	63156476
2	home improvement	31569375	34555486
3	other	29755700	31895627
4	small business	19971225	19650516
5	major purchase	16625500	17984663
6	car	9897025	10960581
7	wedding	9036625	10059429
8	medical	5382025	5700530
9	house	4583125	4931876



GROUP BY EMP GROUP

```
grouped_df_based_emp_length= df.groupby('emp_length').agg({  
    'loan_amount': 'mean',  
    'annual_income': 'mean'  
}).reset_index()  
emp_length_sorted_grouped_df = grouped_df_based_emp_length.sort_values('loan_amount',  
                           ascending=False).head(10).reset_index(drop=True).round(2)
```

```
print(emp_length_sorted_grouped_df)
```

	emp_length	loan_amount	annual_income
0	10+ years	13019.88	81042.50
1	9 years	11973.53	73695.29
2	8 years	11871.72	74308.71
3	7 years	11666.12	68929.94
4	6 years	11453.76	67722.59
5	5 years	11300.20	67956.18
6	4 years	10951.64	66402.08
7	3 years	10736.81	66486.51
8	2 years	10242.45	63141.62
9	1 year	10202.31	62523.93

STATISTICAL INSIGHT

```
df.describe().transpose()
```

	count	mean	std	min	25%	50%	75%	max
id	37138.0	682226.861220	210803.489299	55742.0000	515955.2500	664075.0000	8.371488e+05	1.077430e+06
member_id	37138.0	849212.139641	266121.432554	70699.0000	666398.2500	848924.0000	1.046772e+06	1.314167e+06
annual_income	37138.0	69279.083181	64233.406664	4000.0000	41600.0000	60000.0000	8.300000e+04	6.000000e+06
dti	37138.0	0.133966	0.066529	0.0000	0.0831	0.1350	1.865000e-01	2.999000e-01
installment	37138.0	326.025746	207.432894	16.0800	168.6775	283.2800	4.318450e+02	1.305190e+03
int_rate	37138.0	0.120540	0.037169	0.0542	0.0932	0.1186	1.459000e-01	2.440000e-01
loan_amount	37138.0	11279.596370	7418.277857	500.0000	5600.0000	10000.0000	1.500000e+04	3.500000e+04
total_acc	37138.0	22.180704	11.386043	2.0000	14.0000	21.0000	2.900000e+01	9.000000e+01
total_payment	37138.0	12267.320588	9017.266703	34.0000	5657.0000	10072.0000	1.665200e+04	5.856400e+04



