Applicant Profile: Key Characteristics of Loan Applicants



Key Features:

- Income: Avg ~\$110K (Range \$20K-\$200K, Symmetric)
- Credit Score: Avg ~576 (Range 300-850, Symmetric)
- **Loan Amount:** Avg ~\$44K (Range \$1K-\$159K, Slightly Positively Skewed)
- DTI Ratio: Avg ~34.7% (Range 2.5%-246%, Positively Skewed, A High Max!)

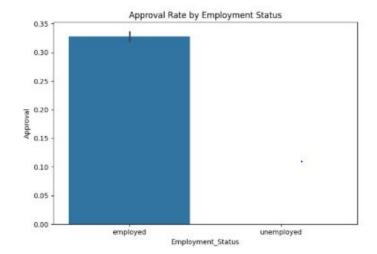
Key Insights: Diverse applicant pool, potential DTI outlier, skews in loan amount & DTI.

Employment & Loan Approval: A Key Relationship

Key Finding: Employment status strongly influences loan approval rates.

Approval Rates:

- Employed Applicants: Significantly higher approval rate (~33%). Stable estimate.
- Unemployed Applicants: Very low approval rate (near 0%). Consistently low.
- Conclusion: Being employed is a major factor for loan approval.
 Unemployment is a significant barrier.
- Implication: Lenders heavily consider employment as an indicator of repayment ability.



Credit Score & Loan Approval: A Clear Trend <a>V

Key Finding: Higher credit score categories generally have higher loan approval rates.

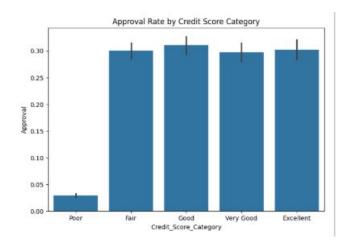
Approval Rates by Category:

- Poor: Very Low (~3%) 😞
- Fair: Significant Jump (~30%)
- Good: Slightly Higher (~31%)
- Very Good: Similar to Good (~29.5%)
- Excellent: Similar to Fair/Very Good (~30%) 👍

Conclusions:

- "Poor" credit = very low approval chance.
- Crossing into "Fair" is a critical positive threshold.
- Diminishing returns for approval rate beyond "Fair."

Implication: Credit score is a strong indicator of loan approval, with a key threshold at "Fair."



DTI Ratio & Loan Approval: A Negative Link 🔗 🚫 🗖 🔽

Key Finding: Higher Debt-to-Income (DTI) ratios are strongly associated with lower loan approval rates.

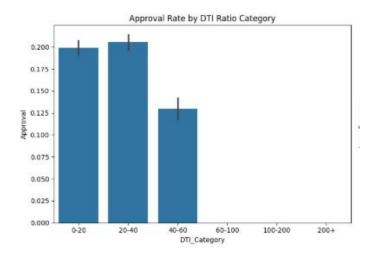
Approval Rates by DTI Category:

- 0-20%: Relatively High (~20%) 👍
- 20-40%: Slightly Higher (~20.5%) 👍
- 40-60%: Noticeable Drop (~13%)
- 60-100%: Very Low (near 0%) X
- 100-200%: Zero Approvals XX
- 200+%: Zero Approvals XXX

Conclusions:

- Lower DTI (0-40%) = Higher Approval.
- DTI > 40% = Decreasing Approval.
- DTI ≥ 60% = Very Slim to No Approval.

Implication: Lenders prioritize applicants with a lower debt burden relative to their income, indicating a strict risk assessment policy.



Loan Purpose & Approval: Some Influence 🤔

Key Finding: The stated loan purpose shows some variation in approval rates, though differences aren't drastic.

