Loan Data Analysis Project Report

(Using Python)

1. Problem Statement Summary :-

BRD 1: SUMMARY :-

This project analyzes a financial loan dataset to generate insights and support lending decisions.

Key Performance Indicators (KPIs) Requirements:

- **Total Loan Applications :-** We need to calculate the total number of loan applications received during a specified period. Additionally, it is essential to monitor the Month-to-Date (MTD) Loan Applications.
- **Total Funded Amount** :- Understanding the total amount of funds disbursed as loans is crucial. We also want to keep an eye on the MTD Total Funded Amount metric.

- **Total Amount Received** :- Tracking the total amount received from borrowers is essential for assessing the bank's cash flow and loan repayment. We should analyse the Month-to-Date (MTD) Total Amount Receive.

- **Average Interest Rate** :- Calculating the average interest rate across all loans which will provide insights into our lending portfolio's overall cost.

- **Average Debt-to-Income Ratio (DTI)** :- Evaluating the average DTI for our borrowers helps us gauge their financial health. We need to compute the average DTI for all loans.

- **Good Loan vs Bad Loan KPI's :-**

- **Good Loan :**
  1. Good Loan Application Percentage
  2. Good Loan Applications
  3. Good Loan Funded Amount
  4. Good Loan Total Received Amount

- **Bad Loan :-**
  1. Bad Loan Application Percentage
  2. Bad Loan Applications

3. Bad Loan Funded Amount
4. **Bad Loan Total Received Amount**

BRD 2: OVERVIEW :-

CHARTS :-

1. **Monthly Trends by Issue Date (Line/ Area Chart):-**
To identify seasonality and long-term trends in lending activities

2. **Regional Analysis by State (Bar Chart):**

To identify regions with significant lending activity and assess regional disparities

3. **Loan Term Analysis (Donut Chart):**

To allow the client to understand the distribution of loans across various term lengths.

4. **Employee Length Analysis (Bar Chart):**

How lending metrics are distributed among borrowers with different employment

lengths, helping us assess the impact of employment history on loan applications.

5. **Loan Purpose Breakdown (Bar Chart):**

Will provide a visual breakdown of loan metrics based on the stated purposes of

loans, aiding in the understanding of the primary reasons borrowers seek financing.

6. **Home Ownership Analysis (Tree/ Heat Map):**

For a hierarchical view of how home ownership impacts loan applications and disbursements.

❖ Dataset Used :

Dataset: financial_loan.xlsx
Contains loan-level data including fields like issue date, loan amount, term, state, employment length, purpose, interest rate, home ownership, etc.
This dataset was processed using Python (Pandas) and visualized using Matplotlib and Plotly.

Key Performance Indicators (KPI's)

Important KPI's :-

- ❖ **Total Number Of Applications :- 38576**

- ❖ **Total Funded Amount :- $ 435.76M**

- ❖ **Total Amount Received :- $ 473.07 M**

- ❖ **Average Interest Rate :- 12.05 %**

- ❖ **Average Debt-to-Income Ratio (DTI) :- 13 .33 %**

- ❖ **Good Loan Metrics :**
- ❖ **Good Loan Application Percentage :- 86.17 %**
- ❖ **Good Loan Applications :- 33243**
- ❖ **Good Loan Funded Amount:- $ 370.22 M**
- ❖ **Good Loan Total Received Amount :- $435.79 M**

- ❖ **Bad Loan Metrics :**
- ❖ **Bad Loan Application Percentage :- 13 .82 %**
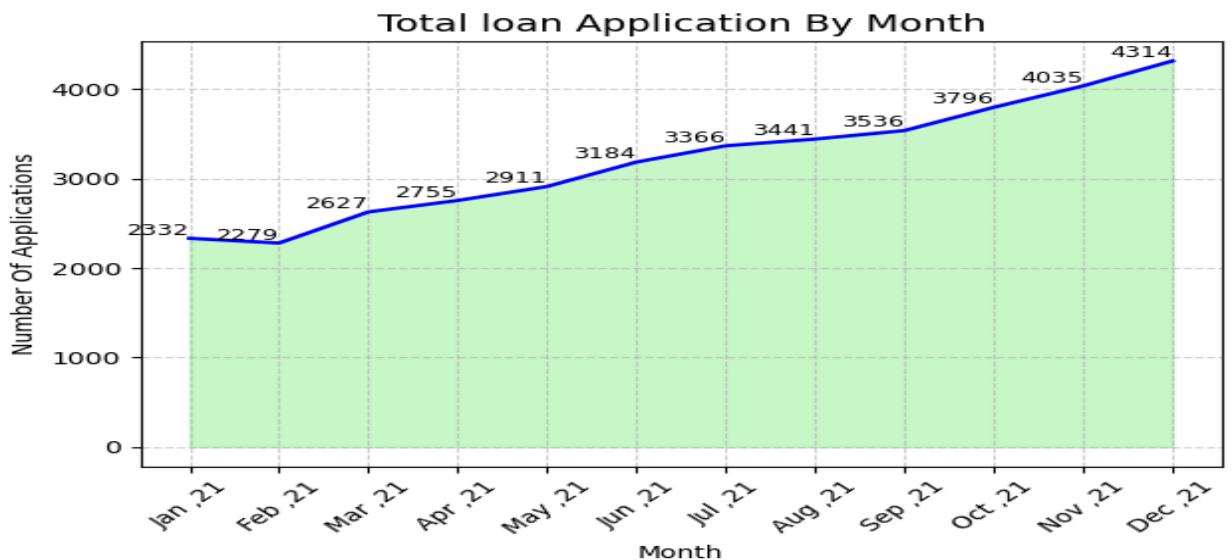- ❖ **Bad Loan Applications :- 5333**

