



# Lending Club - Case Study

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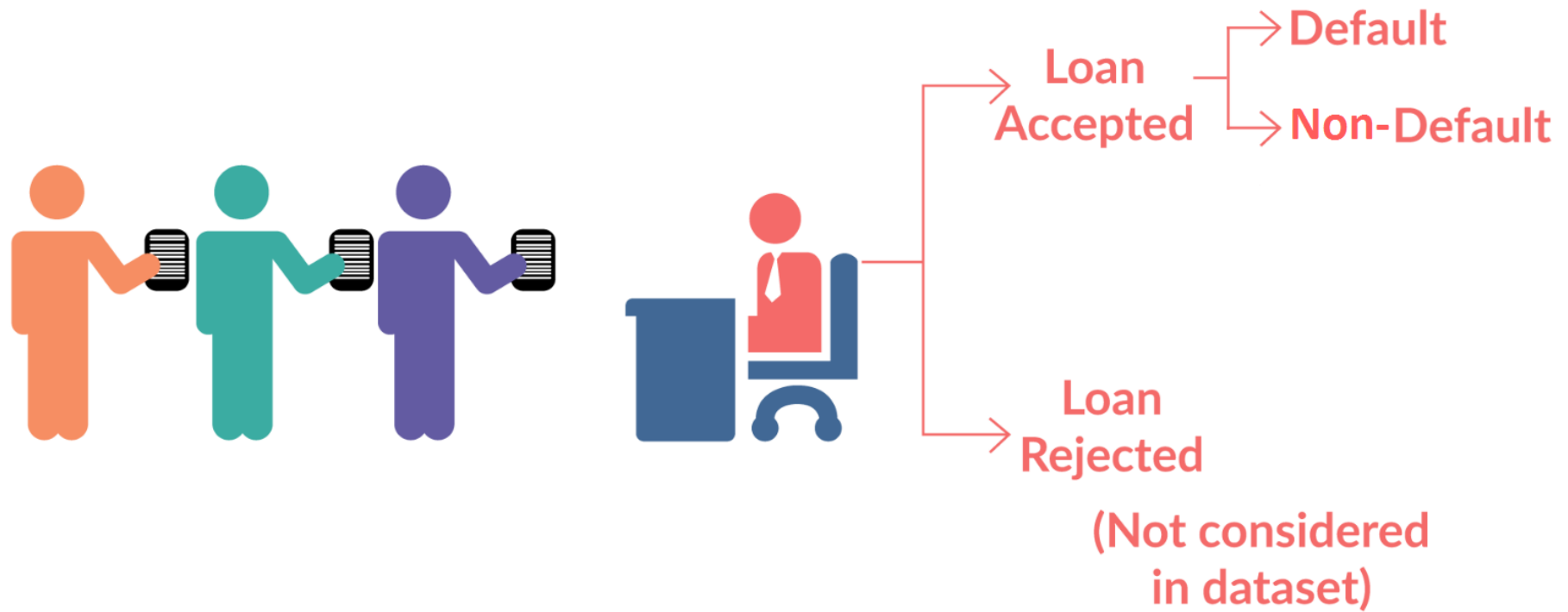
# Problem Statement (Business Definition)

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When the company receives a loan application, the company has to make a decision for loan approval based on the applicant's profile. Two **types of risks** are associated with the bank's decision:

- If the applicant is **likely to repay the loan**, then not approving the loan results in a **loss of business** to the company
- If the applicant is **not likely to repay the loan**, he/she is likely to **default**, then approving the loan may lead to a **financial loss** for the company

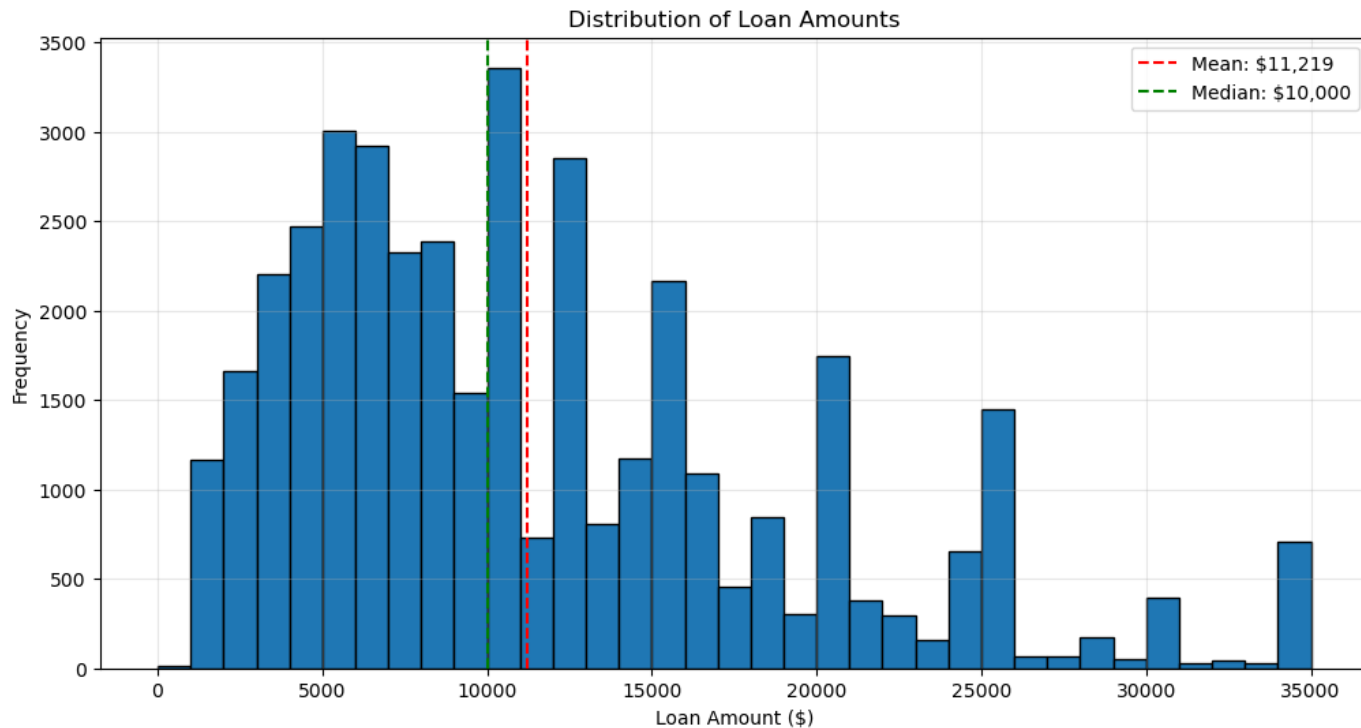
# LOAN DATASET



# Univariate Analysis

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1. Distribution of Loan Amount Statistics
2. Distribution of Loan Status Statistics
3. Count of Loan Terms Statistics
4. Distribution of loan grades statistics
5. Distribution of Loan Applicants by Work Experience Statistics
6. Distribution of Loan Applicants by Home Ownership Statistics



## Distribution of Loan Amount Statistics:

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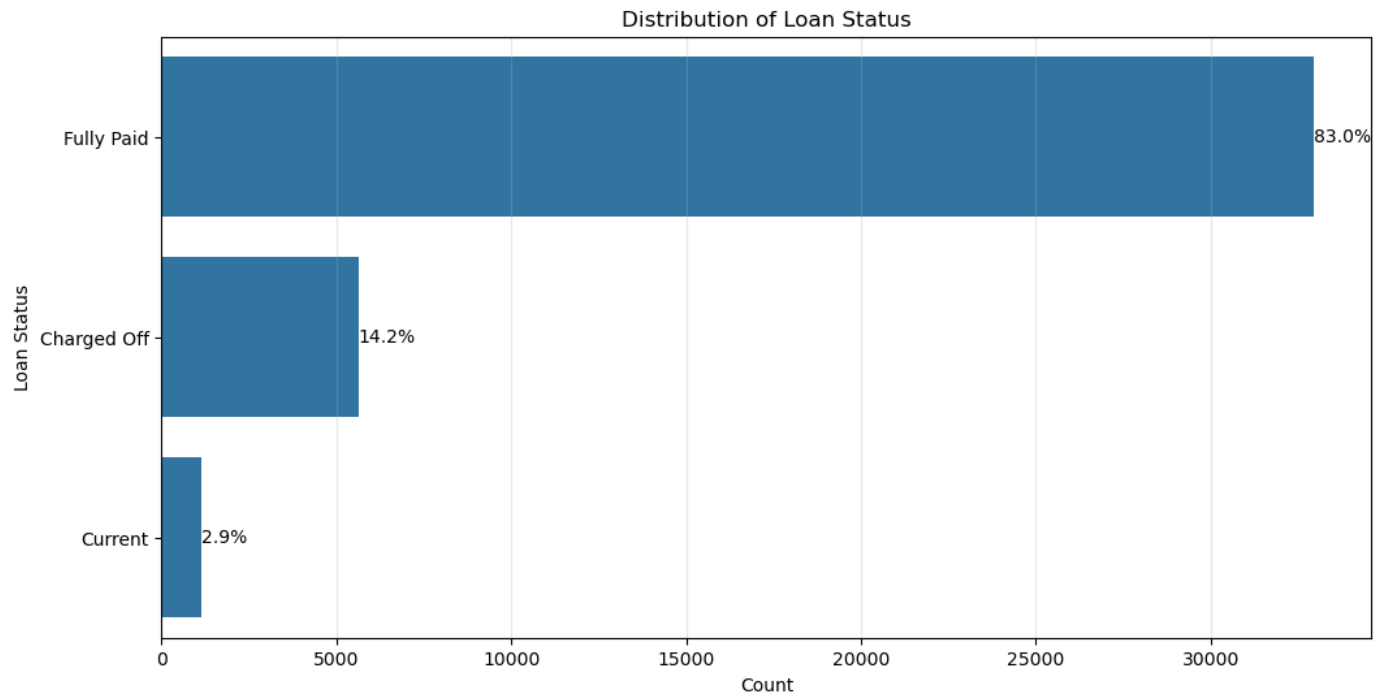
Min: \$500.00

Max: \$35,000.00

Mean: \$11,219.44

Median: \$10,000.00

Analysis shows that the loan amounts range from \$500 to \$35,000 with a mean of \$11,219 and a median of \$10,000.