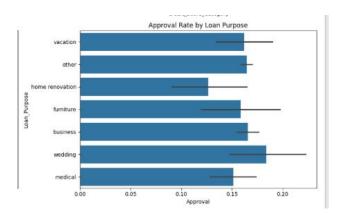
Approval Rates by Purpose:

- Debt: Relatively High (~17%)
- Other: Relatively High (~16%) ? ✓
- Vacation: Moderate (~16%) X 4
- Furniture: Moderate (~16%) <u>4</u>
- ▶ Business: Lower (~15%) 💼 🛝
- Medical: Lowest (~15%)
- Home Renovation: Lowest (~13%) ♠ ○

Conclusions:

- "Wedding" & "Debt" have slightly higher approval.
- "Home Renovation" & "Medical" have lower approval.
- "Other" warrants investigation.
- Overlapping error bars suggest some differences might not be statistically significant.

[3] Implication: Loan purpose might reflect perceived risk or necessity, influencing lender decisions.



Correlation Matrix: Understanding Feature Relationships 📊 🔗



Key Finding: Credit Score shows the strongest linear positive correlation with Loan Approval.

■ Correlations with Approval:

- Credit Score: Moderate Positive (0.35)
- Income: Weak Positive (0.14) slightly
- DTI Ratio: Weak Negative (-0.17) slightly
- Loan Amount: Very Weak Negative (-0.09)

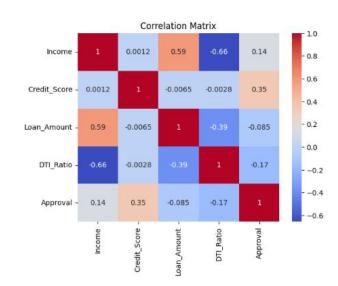
Correlations Between Features (Key Relationships):

- Income & Loan Amount: Moderate Positive (0.59) Higher income, larger loans.
- Income & DTI Ratio: Moderate Negative (-0.66) Higher income, lower DTI.
- Loan Amount & DTI Ratio: Weak Negative (-0.39) Larger loans, slightly lower DTI.

Overall Conclusions:

- Credit Score is the best linear predictor among numerical features.
- Higher DTI decreases approval likelihood.
- Higher Income slightly increases approval likelihood.
- Loan Amount has minimal linear impact on approval.

Implication: Linear relationships provide insights, but non-linear effects and feature interactions might also be important.



Loan Approval Breakdown 🛝

Key Finding: Loan approvals are heavily skewed towards rejections.

Approval Status:

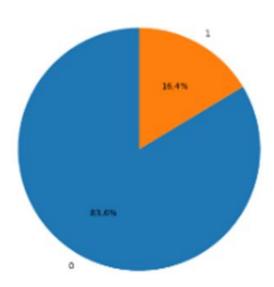
• Rejected: 83.6% X

Approved: 16.4%

Conclusion: The vast majority of loan applications are rejected, indicating a significant class imbalance.

Implication: Models may be biased towards rejection; consider alternative evaluation metrics and balancing strategies.

Loan Approval Distribution



Numerical Feature Correlations & Loan Approval 📊 🔗



Key Finding: Credit Score shows the strongest linear positive correlation with Loan Approval.

GATE 1 Correlations with Approval:

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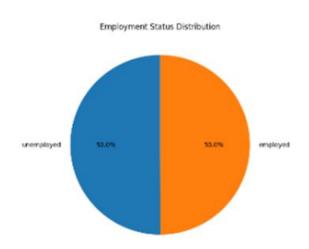
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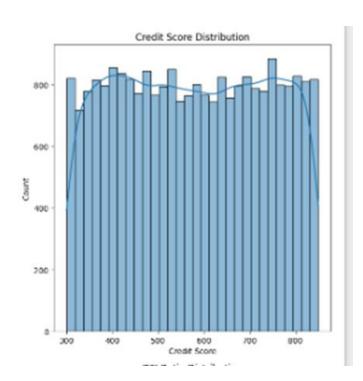


Credit Score Distribution of Applicants

Key Finding: Credit scores are broadly and relatively evenly distributed across the typical range.

II Distribution:

- Range: 300 850 (Typical FICO range)
- Shape: Relatively uniform distribution, especially between 350-850.
- Minor Peaks: Slight increases around lower 400s and mid-700s.
- Minor Dips: Slight decreases around lower 300s and upper 600s.
- Conclusion: Diverse applicant pool in terms of creditworthiness, without a strong central tendency.
- Implication: Credit score is an important factor for loan approval (as seen previously), and this distribution shows a wide spectrum of credit risk among applicants.