STATISTICAL INSIGHT

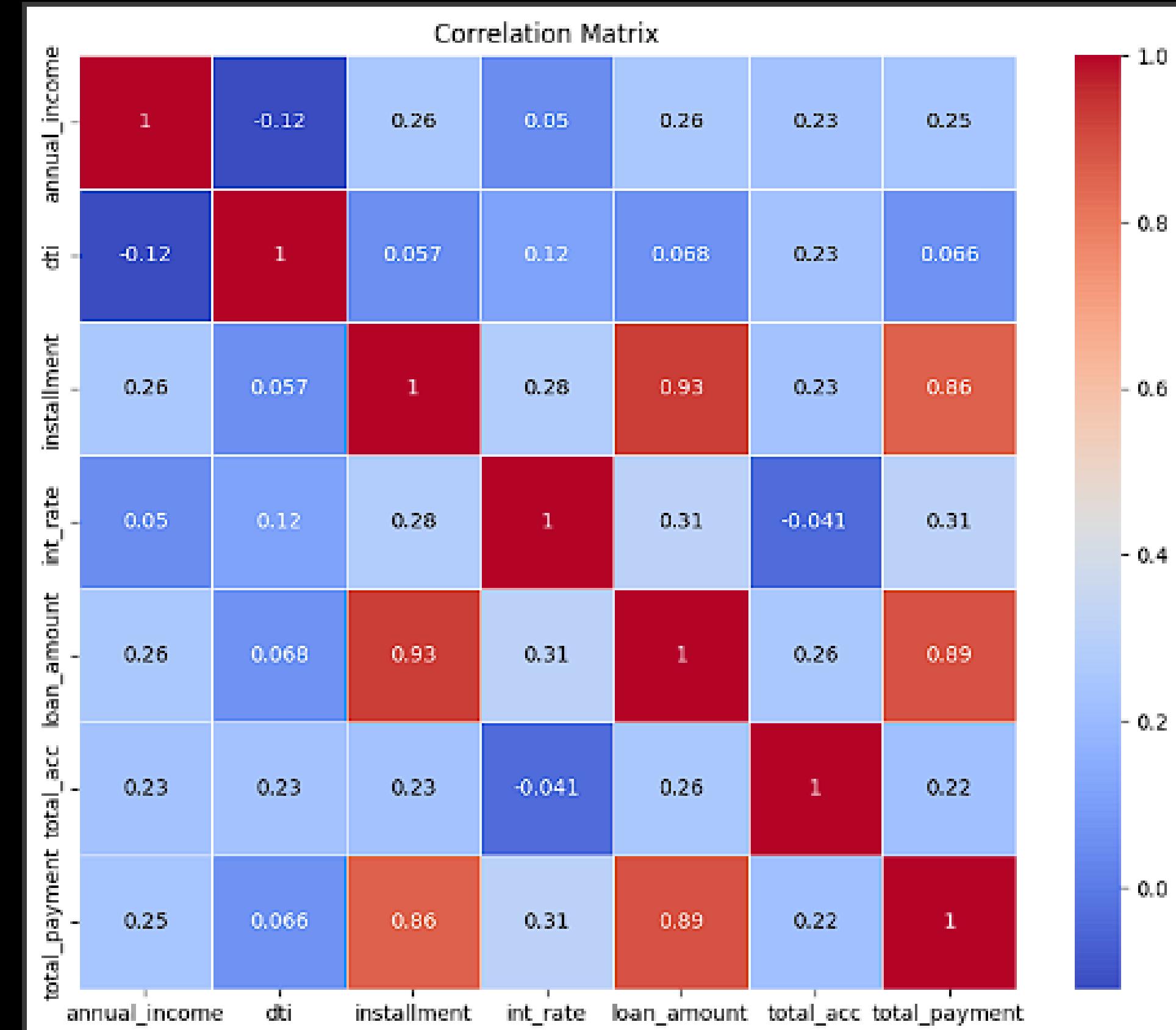
```
selected_columns = ['annual_income', 'dti', 'installment', 'int_rate', 'loan_amount', 'total_acc', 'total_payment']
df_selected = df[selected_columns]
```

```
corr1 = df_selected.corr()
corr1
```