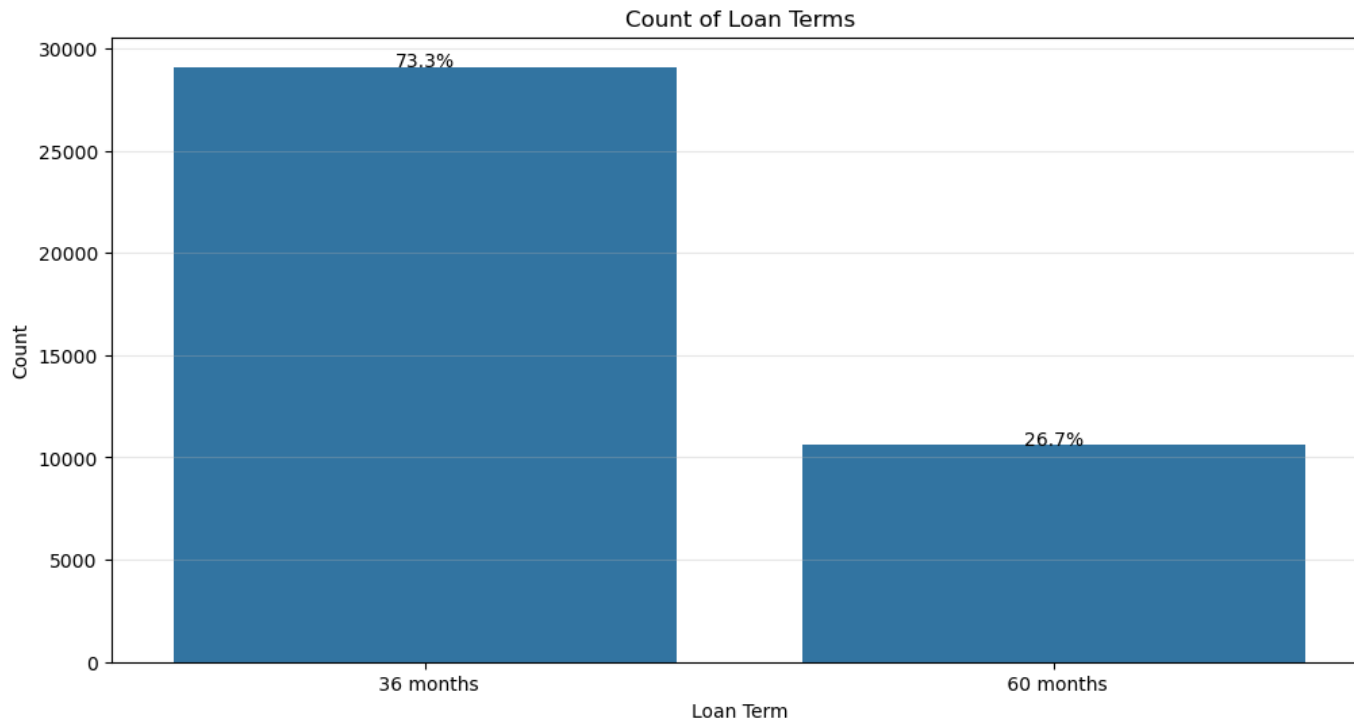


## Distribution of Loan Status Statistics:

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1. Fully Paid: 32,950 (82.96%)
2. Charged Off(Defaulter): 5,627 (14.17%)
3. Current: 1,140 (2.87%)

Analysis shows that the loan status with 'Fully Paid' being the most common category (82.9%).

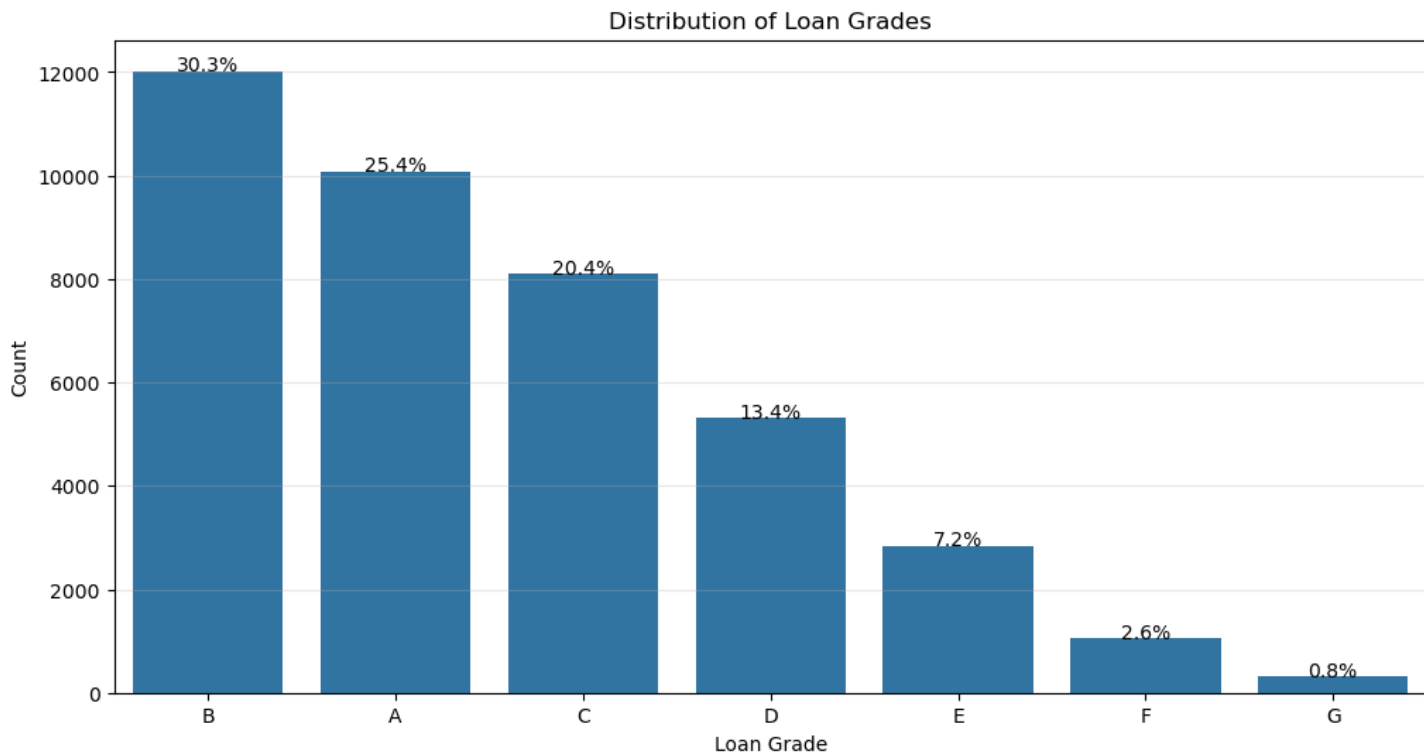


## Count of Loan Terms Statistics:

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1. 36 months: 29,096 (73.26%)
2. 60 months: 10,621 (26.74%)

Analysis shows that the majority of loans have a term of 36 months (73.3%).



## Distribution of loan grades statistics:

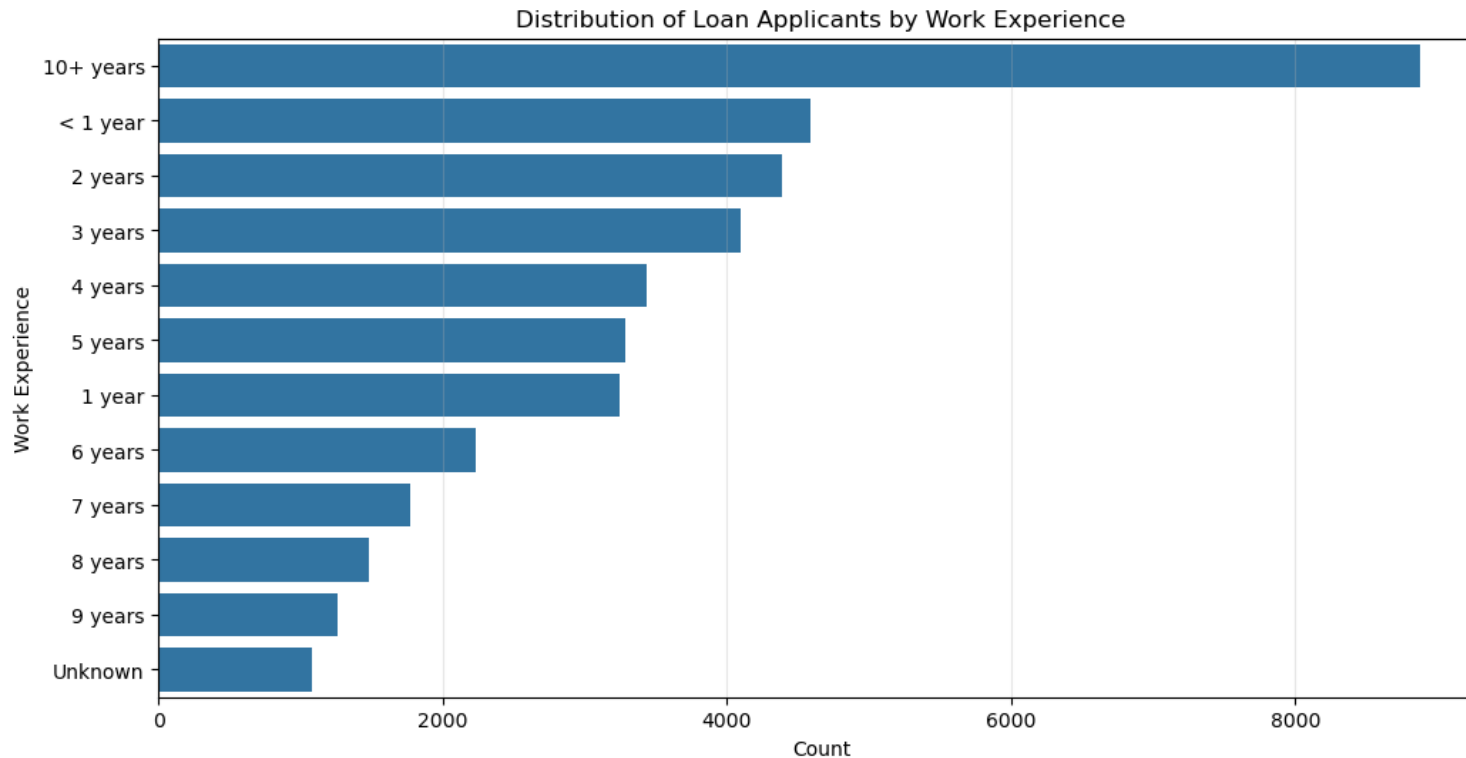
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1. B: 12,020 (30.26%)
2. A: 10,085 (25.39%)
3. C: 8,098 (20.39%)
4. D: 5,307 (13.36%)
5. E: 2,842 (7.16%)
6. F: 1,049 (2.64%)
7. G: 316 (0.80%)

Analysis shows that the majority of loans are assigned a grade of 'B' (29.2%).