❖ **Bad Loan Funded Amount :- $ 65.53 M**

❖ **Bad Loan Total Received Amount :- $37.28M**
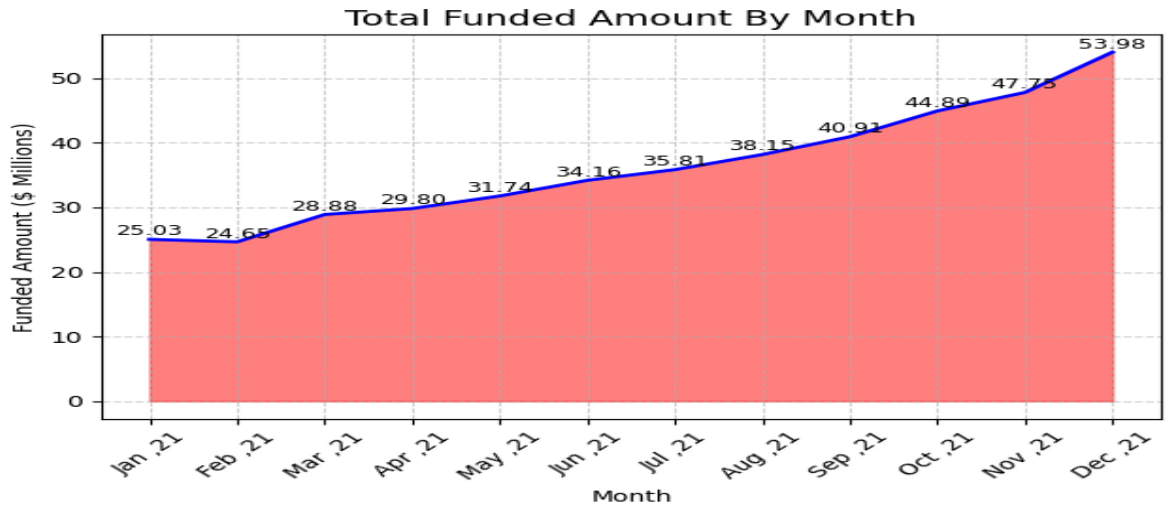
Charts & Visual Analysis: -

1. **Monthly Trends by Issue Date (Line/ Area Chart):**

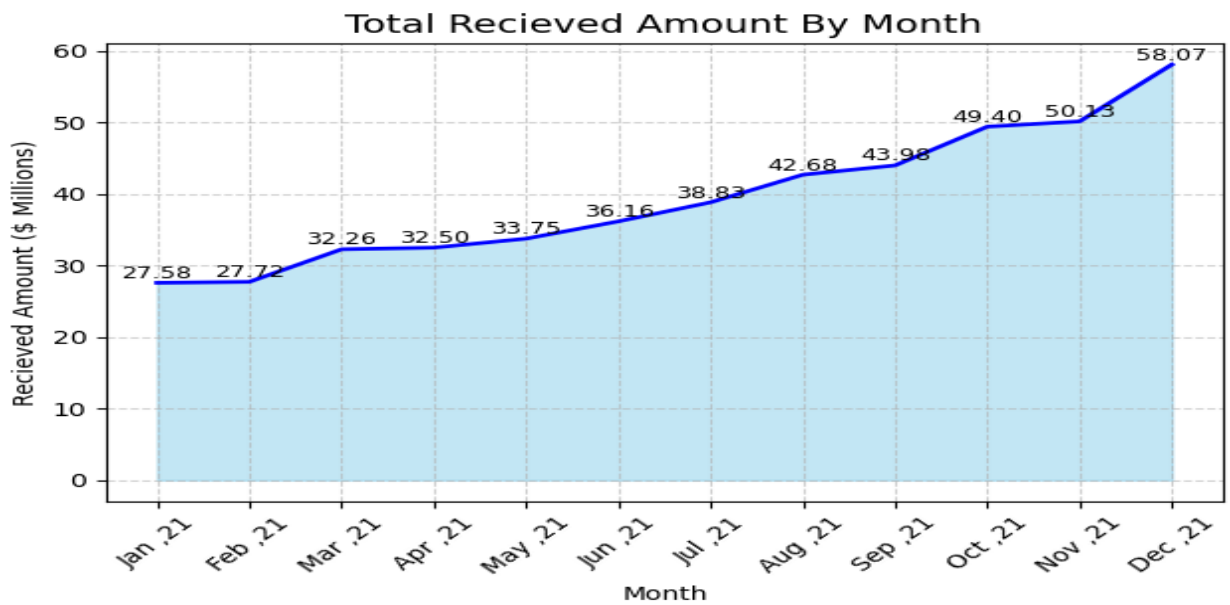   To identify seasonality and long-term trends in lending activities