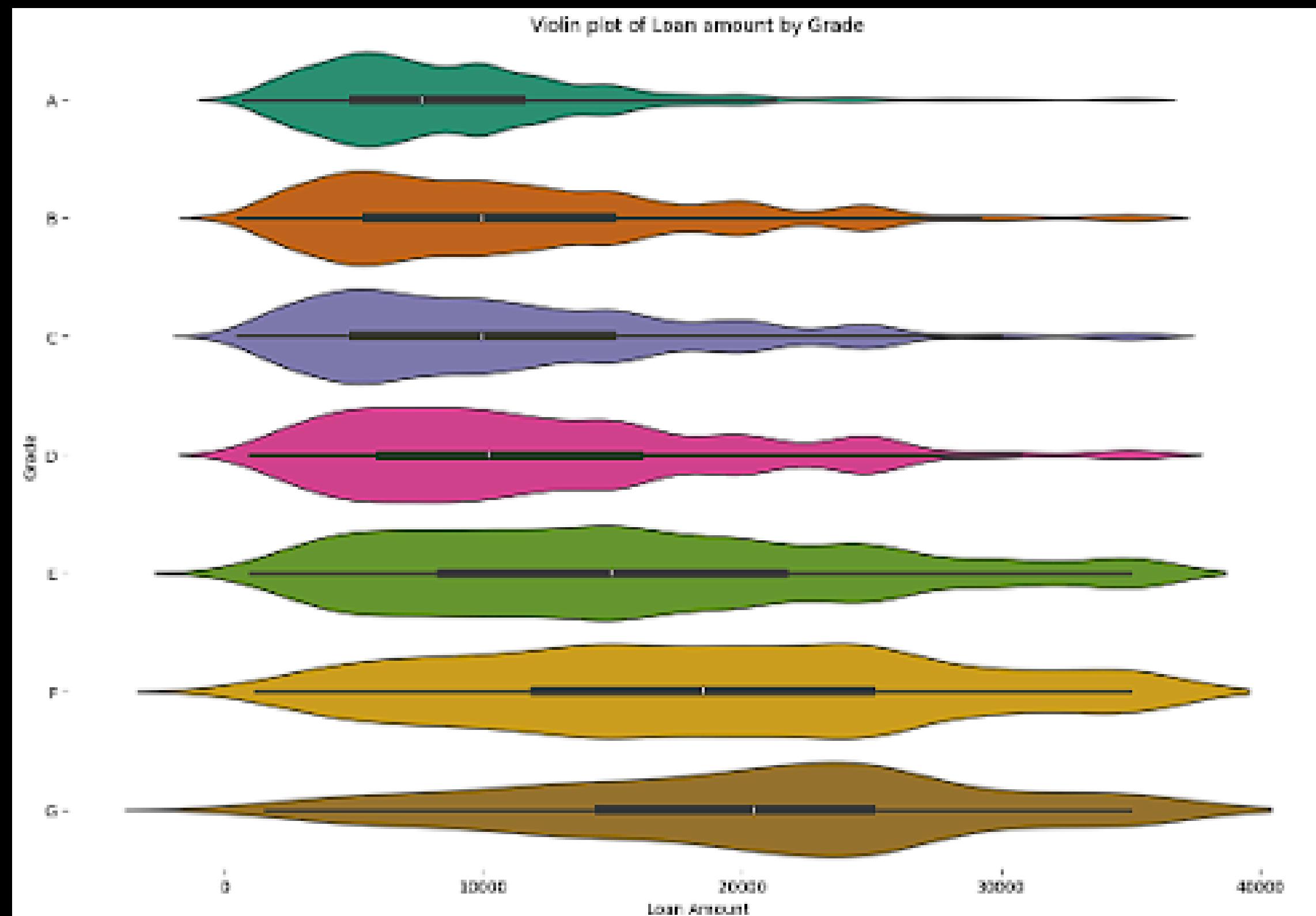
	annual_income	dti	installment	int_rate	loan_amount	total_acc	total_payment
annual_income	1.000000	-0.122218	0.255227	0.050034	0.257568	0.232510	0.245199
dti	-0.122218	1.000000	0.057054	0.115101	0.068449	0.230127	0.066378
installment	0.255227	0.057054	1.000000	0.280720	0.929328	0.230297	0.858081
int_rate	0.050034	0.115101	0.280720	1.000000	0.307638	-0.041447	0.310544
loan_amount	0.257568	0.068449	0.929328	0.307638	1.000000	0.255652	0.888241
total_acc	0.232510	0.230127	0.230297	-0.041447	0.255652	1.000000	0.222774
total_payment	0.245199	0.066378	0.858081	0.310544	0.888241	0.222774	1.000000