## Distribution of Loan Applicants by Work Experience Statistics:

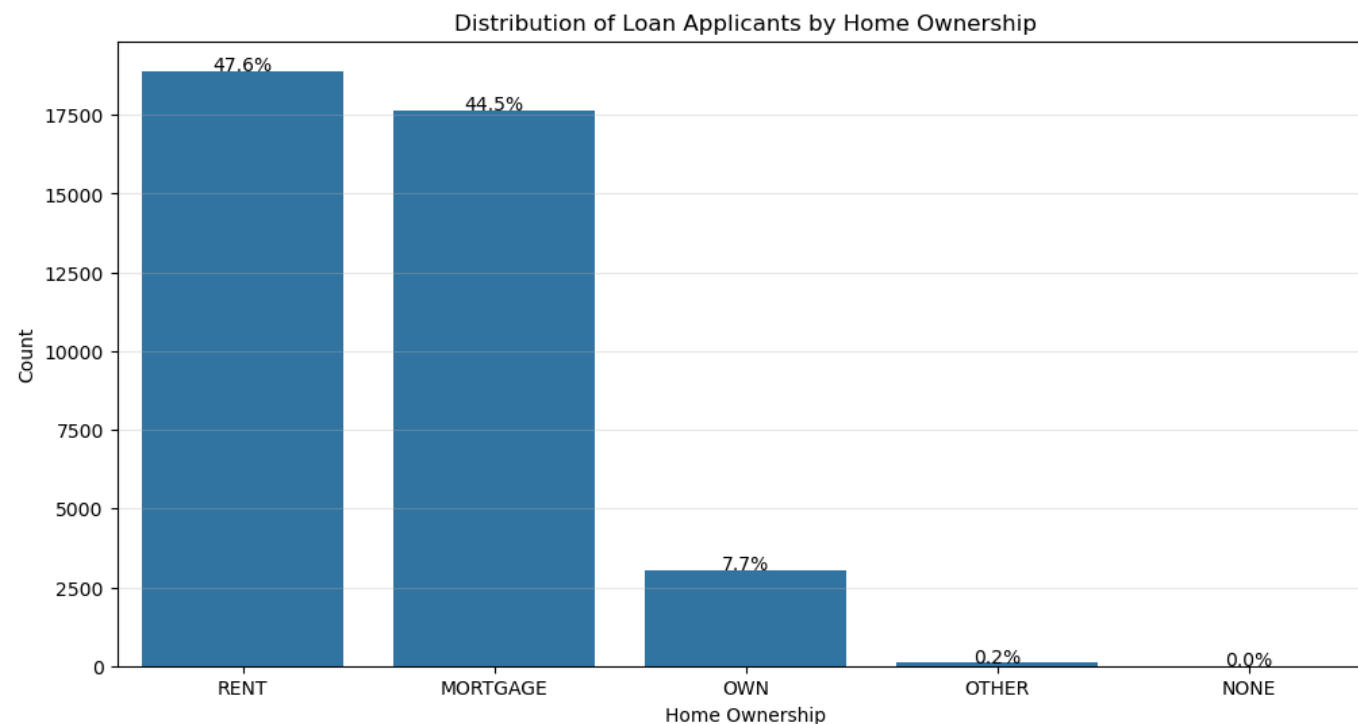


Analysis shows that the majority of loan applicants have work experience of 10+ years (22.36%).

1. 10+ years: 8,879 (22.36%)
2. < 1 year: 4,583 (11.54%)
3. 2 years: 4,388 (11.05%)
4. 3 years: 4,095 (10.31%)
5. 4 years: 3,436 (8.65%)
6. 5 years: 3,282 (8.26%)
7. 1 year: 3,240 (8.16%)
8. 6 years: 2,229 (5.61%)
9. 7 years: 1,773 (4.46%)
10. 8 years: 1,479 (3.72%)
11. 9 years: 1,258 (3.17%)
12. Unknown: 1,075 (2.71%)

# Distribution of Loan Applicants by Home Ownership Statistics:

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Analysis shows that the majority of loan applicants have home ownership of 'RENT' (47.58%)

1. RENT: 18,899 (47.58%)
2. MORTGAGE: 17,659 (44.46%)
3. OWN: 3,058 (7.70%)
4. OTHER: 98 (0.25%)
5. NONE: 3 (0.01%)

# Bivariate Analysis

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1. Analysis of Loan Amount by Loan Status Statistics
2. Analysis of Loan Status by Loan Term Statistics
3. Analysis of Loan Status by Home Ownership Statistics
4. Analysis of Loan Purpose by Loan Status Statistics
5. Analysis of Loan Amount by Loan Purpose Statistics
6. Analysis of loan status by work experience
7. Analysis of loan status by loan grade

# Analysis of Loan Amount by Loan Status Statistics:

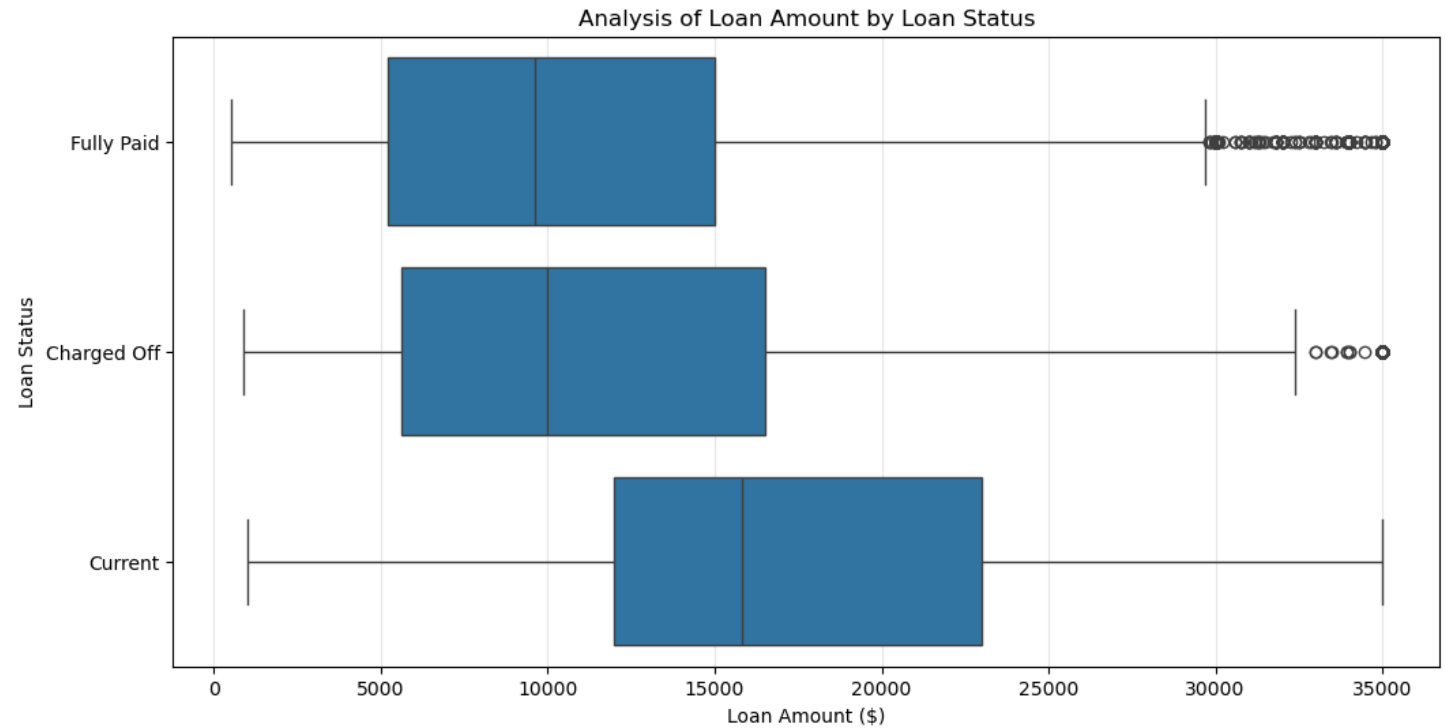
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Mean loan amount by loan status

1. Charged Off: \$12,104.39
2. Current: \$17,053.99
3. Fully Paid: \$10,866.46

Max loan amount by loan status

1. Charged Off: \$35,000.00
2. Current: \$35,000.00
3. Fully Paid: \$35,000.00



Analysis shows that the loan amount varies by loan status. The mean and max loan amounts are highest for 'Charged Off'(defaulters) loans.