   - **Monthly Trends By No. Of Applications :-**

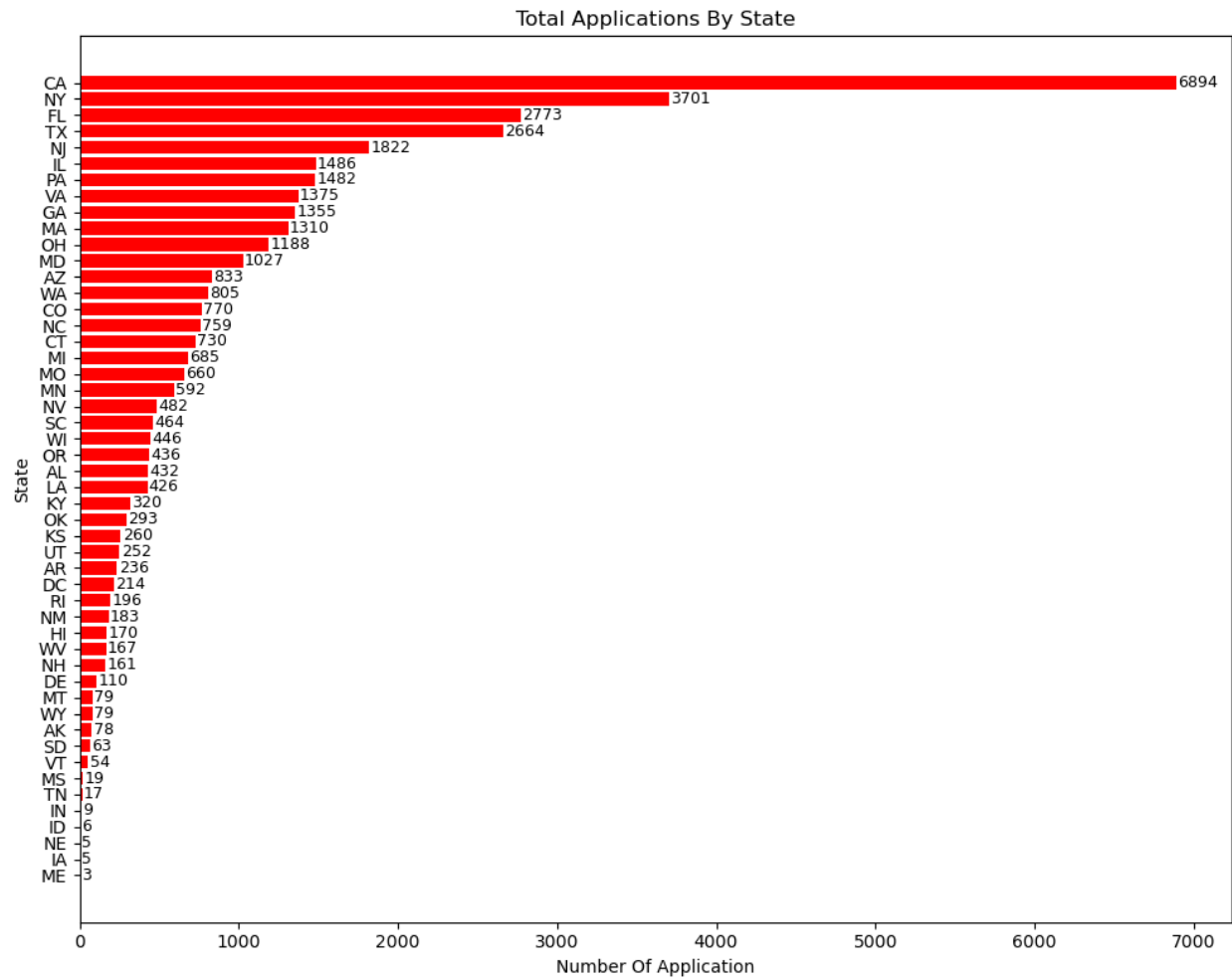   - **Monthly Trends By Total Funded Amount :-**

Total Funded Amount By Month

Funded Amount ($ Millions)

Jan ,21: 25.03
Feb ,21: 24.65
Mar ,21: 28.88
Apr ,21: 29.80
May ,21: 31.74
Jun ,21: 34.16
Jul ,21: 35.81
Aug ,21: 38.15
Sep ,21: 40.91
Oct ,21: 44.89
Nov ,21: 47.75
Dec ,21: 53.98

- **Monthly Trends By Total Received Amount :-**

Total Recieved Amount By Month

Recieved Amount ($ Millions)