Income Distribution of Applicants 🤵 🔁 💰



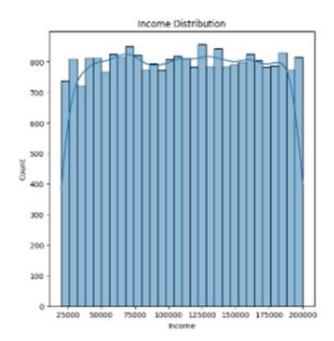




Key Finding: Applicant incomes are distributed relatively evenly across the observed range.

■ Distribution:

- Range: \$20,000 \$200,000
- Shape: Relatively uniform distribution.
- Minor Fluctuations: Slight variations, but no strong peaks.
- Conclusion: Diverse income levels among applicants, without a strong concentration in any particular bracket.
- Implication: Loan decisions likely consider factors beyond just income, as approvals/rejections occur across income levels.

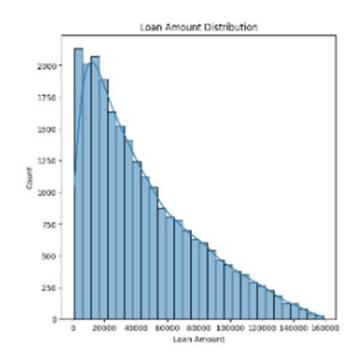


Loan Amount Requests 🏦 🗖 📉

Key Finding: Most applicants request smaller loan amounts.

■ Distribution:

- Range: \$0 \$160,000
- Shape: Strongly Positively Skewed (Peak at lower amounts)
- High number of requests below \$20,000.
- Fewer requests for larger amounts (long tail).
- P Conclusion: Demand for smaller loans is much higher than for larger loans.
- Implication: Lending portfolio likely dominated by smaller loans; risk assessment might vary by loan size.



Applicant Employment Status on unemployed

Key Finding: Applicants are evenly split between employed and unemployed.

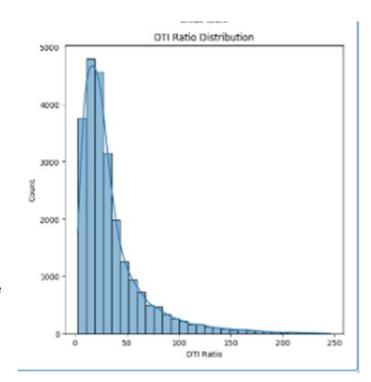
□ Distribution:

• Employed: 50.0%

• Unemployed: 50.0%

Conclusion: The dataset has a balanced representation of employed and unemployed loan applicants.

Implication: This balance highlights the impact of employment status on loan approval (as seen in previous analysis), as the approval rates differ greatly despite the equal representation.



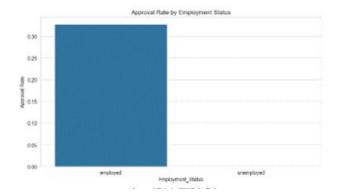
Loan Approval vs. Employment Status 💼 🔁 🔽



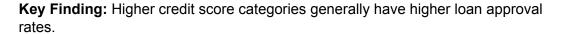
Key Finding: Employment status strongly influences loan approval rates.

Approval Rates:

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- Implication: Lenders heavily consider employment as an indicator of repayment ability.



Loan Approval vs. Credit Score Category —



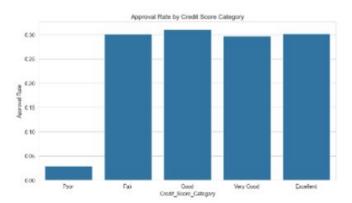
Approval Rates by Category:

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- Fair: Significant Jump (~30%)
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- Excellent: Similar to Fair/Very Good (~30%)

Conclusions:

- "Poor" credit = very low approval chance.
- Crossing into "Fair" is a critical positive threshold.
- Diminishing returns for approval rate beyond "Fair."

!mplication: Credit score is a strong indicator of loan approval, with a key threshold at "Fair."