# Analysis of Loan Status by Loan Term Statistics:

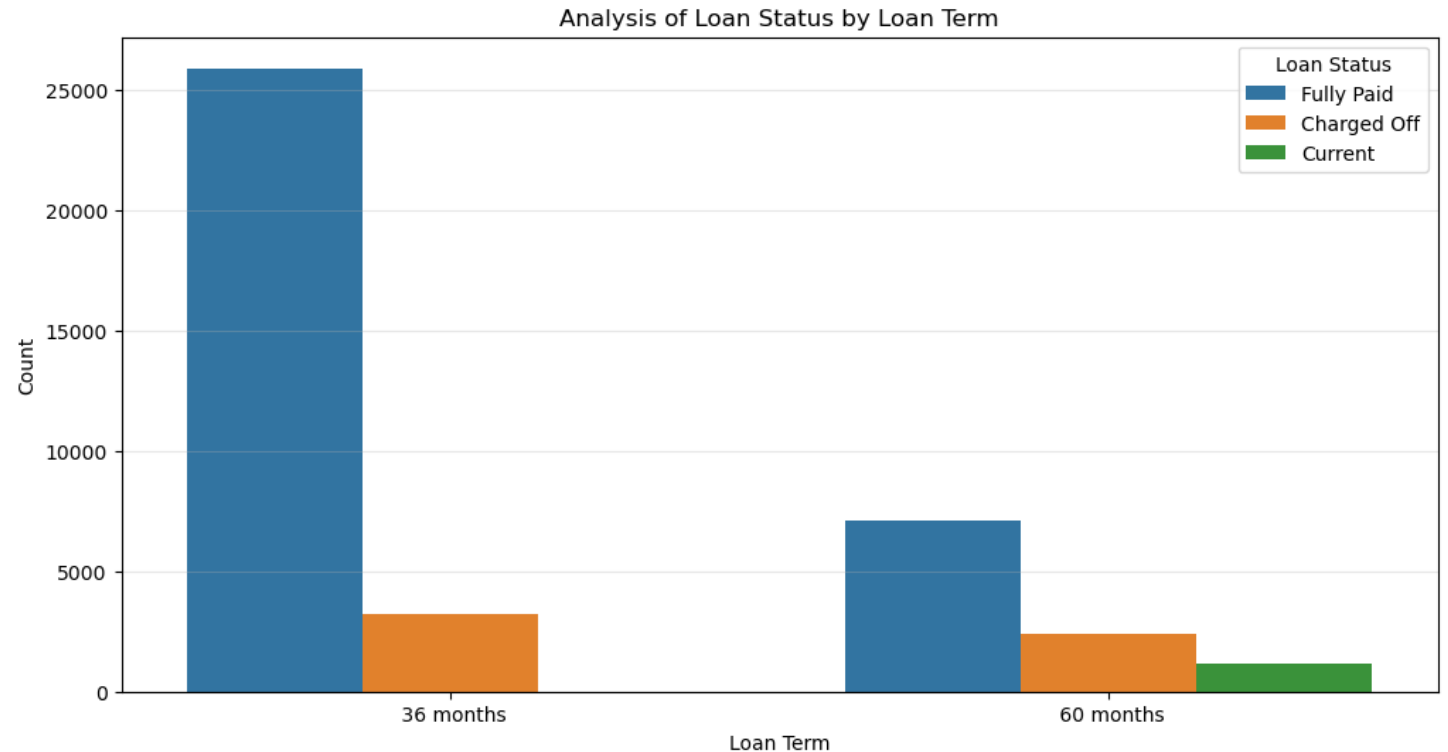
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## 1. Loan Term: 36 months

1. Fully Paid: 25,869 (88.91%)
2. Charged Off: 3,227 (11.09%)
3. Current: 0 (0.00%)

## 2. Loan Term: 60 months

1. Fully Paid: 7,081 (66.67%)
2. Charged Off: 2,400 (22.60%)
3. Current: 1,140 (10.73%)



Analysis shows most of the defaulters(Charged Off) belong to the 36-month loan term

# Analysis of Loan Status by Home Ownership Statistics:

## 1. Home Ownership: RENT

1. Fully Paid: 15,641 (82.76%)
2. Charged Off: 2,839 (15.02%)
3. Current: 419 (2.22%)

## 2. Home Ownership: MORTGAGE

1. Fully Paid: 14,694 (83.21%)
2. Charged Off: 2,327 (13.18%)
3. Current: 638 (3.61%)

## 3. Home Ownership: OWN

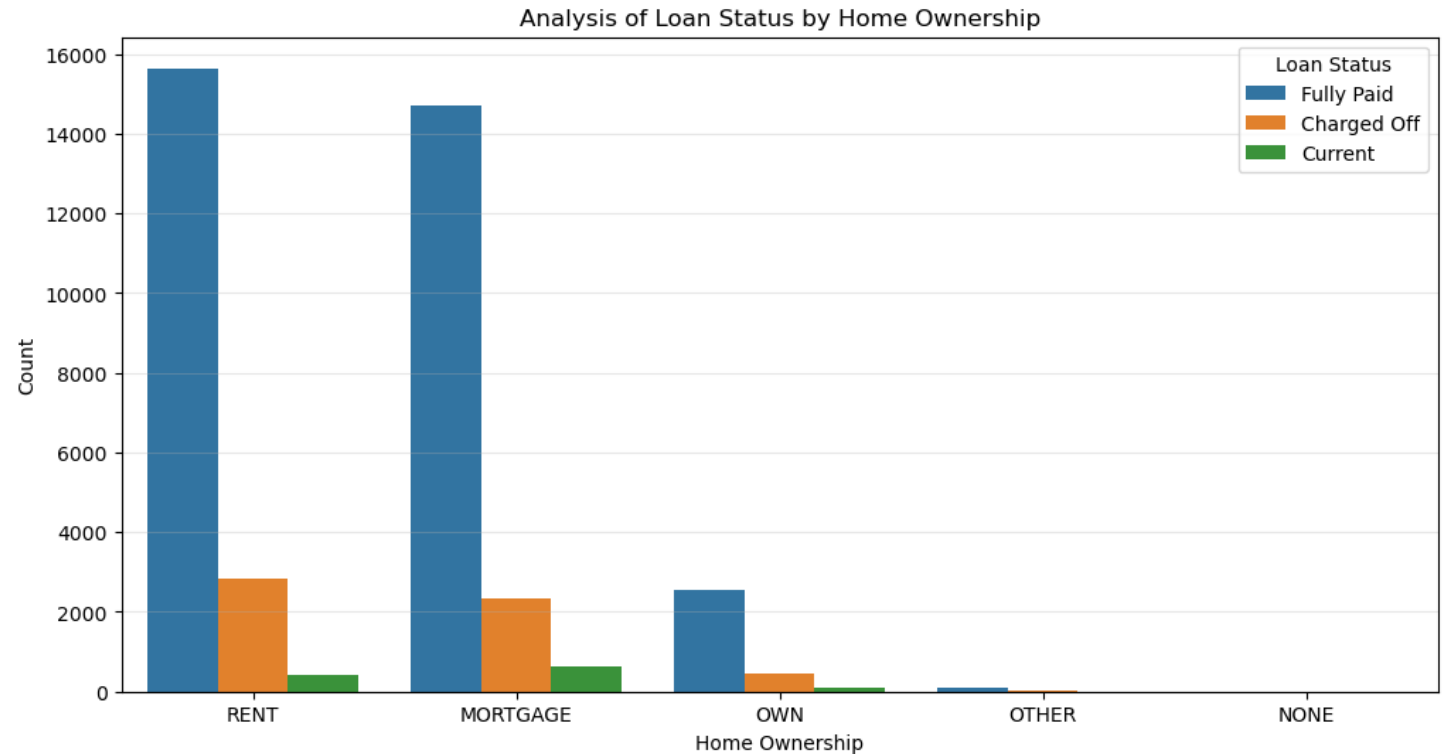
1. Fully Paid: 2,532 (82.80%)
2. Charged Off: 443 (14.49%)
3. Current: 83 (2.71%)

## 4. Home Ownership: OTHER

1. Fully Paid: 80 (81.63%)
2. Charged Off: 18 (18.37%)
3. Current: 0 (0.00%)

## 5. Home Ownership: NONE

1. Fully Paid: 3 (100.00%)
2. Charged Off: 0 (0.00%)
3. Current: 0 (0.00%)



Analysis shows most of the defaulters(Charged Off) belong to the Rent home ownership category