DATA VISUALIZATION

CORRECTION MAP

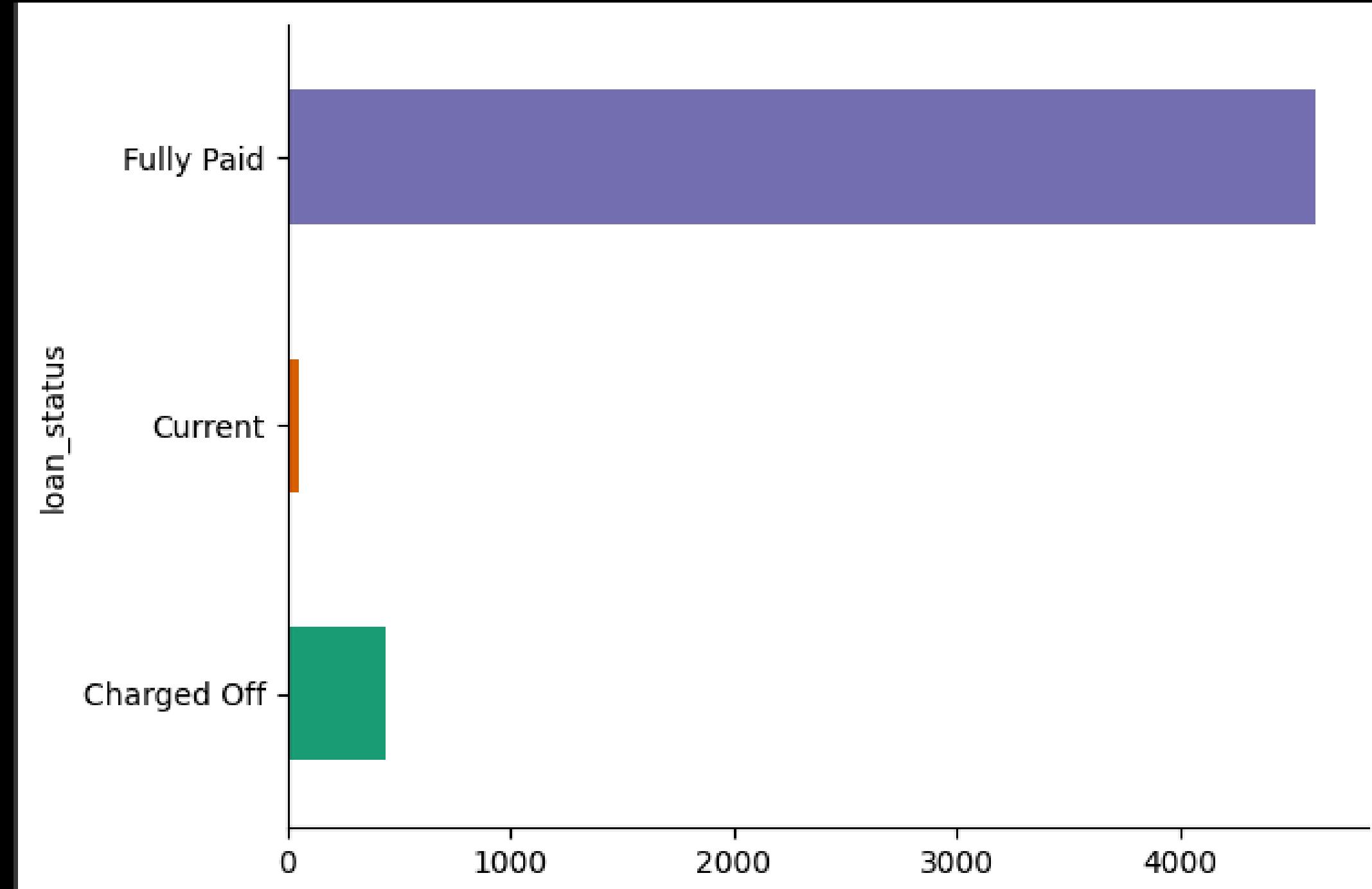


TREND ANALYSIS





TREND ANALYSIS



ANALYTICAL SUMMARY



Profitability Analysis

Fully Paid Loans: These loans result in 86% profit for the bank. This high percentage indicates a strong performance in terms of loan repayments.