Jan ,21: 27.58
Feb ,21: 27.72
Mar ,21: 32.26
Apr ,21: 32.50
May ,21: 33.75
Jun ,21: 36.16
Jul ,21: 38.83
Aug ,21: 42.68
Sep ,21: 43.98
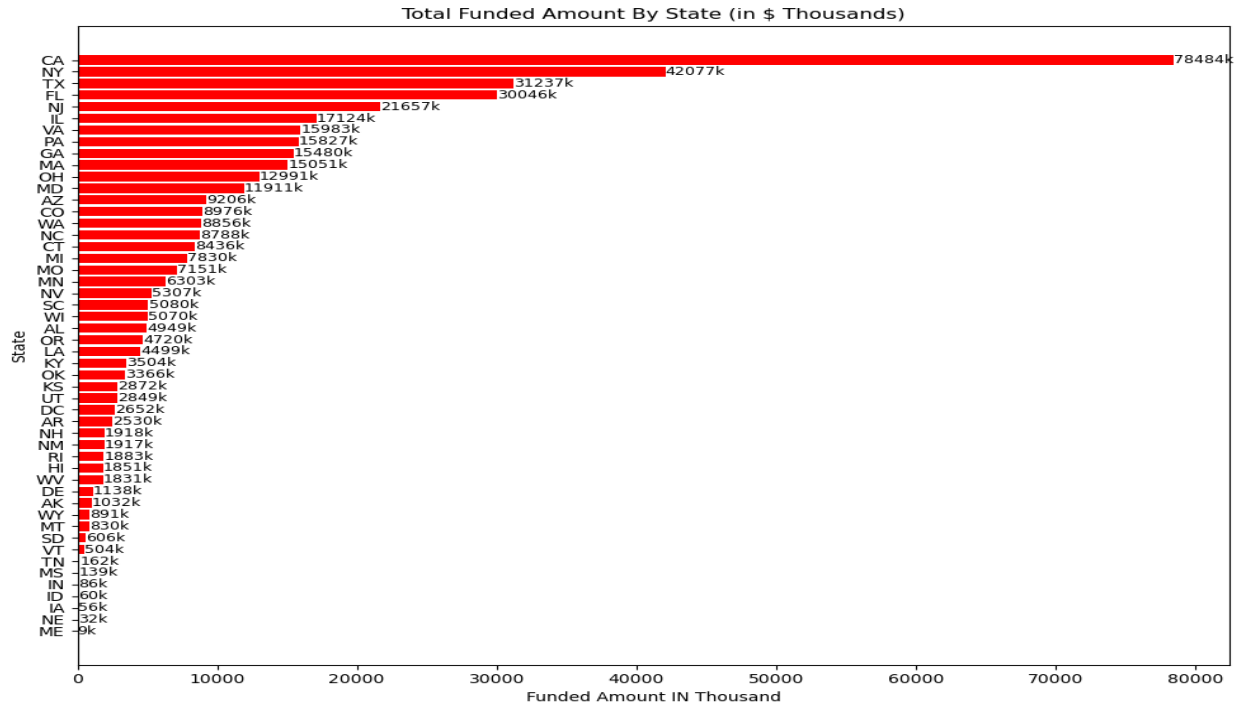Oct ,21: 49.40
Nov ,21: 50.13
Dec ,21: 58.07

2.Regional Analysis by State (Bar Chart): -

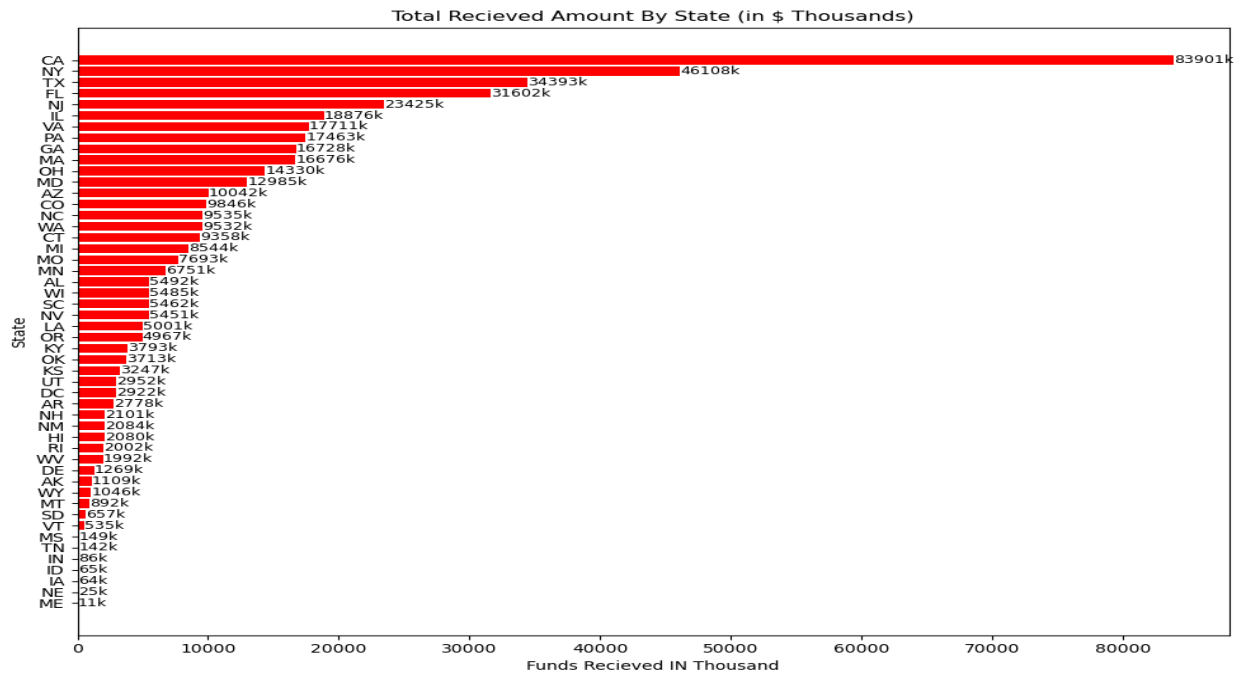To identify regions with significant lending activity and assess regional disparities.