# Analysis of purpose by loan status :

## 1. Loan Purpose: debt\_consolidation

1. Fully Paid: 15,288 (82.01%)
2. Charged Off: 2,767 (14.84%)
3. Current: 586 (3.14%)

## 2. Loan Purpose: credit\_card

1. Fully Paid: 4,485 (87.43%)
2. Charged Off: 542 (10.57%)
3. Current: 103 (2.01%)

## 3. Loan Purpose: other

1. Fully Paid: 3,232 (80.94%)
2. Charged Off: 633 (15.85%)
3. Current: 128 (3.21%)

## 4. Loan Purpose: home\_improvement

1. Fully Paid: 2,528 (84.95%)
2. Charged Off: 347 (11.66%)
3. Current: 101 (3.39%)

## 5. Loan Purpose: major\_purchase

1. Fully Paid: 1,928 (88.16%)
2. Charged Off: 222 (10.15%)
3. Current: 37 (1.69%)

## 6. Loan Purpose: small\_business

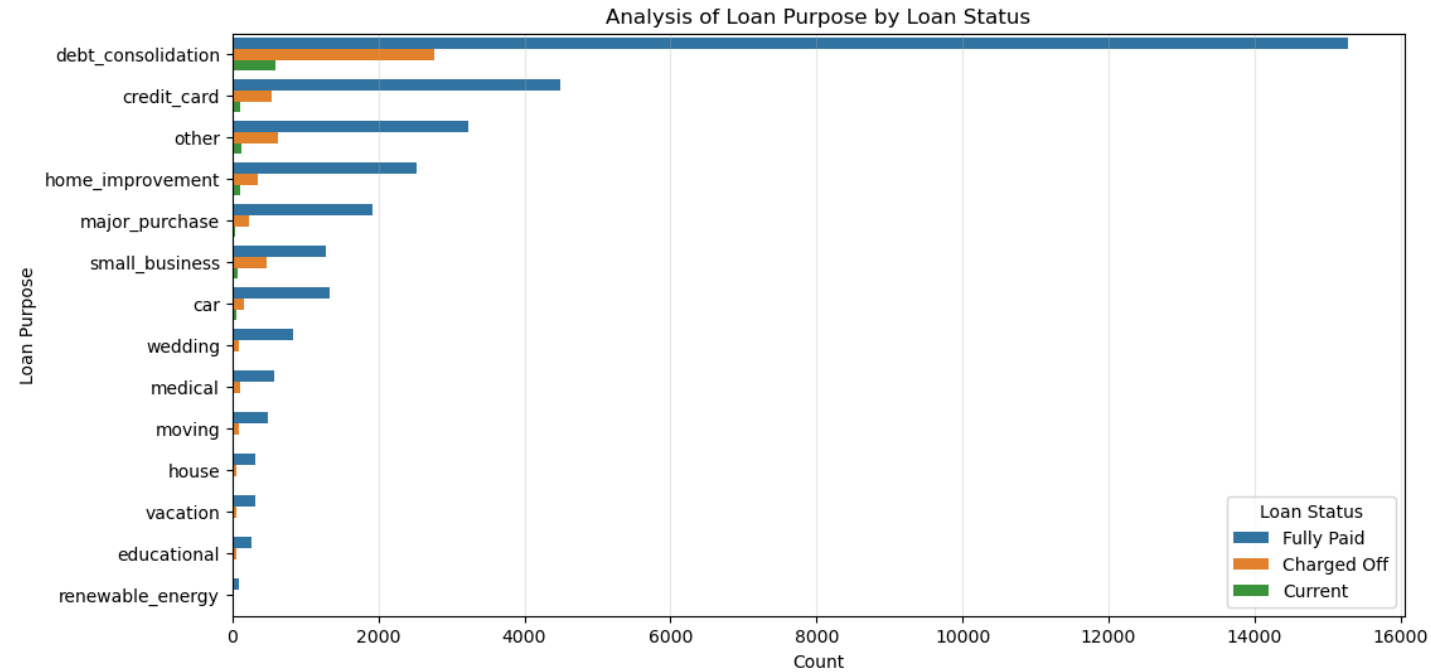
1. Fully Paid: 1,279 (69.97%)
2. Charged Off: 475 (25.98%)
3. Current: 74 (4.05%)

## 7. Loan Purpose: car

1. Fully Paid: 1,339 (86.44%)
2. Charged Off: 160 (10.33%)
3. Current: 50 (3.23%)

## 8. Loan Purpose: wedding

1. Fully Paid: 830 (87.65%)
2. Charged Off: 96 (10.14%)
3. Current: 21 (2.22%)



Analysis shows most of the defaulters(Charged Off) belong to the Debt consolidation loan purpose category

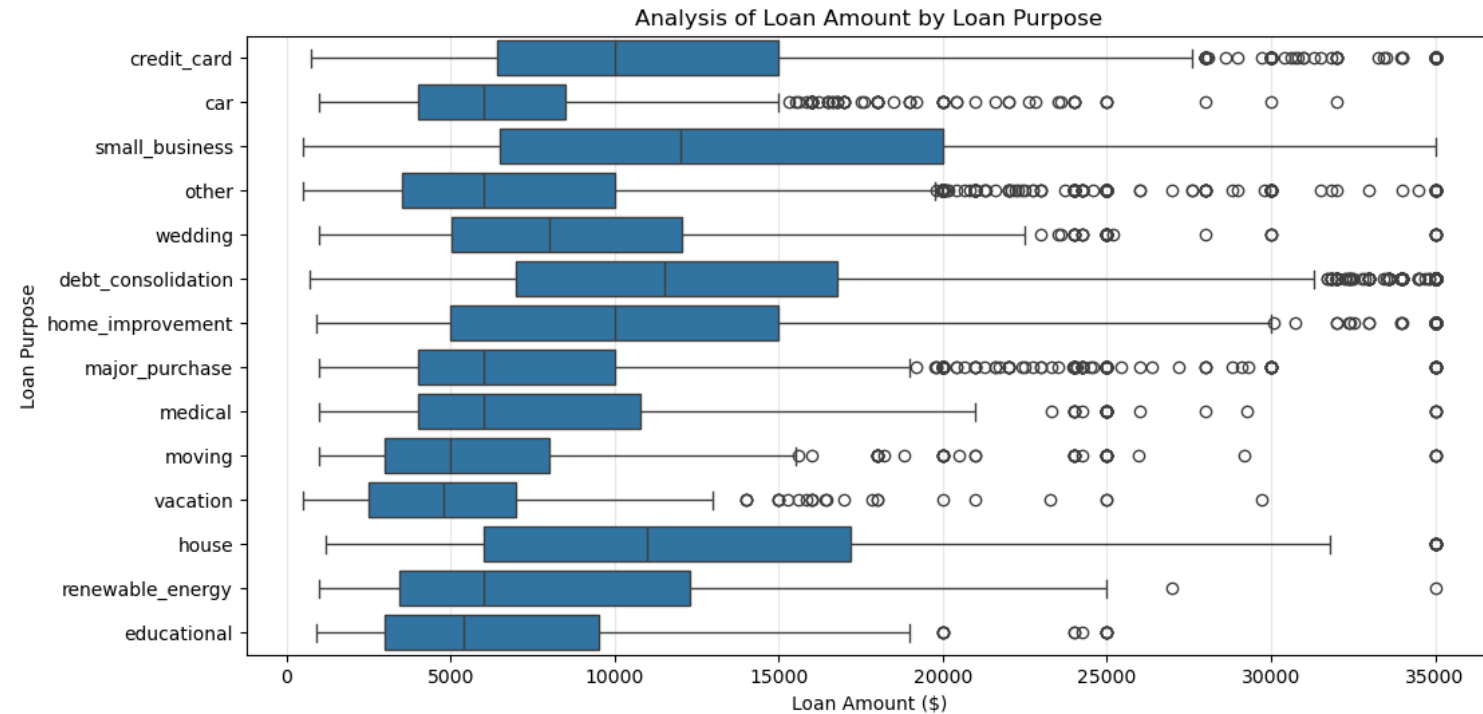
# Analysis of Loan Amount by Loan Purpose Statistics:

## Mean loan amount by loan purpose

1. car: \$6,777.52
2. credit\_card: \$11,723.62
3. debt\_consolidation: \$12,694.99
4. educational: \$6,810.46
5. home\_improvement: \$11,537.21
6. house: \$13,071.00
7. major\_purchase: \$8,155.43
8. medical: \$8,263.67
9. moving: \$6,650.17
10. other: \$8,067.61
11. renewable\_energy: \$8,717.23
12. small\_business: \$13,567.27
13. vacation: \$5,463.32
14. wedding: \$9,876.03

## Max loan amount by loan purpose

1. car: \$32,000.00
2. credit\_card: \$35,000.00
3. debt\_consolidation: \$35,000.00
4. educational: \$25,000.00
5. home\_improvement: \$35,000.00
6. house: \$35,000.00
7. major\_purchase: \$35,000.00
8. medical: \$35,000.00
9. moving: \$35,000.00
10. other: \$35,000.00
11. renewable\_energy: \$35,000.00
12. small\_business: \$35,000.00
13. vacation: \$29,700.00
14. wedding: \$35,000.00



Analysis shows that the loan amount varies by loan purpose. The mean and max loan amounts are highest for 'small\_business' loan purpose.