Charged-Off Loans: These loans result in a 14% loss, indicating a risk area that needs attention.



Employment Length vs Loan Amount vs. Annual Income

Employment Length vs. Loan Amount

Individuals with longer employment lengths tend to borrow larger loan amounts. Borrowers with "10+ years" of employment have the highest average loan amount.

Employment Length vs. Annual Income

Longer employment generally correlates with higher annual income.

Borrowers with "10+ years" of employment have the highest annual income.



Loan Amount vs. Annual Income

There is a positive correlation between annual income and loan amount, indicating that higher-income individuals are more likely to take larger loans. Both annual income and loan amount tend to decrease slightly with shorter employment lengths.



Debt Consolidation:

Highest loan amount category. Borrowers repay 8.03% more than the borrowed amount, indicating significant interest and fees.

Credit Card:

Borrowers repay 10.83% more than the borrowed amount, indicating substantial interest rates or fees.

Car:

Borrowers repay 10.75% more than the borrowed amount, suggesting a similar interest/fee structure to credit card loans.

REOPRT QUERY DOCUMENT

KPI'S

Total Funded Amount

```
SELECT SUM(loan_amount) AS Total_Funded_Amount FROM bank_loan_data
```

Total_Funded_Amount
435757075

MTD Total Funded Amount

```
SELECT SUM(loan_amount) AS Total_Funded_Amount FROM bank_loan_data WHERE  
MONTH(issue_date) = 12
```

Total_Funded_Amount
53981425

PMTD Total Funded Amount

```
SELECT SUM(loan_amount) AS Total_Funded_Amount FROM bank_loan_data  
WHERE MONTH(issue_date) = 11
```

GOOD LOAN ISSUED

Good Loan Percentage

```
SELECT  
  (COUNT(CASE WHEN loan_status = 'Fully Paid' OR loan_status = 'Current' THEN  
    id END) * 100.0) / COUNT(id)  
AS Good_Loan_Percentage  
FROM bank_loan_data
```

Good_Loan_Percentage
86.175342181667

Good Loan Applications

```
SELECT  
COUNT(id) AS Good_Loan_Applications  
FROM bank_loan_data  
WHERE loan_status = 'Fully Paid' OR loan_status = 'Current'
```

Total_Funded_Amount
435757075

Good Loan Funded Amount

```
SELECT  
SUM(loan_amount) AS Good_Loan_Funded_amount  
FROM bank_loan_data  
WHERE loan_status = 'Fully Paid' OR loan_status = 'Current'
```

Good_Loan_Funded_amount
370224850

Good Loan Amount Received

```
SELECT  
SUM(total_payment) AS Good_Loan_amount_received  
FROM bank_loan_data  
WHERE loan_status = 'Fully Paid' OR loan_status = 'Current'
```

Good_Loan_amount_received
435786170

BAD LOAN ISSUED

Bad Loan Percentage

```
SELECT  
  (COUNT(CASE WHEN loan_status = 'Charged Off' THEN id END) * 100.0) /  
    COUNT(id) AS Bad_Loan_Percentage  
FROM bank_loan_data
```

Bad_Loan_Percentage
13.824657818332

Bad Loan Applications

```
SELECT  
COUNT(id) AS Bad_Loan_Applications  
FROM bank_loan_data  
WHERE loan_status = 'Charged Off'
```

Bad_Loan_Applications
5333

Bad Loan Funded Amount

```
SELECT  
SUM(loan_amount) AS Bad_Loan_Funded_amount  
FROM bank_loan_data  
WHERE loan_status = 'Charged Off'
```

Bad_Loan_Funded_amount
65532225

Bad Loan Amount Received

```
SELECT  
SUM(total_payment) AS Bad_Loan_amount_received  
FROM bank_loan_data  
WHERE loan_status = 'Charged Off'
```