Loan Approval vs. DTI Ratio

Key Finding: Higher Debt-to-Income (DTI) ratios strongly decrease loan approval chances.

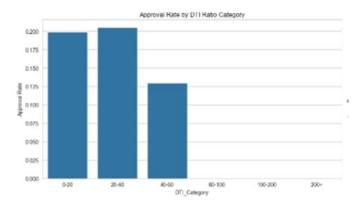
Approval Rates by DTI Category:

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- 20-40%: Slightly Higher (~20.5%)
- 40-60%: Noticeable Drop (~13%) 1
- 60-100%: Very Low (near 0%) X
- 100-200%: Zero Approvals \(\int\)
- 200+%: Zero Approvals

Conclusions:

- Lower DTI (under 40%) = Better Approval.
- DTI over 40% = Lower Approval.
- DTI over 60% = Almost No Approval.

Implication: Lenders prefer lower debt compared to income.



Loan Approval vs. Loan Purpose 🎯

Key Finding: The stated loan purpose shows some variation in approval rates.

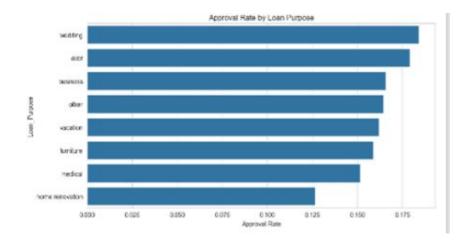
Approval Rates by Purpose (Approximate):

- Debt Consolidation: High (~17%) ⟨□▼
 ✓
- Other: Moderately High (~16%) ? 4
- Vacation: Moderate (~16%) X 4
- Furniture: Moderate (~16%) <u>4</u>
- Medical: Lower (~15%)
- Home Renovation: Lowest (~13%) ♠ ○

🔑 Conclusions:

- "Wedding" & "Debt" have slightly higher approval.
- "Home Renovation" & "Medical" have lower approval.
- "Other" warrants investigation.

Implication: Perceived risk or necessity of the loan might influence lender decisions.



Loan Approval Breakdown 🛝

Key Finding: Most loan applications were rejected.

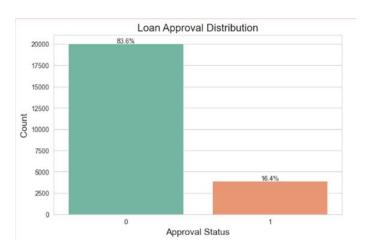
Approval Status:

• Rejected: 83.6% X

• Approved: 16.4% 🔽

Conclusion: The data shows a strong imbalance, with a large majority of applications being rejected.

!mplication: The model might be more inclined to predict rejection, and we should consider other ways to measure how well it performs.



Income Distribution of Applicants 🤵 🔁 💰



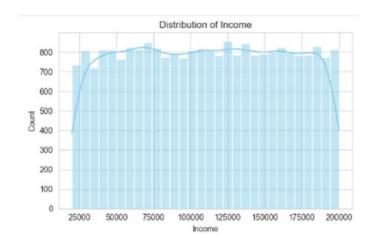




Key Finding: Applicant incomes are distributed relatively evenly across the observed range.

Distribution:

- Range: \$20,000 \$200,000
- Shape: Relatively uniform distribution.
- Minor Fluctuations: Slight variations, but no strong peaks.
- Conclusion: Diverse income levels among applicants, without a strong concentration in any particular bracket.
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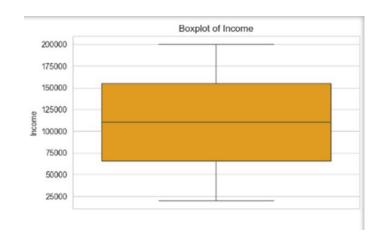


Income Distribution via Boxplot 🤵

Key Finding: Income distribution is relatively symmetric with a median around \$110,000.

III Distribution Highlights:

- Median Income: \$110,000
- Interquartile Range (IQR): \$67,500 \$152,500 (Middle 50% of incomes)
- Overall Range: \$25,000 \$200,000
- Symmetry: Reasonably symmetric distribution
- Outliers: None detected
- Conclusion: Income distribution is fairly balanced, with most applicants earning between \$67,500 and \$152,500.
- [5] Implication: The income data doesn't show extreme skewness or outliers, which is useful for further analysis.