# Analysis of loan status by work experience:

## 1. Work Experience: 10+ years

1. Fully Paid: 7,157 (80.61%)
2. Charged Off: 1,331 (14.99%)
3. Current: 391 (4.40%)

## 2. Work Experience: < 1 year

1. Fully Paid: 3,869 (84.42%)
2. Charged Off: 639 (13.94%)
3. Current: 75 (1.64%)

## 3. Work Experience: 2 years

1. Fully Paid: 3,724 (84.87%)
2. Charged Off: 567 (12.92%)
3. Current: 97 (2.21%)

## 4. Work Experience: 3 years

1. Fully Paid: 3,457 (84.42%)
2. Charged Off: 555 (13.55%)
3. Current: 83 (2.03%)

## 5. Work Experience: 4 years

1. Fully Paid: 2,880 (83.82%)
2. Charged Off: 462 (13.45%)
3. Current: 94 (2.74%)

## 6. Work Experience: 5 years

1. Fully Paid: 2,736 (83.36%)
2. Charged Off: 458 (13.95%)
3. Current: 88 (2.68%)

## 7. Work Experience: 1 year

1. Fully Paid: 2,713 (83.73%)
2. Charged Off: 456 (14.07%)
3. Current: 71 (2.19%)

## 8. Work Experience: 6 years

1. Fully Paid: 1,861 (83.49%)
2. Charged Off: 307 (13.77%)
3. Current: 61 (2.74%)

## 9. Work Experience: 7 years

1. Fully Paid: 1,448 (81.67%)
2. Charged Off: 263 (14.83%)
3. Current: 62 (3.50%)

## 10. Work Experience: 8 years

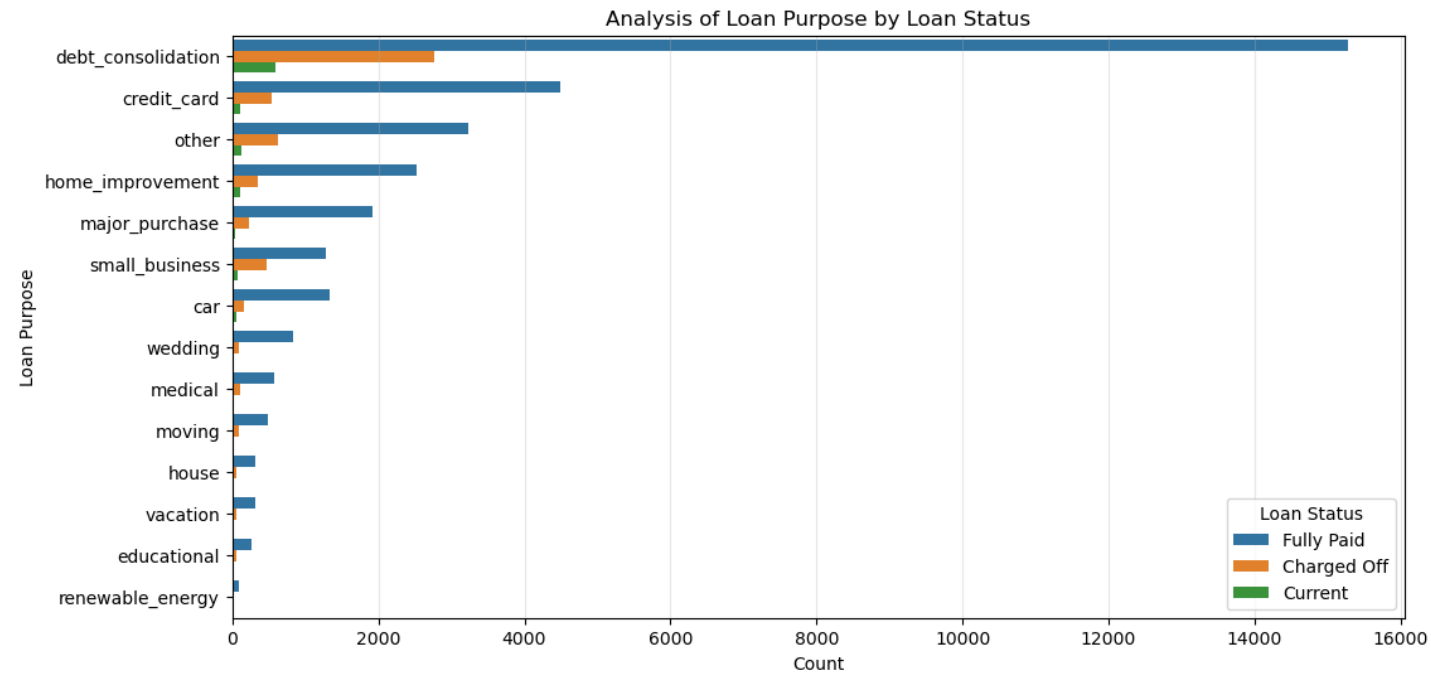
1. Fully Paid: 1,232 (83.30%)
2. Charged Off: 203 (13.73%)
3. Current: 44 (2.97%)

## 11. Work Experience: 9 years

1. Fully Paid: 1,068 (84.90%)
2. Charged Off: 158 (12.56%)
3. Current: 32 (2.54%)

## 12. Work Experience: Unknown

1. Fully Paid: 805 (74.88%)
2. Charged Off: 228 (21.21%)
3. Current: 42 (3.91%)



Analysis shows most of the defaulters(Charged Off) belong to the 10+ years work experience category

# Analysis of loan status by loan grade:

## 1. Loan Grade: B

1. Fully Paid: 10,250 (85.27%)
2. Charged Off: 1,425 (11.86%)
3. Current: 345 (2.87%)

## 2. Loan Grade: A

1. Fully Paid: 9,443 (93.63%)
2. Charged Off: 602 (5.97%)
3. Current: 40 (0.40%)

## 3. Loan Grade: C

1. Fully Paid: 6,487 (80.11%)
2. Charged Off: 1,347 (16.63%)
3. Current: 264 (3.26%)

## 4. Loan Grade: D

1. Fully Paid: 3,967 (74.75%)
2. Charged Off: 1,118 (21.07%)
3. Current: 222 (4.18%)

## 5. Loan Grade: E

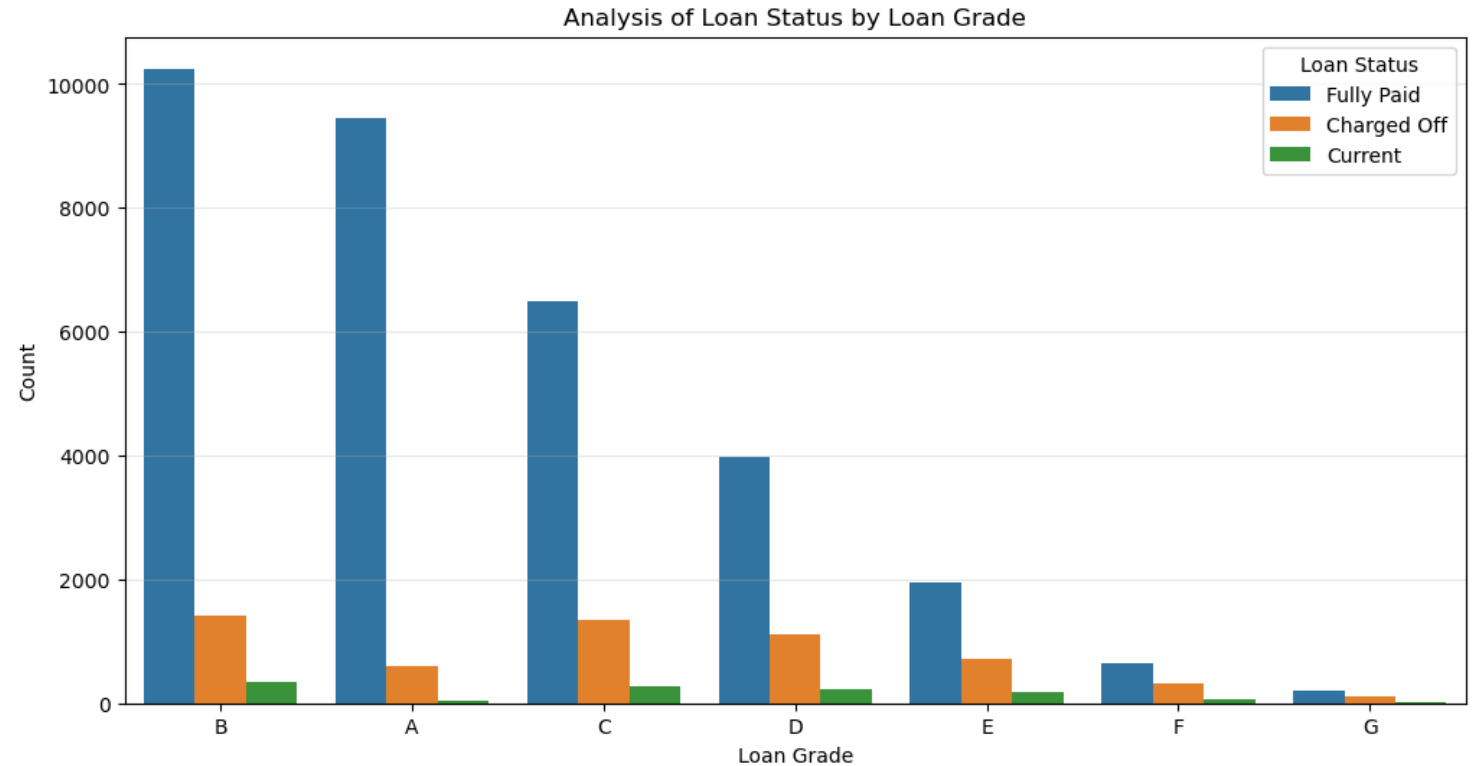
1. Fully Paid: 1,948 (68.54%)
2. Charged Off: 715 (25.16%)
3. Current: 179 (6.30%)

## 6. Loan Grade: F

1. Fully Paid: 657 (62.63%)
2. Charged Off: 319 (30.41%)
3. Current: 73 (6.96%)

## 7. Loan Grade: G

1. Fully Paid: 198 (62.66%)
2. Charged Off: 101 (31.96%)
3. Current: 17 (5.38%)



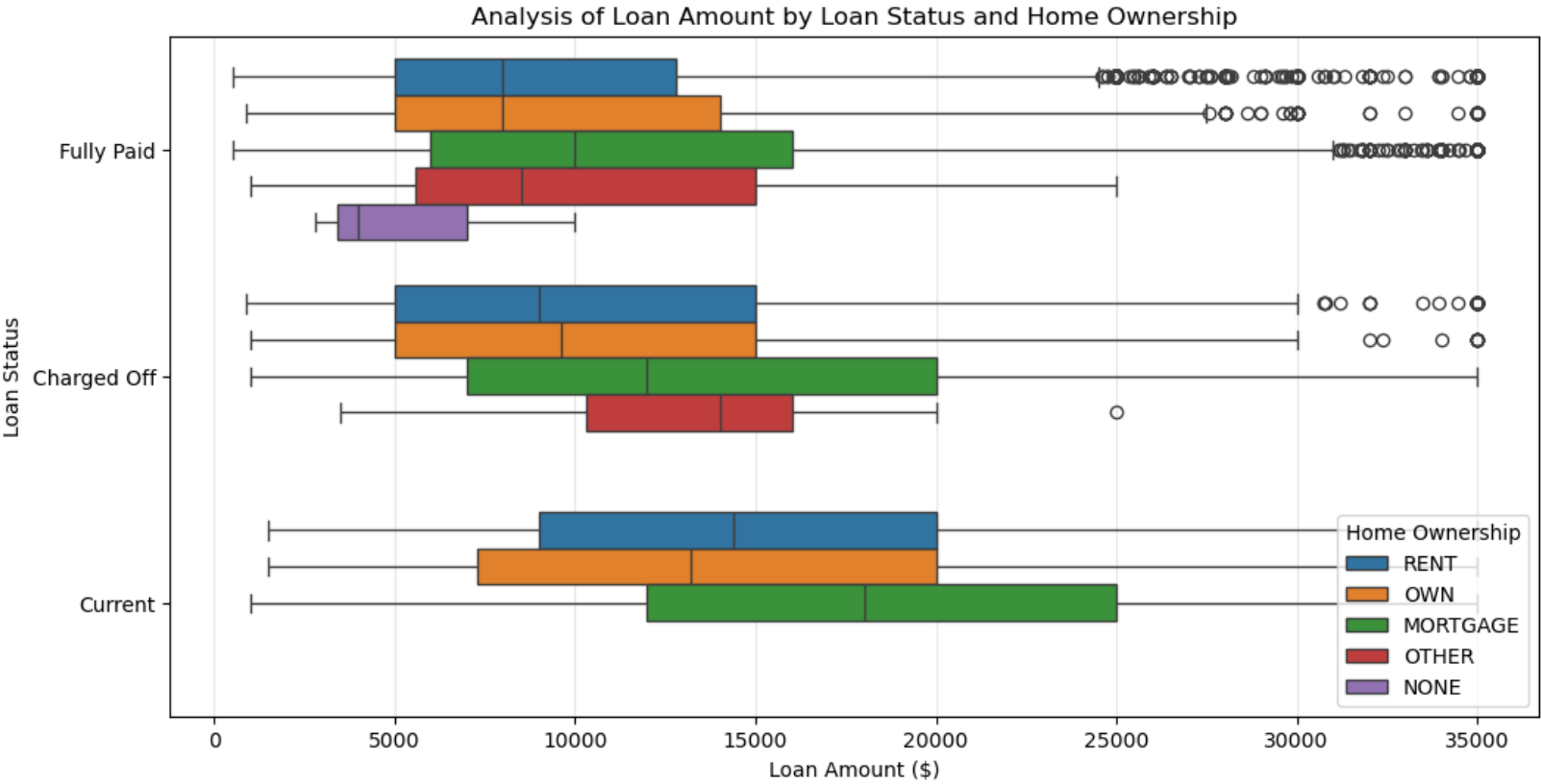
Analysis shows most of the defaulters(Charged Off) belong to the 'C' loan grade category