Bad_Loan_amount_received
37284763

LOAN STATUS

```
SELECT  
    loan_status,  
    COUNT(id) AS LoanCount,  
    SUM(total_payment) AS Total_Amount_Received,  
    SUM(loan_amount) AS Total_Funded_Amount,  
    AVG(int_rate * 100) AS Interest_Rate,  
    AVG(dti * 100) AS DTI  
FROM  
    bank_loan_data  
GROUP BY  
    loan_status
```

	loan_status	LoanCount	Total_Amount_Received	Total_Funded_Amount	Interest_Rate	DTI
1	Fully Paid	32145	411586256	351358350	11.6410707918092	13.1673507557434
2	Charged Off	5333	37284763	65532225	13.8785749318289	14.0047328005517
3	Current	1098	24199914	18866500	15.0993260800947	14.7243442736843

LOAN STATUS

```
SELECT  
    loan_status,  
    SUM(total_payment) AS MTD_Total_Amount_Received,  
    SUM(loan_amount) AS MTD_Total_Funded_Amount  
FROM bank_loan_data  
WHERE MONTH(issue_date) = 12  
GROUP BY loan_status
```

loan_status	MTD_Total_Amount_Received	MTD_Total_Funded_Amount
Fully Paid	47815851	41302025
Charged Off	5324211	8732775
Current	4934318	3946625

BANK LOAN REPORT

MONTH

```
SELECT  
    MONTH(issue_date) AS Month_Munber,  
    DATENAME(MONTH, issue_date) AS Month_name,  
    COUNT(id) AS Total_Loan_Applications,  
    SUM(loan_amount) AS Total_Funded_Amount,  
    SUM(total_payment) AS Total_Amount_Received  
FROM bank_loan_data  
GROUP BY MONTH(issue_date), DATENAME(MONTH, issue_date)  
ORDER BY MONTH(issue_date)
```

MONTH

	Month_Munber	Month_name	Total_Loan_Applications	Total_Funded_Amount	Total_Amount_Received
1	1	January	2332	25031650	27578836
2	2	February	2279	24647825	27717745
3	3	March	2627	28875700	32264400
4	4	April	2755	29800800	32495533
5	5	May	2911	31738350	33750523
6	6	June	3184	34161475	36164533
7	7	July	3366	35813900	38827220
8	8	August	3441	38149600	42682218
9	9	September	3536	40907725	43983948
10	10	October	3796	44893800	49399567
11	11	November	4035	47754825	50132030
12	12	December	4314	53981425	58074380

STATE

```
SELECT  
    address_state AS State,  
    COUNT(id) AS Total_Loan_Applications,  
    SUM(loan_amount) AS Total_Funded_Amount,  
    SUM(total_payment) AS Total_Amount_Received  
FROM bank_loan_data  
GROUP BY address_state  
ORDER BY address_state
```

STATE

	State	Total_Loan_Applications	Total_Funded_Amount	Total_Amount_Received
1	AK	78	1031800	1108570
2	AL	432	4949225	5492272
3	AR	236	2529700	2777875
4	AZ	833	9206000	10041986
5	CA	6894	78484125	83901234
6	CO	770	8976000	9845810
7	CT	730	8435575	9357612
8	DC	214	2652350	2921854
9	DE	110	1138100	1269136
10	FL	2773	30046125	31601905
11	GA	1355	15480325	16728040
12	HI	170	1850525	2080184
13	IA	5	56450	64482
14	ID	6	59750	65329
15	IL	1486	17124225	18875941
16	IN	9	86225	85521
17	KS	260	2872325	3247394
18	KY	320	3504100	3792530
19	LA	426	4498900	5001160
20	MA	1310	15051000	16676279
21	MD	1027	11911400	12985170