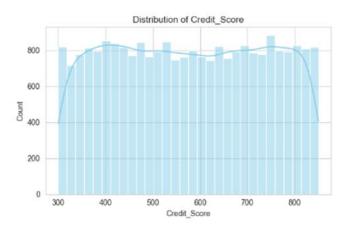
Credit Score Distribution of Applicants

Key Finding: Credit scores are broadly and relatively evenly distributed across the typical range.

- Range: 300 850 (Typical FICO range)
- Shape: Relatively uniform distribution, especially between 350-850.
- Minor Peaks: Slight increases around lower 400s and mid-700s.
- Minor Dips: Slight decreases around lower 300s and upper 600s.

Conclusion: Diverse applicant pool in terms of creditworthiness, without a strong central tendency.

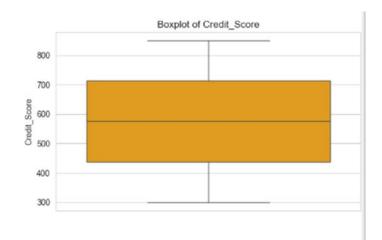
Implication: Credit score is an important factor for loan approval (as seen previously), and this distribution shows a wide spectrum of credit risk among applicants.



Credit Score Distribution (Boxplot View)

Key Finding: Credit scores show a good range with the middle around 570-580.

- Median Credit Score: Around 570-580 (Middle point)
- Interquartile Range (IQR): Around 440 710 (Middle 50% of scores)
- Overall Range: 300 850 (Full spectrum)
- Symmetry: Looks reasonably balanced
- Outliers: None significant detected
- P Conclusion: A wide variety of credit scores exist among applicants, with the typical range for the middle half being 440 to 710.
- !mplication: Lenders likely use this range to assess risk, with higher scores generally being more favorable.

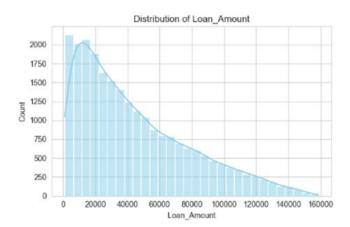


How Much People Want to Borrow :

Key Finding: Most people ask for smaller loans.

■ Distribution:

- Range: From almost \$0 up to \$160,000.
- Shape: Lots of small loan requests, fewer and fewer big loan requests. Like a slide going down!
- Many requests are for under \$20,000.
- Some people ask for very large amounts, but not as many.
- Conclusion: Small loans are much more common than big ones.
- Implication: The lenders probably deal with more small loans overall.

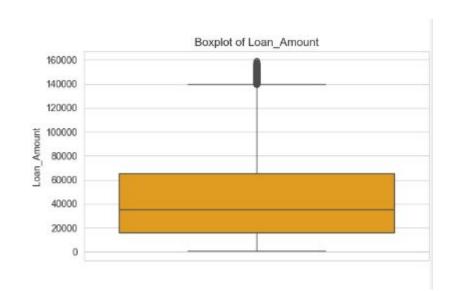


How Loan Amounts are Spread Out 🏦

Key Finding: Most loan requests are in the lower to middle range, but some are very high.

III Distribution:

- Middle Point: Around \$30,000 \$35,000 (Half of requests are below this, half above).
- Typical Range (Middle 50%): From about \$17,500 to \$62,500.
- Overall Range (Most requests): From almost \$0 up to \$140,000.
- Some Very High Requests: A few applications go above \$140,000.
- Conclusion: While many ask for smaller amounts, there's a considerable spread, and some seek very large loans.
- Implication: Lenders need to handle a wide variety of loan sizes, potentially with different risk profiles.



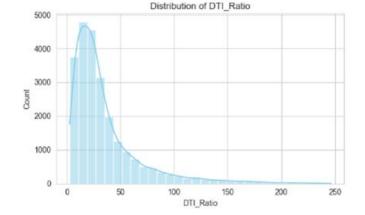
How Much Debt People Have Compared to Income

Key Finding: Most applicants have low debt compared to their income, but some have very high debt.