# Multivariate Analysis

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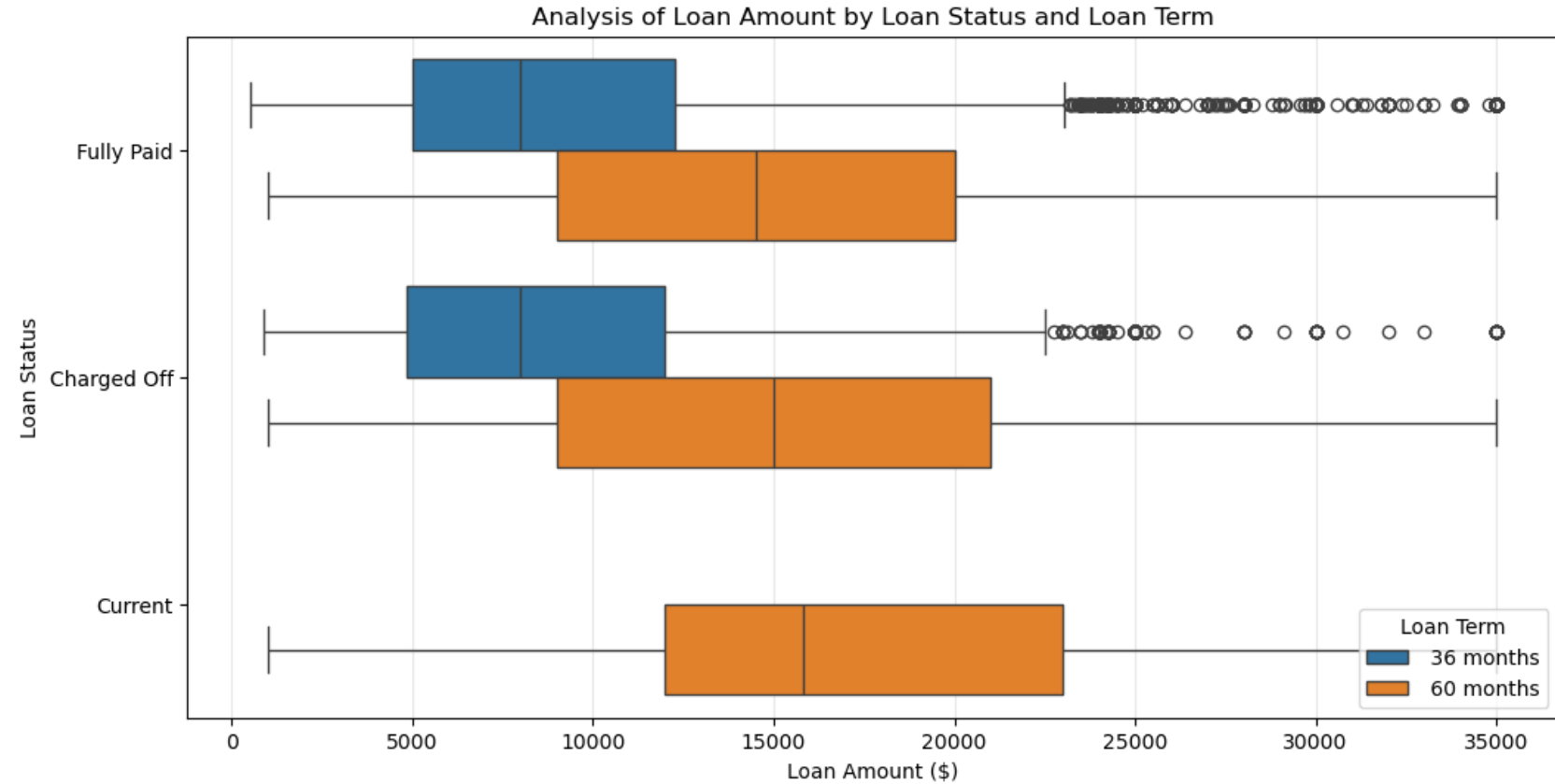
1. Analysis of Loan Amount by Loan Status and Home Ownership
2. Analysis of Loan Amount by Loan Status and Loan Term
3. Analysis of Loan Amount by Loan Status and Loan Purpose
4. Analysis of Scatter Plot of Loan Amount vs. Annual Income vs. Loan Status vs. Home Ownership Statistics
5. Analysis of Correlation Matrix of Numeric Features

# Analysis of Loan Amount by Loan Status and Home Ownership



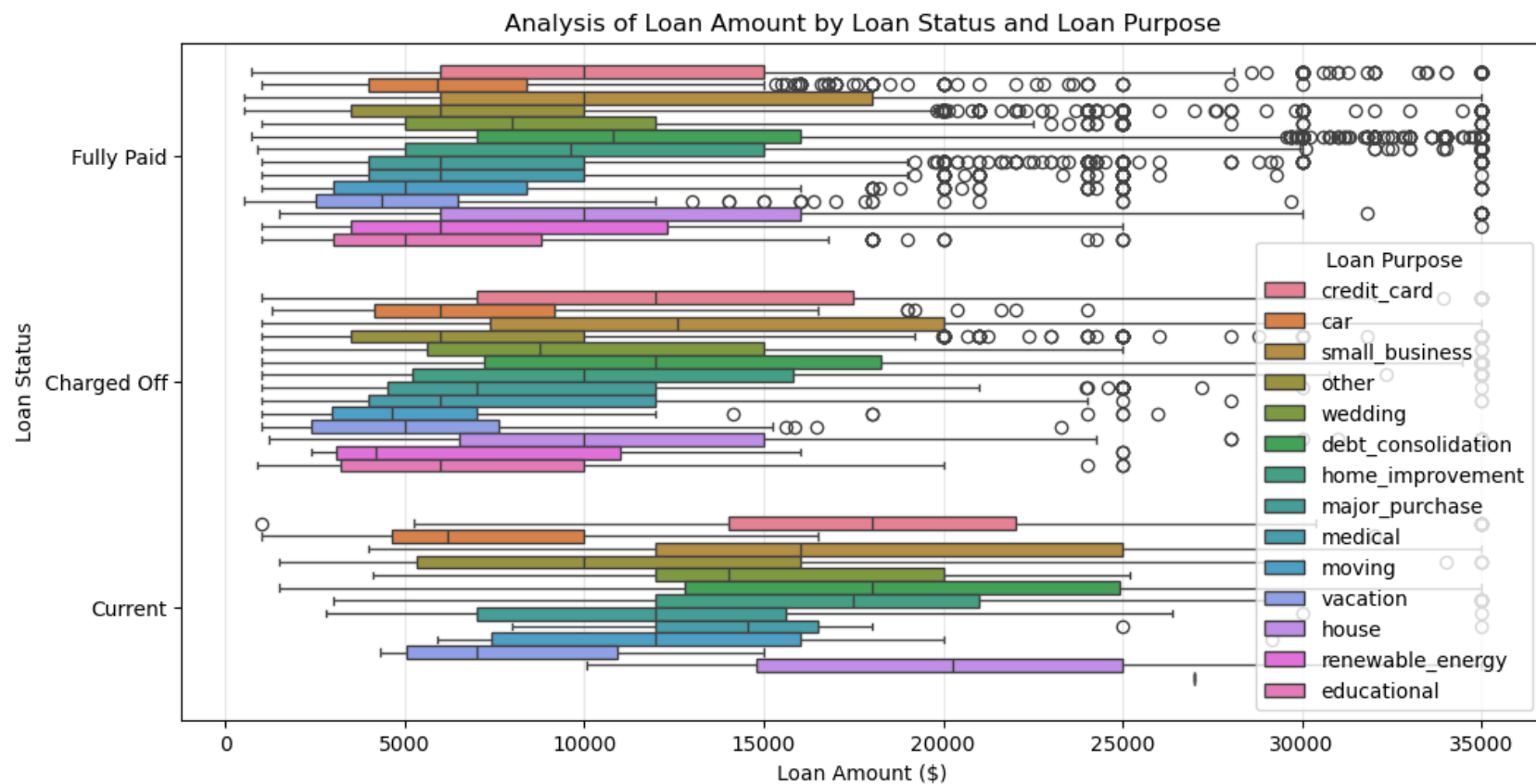
Analysis shows that the loan amount varies by loan status and home ownership. The mean and max loan amounts are highest for 'Charged Off'(Defaulter) loans and Rent home ownership category.