- **Regional Analysis By State (Using Total Applications)**

Total Applications By State

- **Regional Analysis By States (Using Total Funded Amount):-**

Total Funded Amount By State (in $ Thousands)

- CA 78484k
- NY 42077k
- TX 31237k
- FL 30046k
- NJ 21657k
- IL 17124k
- VA 15983k
- PA 15827k
- GA 15480k
- MA 15051k
- OH 12991k
- MD 11911k
- AZ 9206k
- CO 8976k
- WA 8856k
- NC 8788k
- CT 8436k
- MI 7830k
- MO 7151k
- MN 6303k
- NV 5307k
- SC 5080k
- WI 5070k
- AL 4949k
- OR 4720k
- LA 4499k
- KY 3504k
- OK 3366k
- KS 2872k
- UT 2849k
- DC 2652k
- AR 2530k
- NH 1918k
- NM 1917k
- RI 1883k
- HI 1851k
- WV 1831k
- DE 1138k
- AK 1032k
- WY 891k
- MT 830k
- SD 606k
- VT 504k
- TN 162k
- MS 139k
- IN 86k
- ID 60k
- IA 56k
- NE 32k
- ME 9k

Funded Amount IN Thousand

- **Regional Analysis By State (Using Total Received Amount):-**

Total Recieved Amount By State (in $ Thousands)

- CA 83901k
- NY 46108k
- TX 34393k
- FL 31602k
- NJ 23425k
- IL 18876k
- VA 17711k
- PA 17463k
- GA 16728k
- MA 16676k
- OH 14330k
- MD 12985k
- AZ 10042k
- CO 9846k
- NC 9535k
- WA 9532k
- CT 9358k
- MI 8544k
- MO 7693k
- MN 6751k
- AL 5492k
- WI 5485k
- SC 5462k
- NV 5451k
- LA 5001k
- OR 4967k
- KY 3793k
- OK 3713k
- KS 3247k
- UT 2952k
- DC 2922k
- AR 2778k
- NH 2101k
- NM 2084k
- HI 2080k
- RI 2002k
- WV 1992k
- DE 1269k
- AK 1109k
- WY 1046k
- MT 892k
- SD 657k
- VT 535k
- MS 149k
- TN 142k
- IN 86k
- ID 65k
- IA 64k
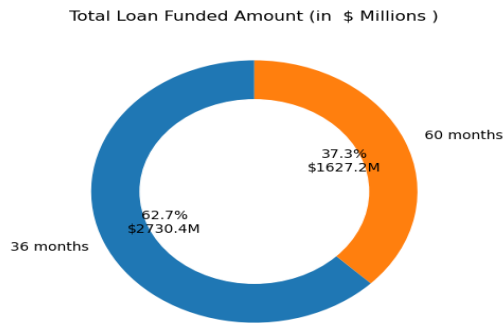- NE 25k
- ME 11k

Funds Recieved IN Thousand

3 . Loan Term Analysis (Donut Chart):

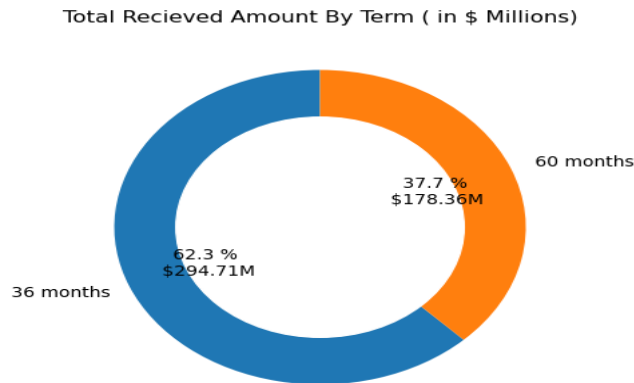To allow the client to understand the distribution of loans across various term lengths.

- **Loan Term Analysis by Total Applications:-**
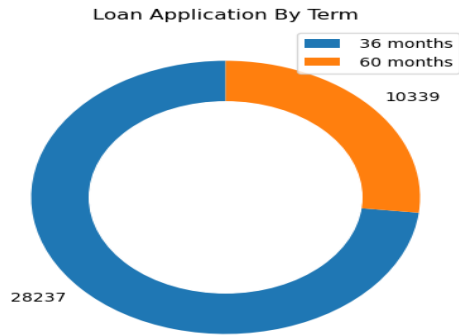
Loan Application By Term

- 36 months
- 60 months

10339

28237

- **Loan Term Analysis by Total Funded Amount:-**

Total Loan Funded Amount (in $ Millions)

60 months

37.3%
$1627.2M

62.7%
$2730.4M

36 months

- **Loan Term Analysis by Total Received Amount:-**

Total Recieved Amount By Term (in $ Millions)

60 months

37.7 %
$178.36M

62.3 %
$294.71M

36 months

4.Employment Length Analysis (Bar Chart):

How lending metrics are distributed among borrowers with different employment lengths, helping us assess the impact of employment history on loan applications.