EMPLOYEE LENGTH

```
SELECT  
    address_state AS State,  
    COUNT(id) AS Total_Loan_Applications,  
    SUM(loan_amount) AS Total_Funded_Amount,  
    SUM(total_payment) AS Total_Amount_Received  
FROM bank_loan_data  
GROUP BY address_state  
ORDER BY address_state
```

Employee_Length	Total_Loan_Applications	Total_Funded_Amount	Total_Amount_Received
< 1 year	4575	44210625	47545011
1 year	3229	32883125	35498348
10+ years	8870	116115950	125871616
2 years	4382	44967975	49206961
3 years	4088	43937850	47551832
4 years	3428	37600375	40964850
5 years	3273	36973625	40397571
6 years	2228	25612650	27908658
7 years	1772	20811725	22584136
8 years	1476	17558950	19025777
9 years	1255	15084225	16516173

BIR REPORT

Bank Loan Report | SUMMARY >>>

Total Loan Applicant
38.6K
MTD
4.3K **MoM**
6.9%

Total Funded Amount
\$435.8M
MTD
54.0M **MoM**
21.6%

Total Amount Received
\$473.1M
MTD
58.1M **MoM**
15.8%

AVG Interest Rate
12%
MTD
12% **MoM**
14.4%

AVG DPI
13%
MTD
13.7% **MoM**
2.7%

 **FILTER**
LOAN STATUS

(All)

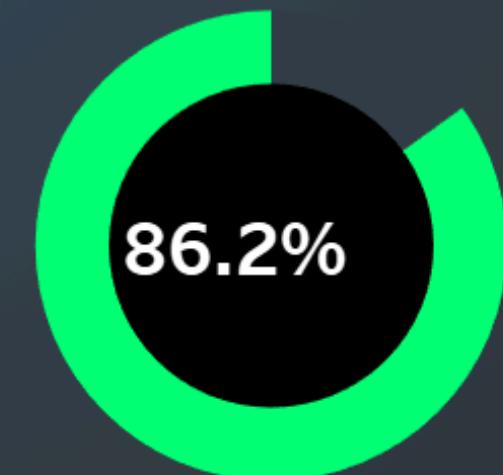
PURPOSE

(All)

VERIFICATION STATUS

(All)
 Not Verified
 Source Verified
 Verified

1 GOOD LOAN



Good Loan Applicant

33.2K

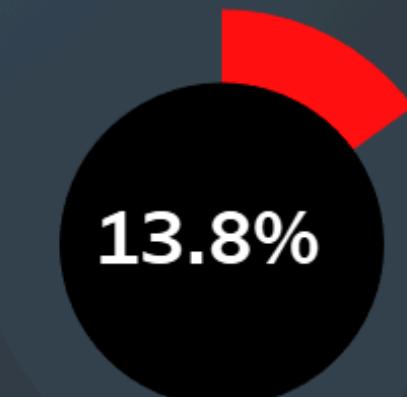
Good Loan Funded Amt

₹ 370.2M

Good Loan Amt received

435.8M

2 BAD LOAN



Bad Loan Applicant

5.3K

Bad Loan Funded Amt

65.5M

Bad Loan Amt received

37.3M

Loan Status	Total Loan Applicants	Total Amount received	Total Funded Amount	MTD Total Funded amou..	MTD Total amount recie..	AVG interest rate	Average DTI
Charged Off	5.3K	437.3M	\$65.5M	\$8.7M	\$5.3M	13.9%	14.0%
Current	1.1K	424.2M	\$18.9M	\$3.9M	\$4.9M	15.1%	14.7%
Fully Paid	32.1K	4411.6M	\$351.4M	\$41.3M	\$47.8M	11.6%	13.2%
Grand Total	38.6K	4473.1M	\$435.8M	\$54.0M	\$58.1M	12.0%	13.3%

FINAL SLIDE

**Happy to see you in my 48th page
And this show you really
like  my post and find some
insight from it**