# Analysis of Loan Amount by Loan Status and Loan Term



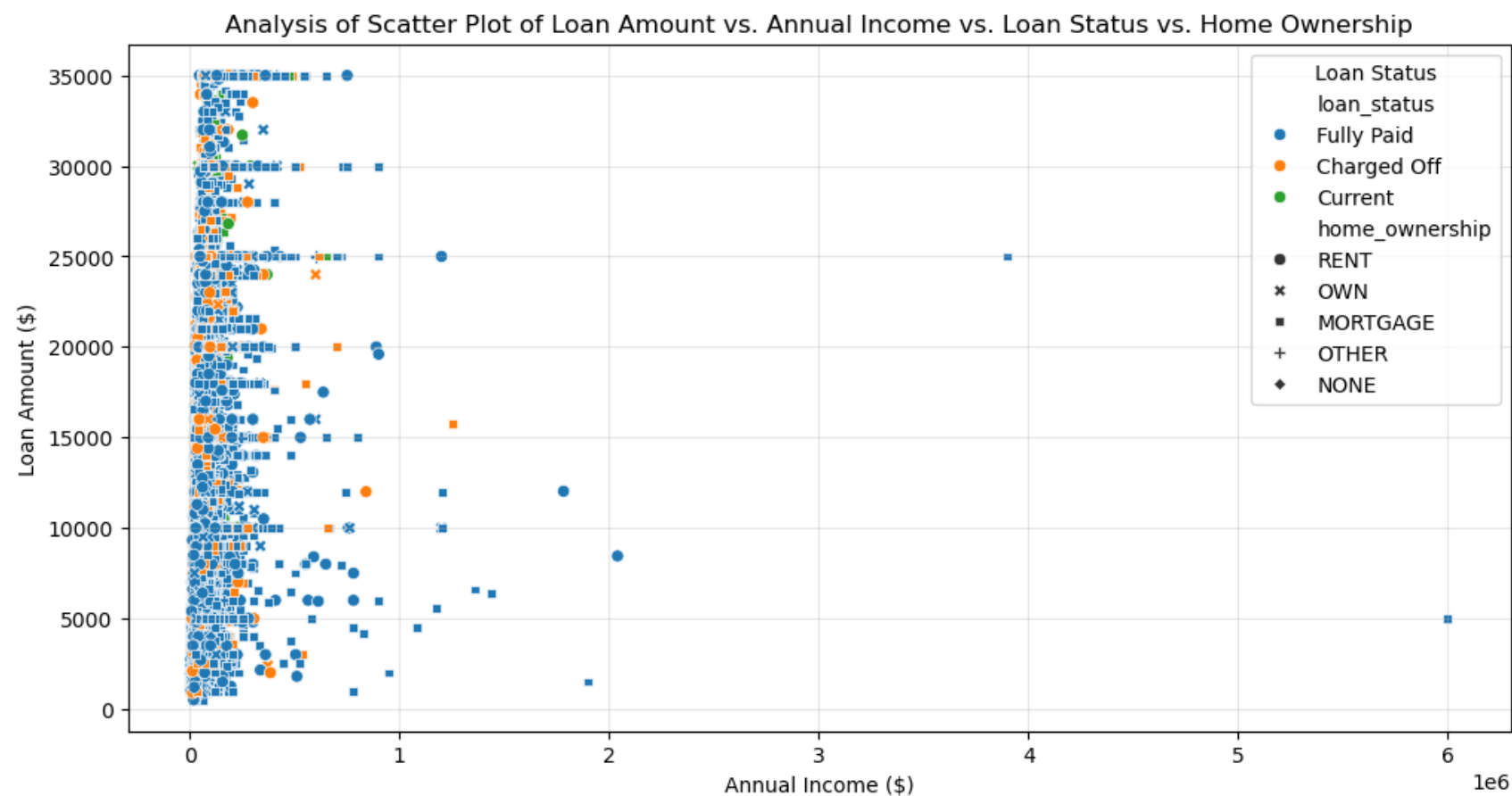
Analysis shows that the loan amount varies by loan status and loan term. The mean and max loan amounts are highest for 'Charged Off'(Defaulter) loans and 36-month loan term.

# Analysis of Loan Amount by Loan Status and Loan Purpose



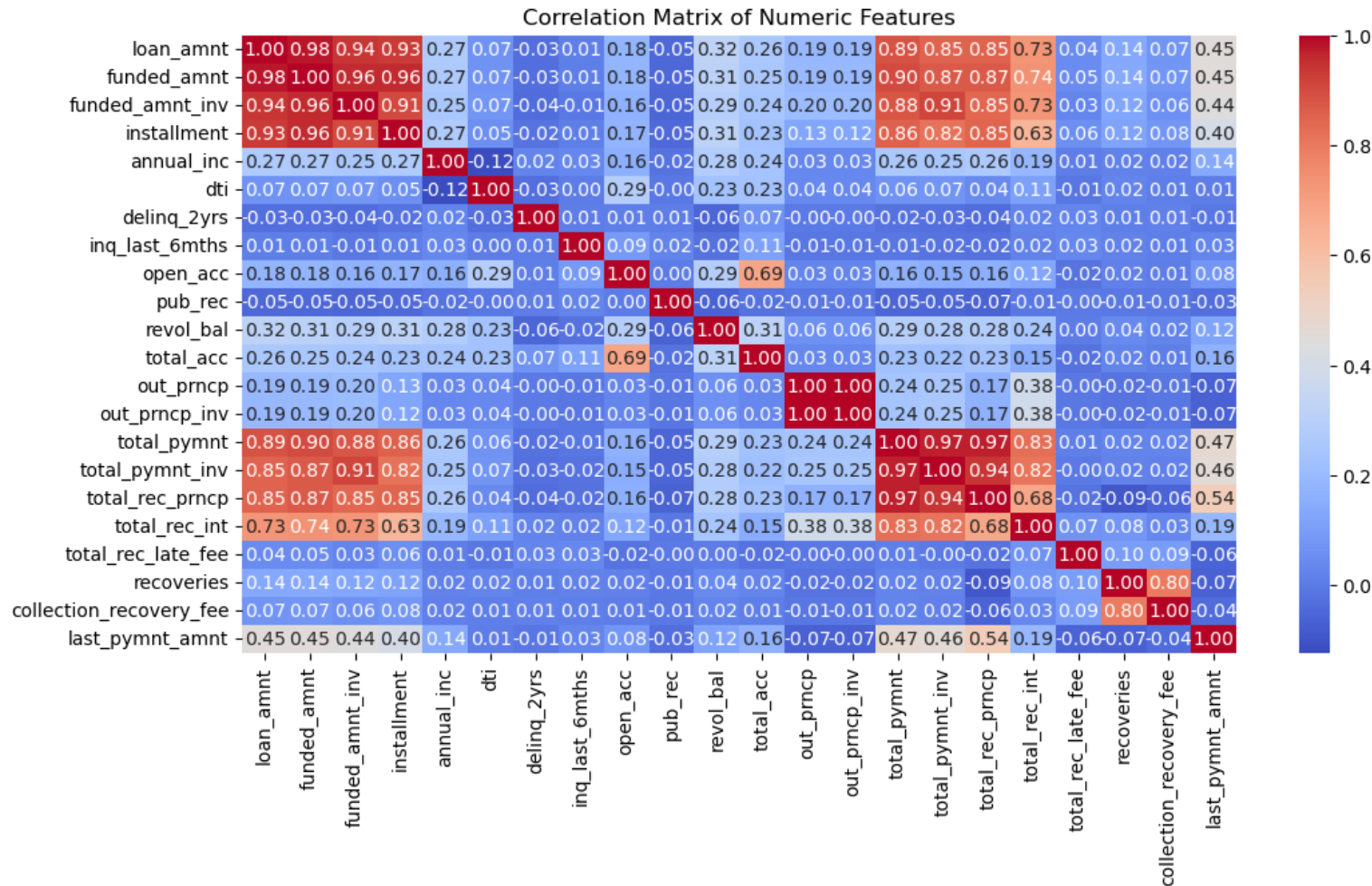
Analysis shows that the loan amount varies by loan status and loan purpose. The mean and max loan amounts are highest for 'Charged Off'(Defaulter) loans and Debt consolidation loan purpose category.

# Analysis of Scatter Plot of Loan Amount vs. Annual Income vs. Loan Status vs. Home Ownership Statistics



Analysis shows that the loan amount varies by annual income, loan status, and home ownership. The scatter plot shows the distribution of loan amount by annual income with loan status and home ownership as hue.

# Analysis of Correlation Matrix of Numeric Features



Analysis shows that the loan amount is positively correlated with installment, funded amount, and total payment, and negatively correlated with interest rate and annual income.



# Conclusion: Driving Factors

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The analysis of the loan dataset reveals five key driving variables:

1. **Home Ownership:** The majority of loan applicants have home ownership of '**RENT**' (47.58%). Most of the defaulters(Charged Off) belong to the Rent home ownership category.
2. **Loan Purpose:** Most of the defaulters(Charged Off) belong to the '**Debt consolidation**' loan purpose category.
3. **Loan Term:** The majority of loans have a term of 36 months (73.3%). Most of the defaulters(Charged Off) belong to the '**36 month**' loan term.
4. **Loan Amount:** The loan amounts range from \$500 to \$35,000 with a mean of \$11,219 and a median of \$10,000. The mean and max loan amounts are highest for 'Charged Off'(Defaulter) loans.
5. **Work Experience:** The majority of defaulters loan applicants have work experience of 10+ years (22.36%).
6. **Loan Grade:** The majority of loans are assigned a grade of 'B' (29.2%). Most of the defaulters(Charged Off) belong to the 'C' loan grade category.
7. **Annual Income:** The loan amount is positively correlated with installment, funded amount, and total payment, and negatively correlated with interest rate and annual income.