- **Employment Length Analysis by Total Applications:-**

Total Applications BY Employment Length

- **Employment Length Analysis By Total Funded Amount :-**
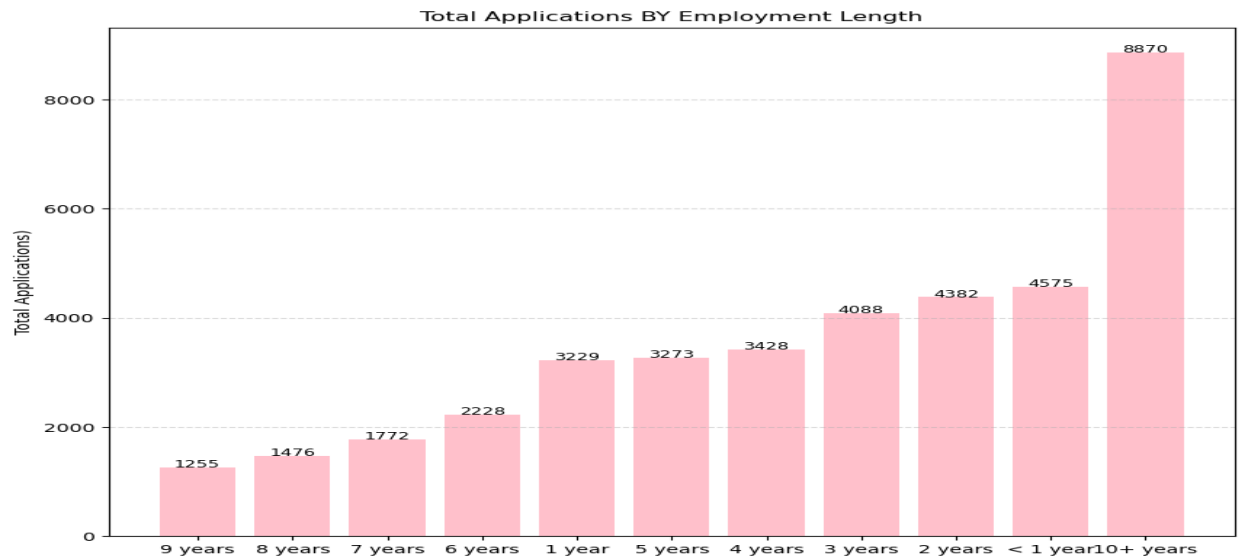
Total funded Amount BY Employment Length
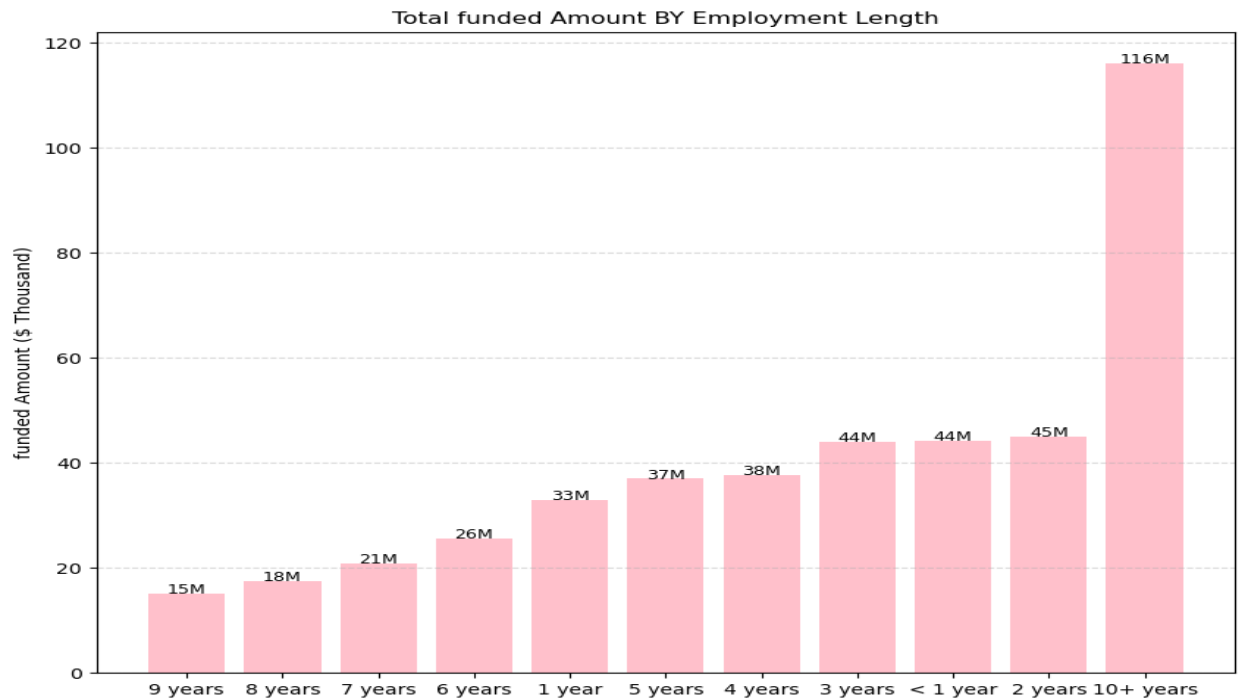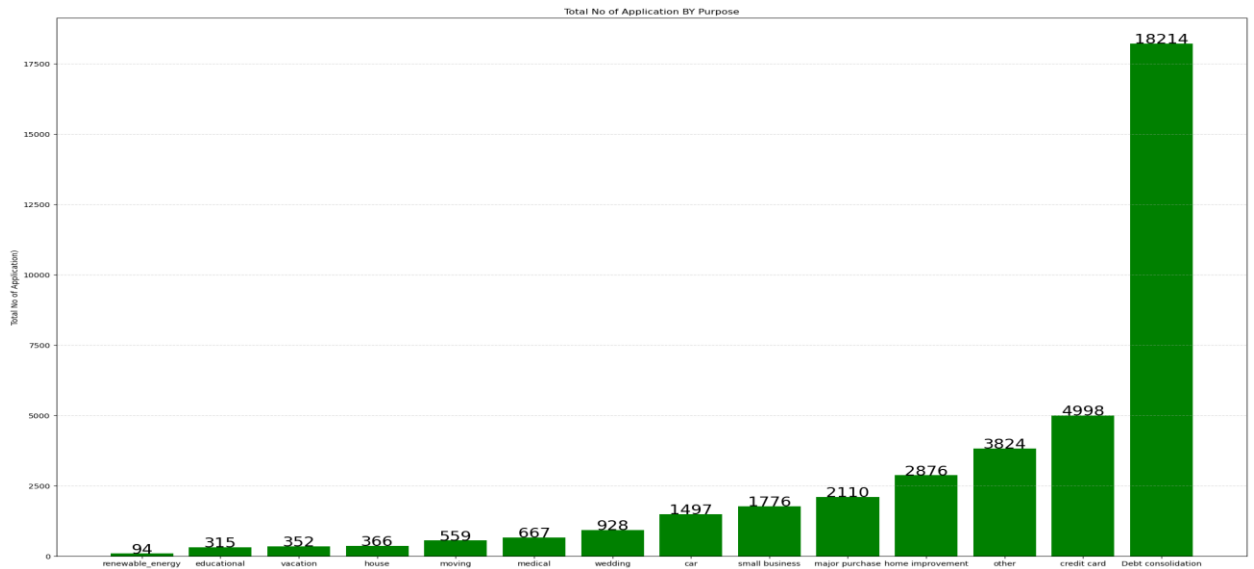

- **Employment Analysis By Total Received Amount :-**
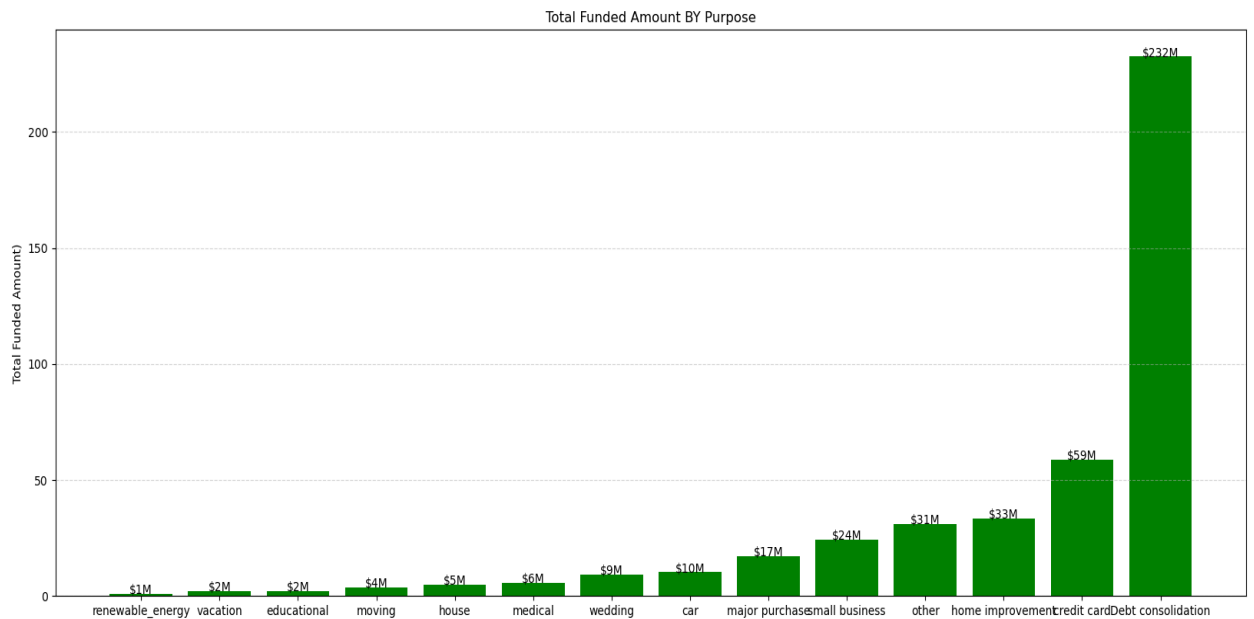
Total Recieved Amount BY Employment Length

5. Loan Purpose Breakdown (Bar Chart):

Will provide a visual breakdown of loan metrics based on the stated purposes of loans, aiding in the understanding of the primary reasons borrowers seek financing.
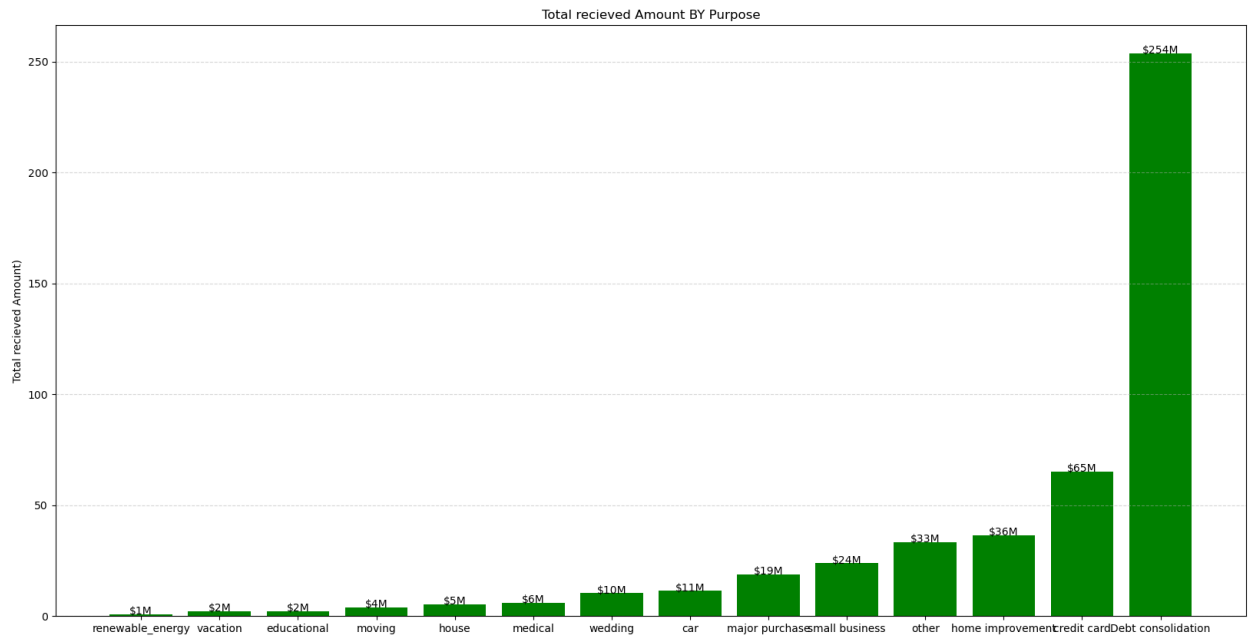
- **Loan Purpose Analysis By Total Applications :-**

- **Loan Purpose Analysis By Total Funded Amount :-**

- **Loan Purpose Analysis By Total Received Amount:-**
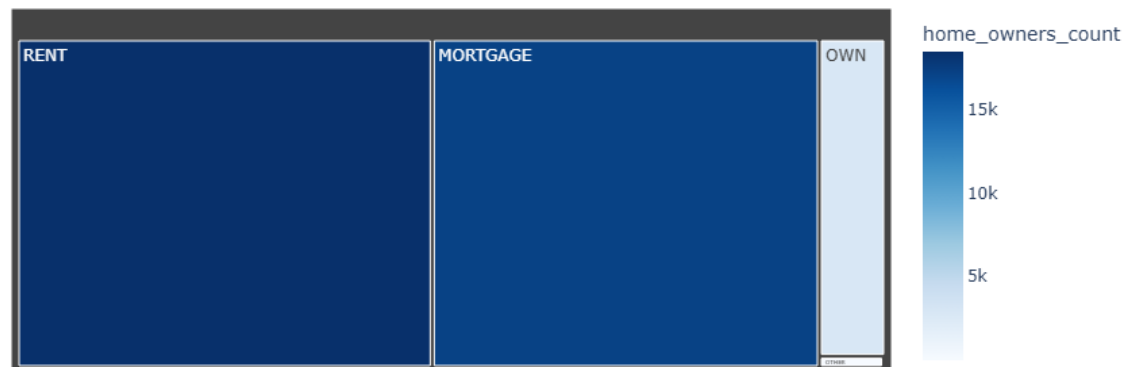
Total recieved Amount BY Purpose

6 . Home Ownership Analysis (Tree/ Heat Map):

For a hierarchical view of how home ownership impacts loan applications and disbursements.
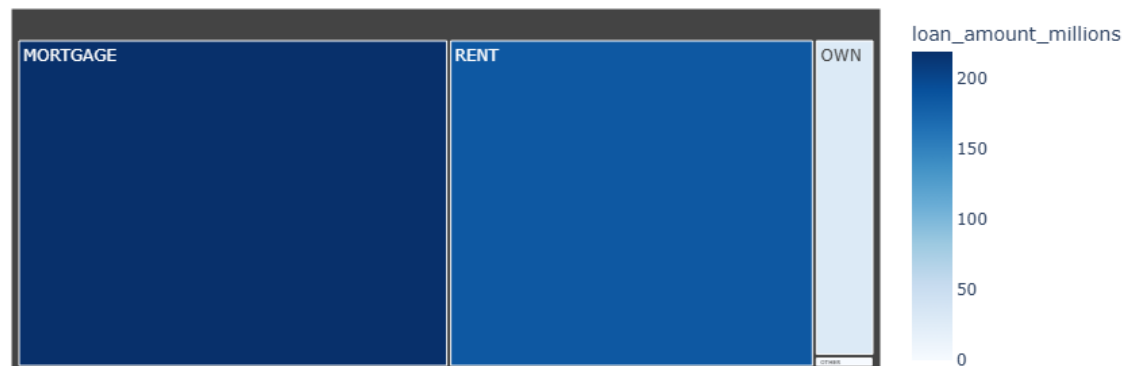
- **Home Ownership Analysis By Total Applications :-**

Loan Application Analysis By Home Ownership

- **Home Ownership Analysis By Total Funded Amount :-**

Total Funded Amount By Home Ownership

- **Home Ownership Analysis By Received Amount:-**

Total Recieved Amount By Home Ownership

4. Methodology

• **Data Cleaning**: Converted date fields, handled missing values, standardized formats.

• **Feature Engineering**: Created Year-Month fields, categorized loan quality, aggregated state-level metrics.

• **KPI Calculation**: Used groupby aggregations for totals, averages, and MTD metrics.

• **Visualization**: Created charts for trends, regional analysis, purpose breakdown, term distribution, and borrower attributes.

5. Conclusion

This analysis provides a complete overview of lending performance, borrower characteristics, loan purpose trends, and repayment metrics. The KPIs and charts help decision makers evaluate portfolio quality, identify regional or seasonal variations, and refine lending strategies.