Distribution:

- Range: From almost 0% up to 250%.
- Shape: Most people have low ratios, then it drops off quickly.
- A lot of people have DTI below 50%.
- A few people have *very* high DTI (over 100%).

P Conclusion: Many applicants have low debt relative to income, but a few have a lot of debt.



Implication: Lenders worry about high DTI, as it means more risk.

DTI Ratio at a Glance (Boxplot)

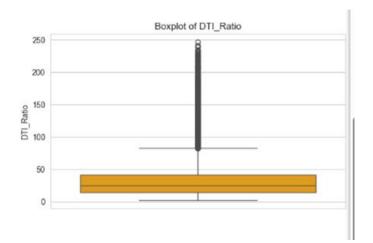
Key Finding: Most applicants have low DTI ratios, but some have very high ones.

III Distribution Highlights:

- Median DTI Ratio: Around 20-25 (Middle point)
- Typical Range (Middle 50%): From about 10-15 to 40-45
- Overall Range: From 0 to around 80-90 (excluding some very high cases)
- Skewness: The data is pushed towards the lower end
- Outliers: Some people have really high DTI ratios (over 200)

P Conclusion: A lot of applicants have low debt compared to their income, but a few have a lot of debt.

Implication: Lenders pay close attention to high DTI ratios, as they indicate more risk.

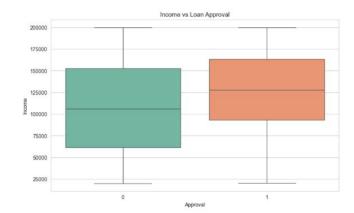


Income and Getting Approved for a Loan 💰 🖃 🔽 / 🚫

Key Finding: People with slightly higher incomes were a bit more likely to get approved.

Income Levels:

- Rejected Applicants: Middle income around \$100,000 \$110,000.
- Approved Applicants: Middle income a bit higher, around \$120,000 \$130,000.
- Conclusion: Having a higher income seems to help a little with loan approval.
- Implication: Income isn't the only thing that matters, as people with lower incomes can still get approved, and higher earners can be rejected too. Other things like credit score are also important.



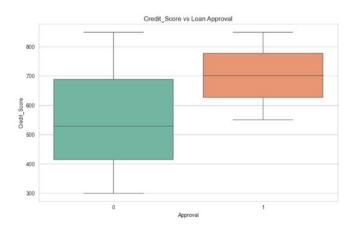
Credit Score and Loan Approval Chances 👍 🗖 🚺



Key Finding: People with higher credit scores were much more likely to get approved.

Ⅲ Credit Score Levels:

- Rejected Applicants: Middle credit score around 520-530.
- Approved Applicants: Middle credit score much higher, around 720-730.
- **Conclusion:** Having a good credit score is really important for getting a loan.
- **Implication:** Lenders look closely at credit scores to decide who is likely to pay back the loan. Higher scores mean better chances.

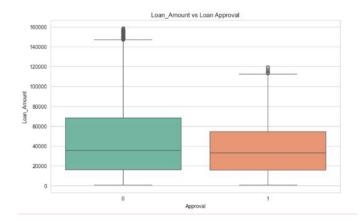


Loan Amount and Approval Chances & 🗗 🚺 / 🚫

Key Finding: Approved and rejected loans have pretty similar loan amounts on average.

I Loan Amounts:

- Rejected Loans: Middle loan amount around \$30,000 \$40,000.
- Approved Loans: Middle loan amount around \$30,000.
- P Conclusion: The amount of the loan doesn't seem to be a big factor in whether it gets approved or not.
- [3] Implication: Lenders aren't just saying yes or no based on loan size. Other things, like credit score and income, are probably more important.

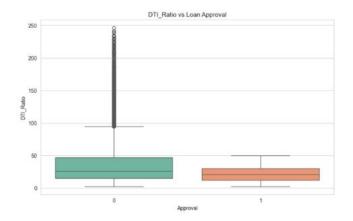


DTI Ratio and Loan Approval Chances 💸 🖃 🔽 / 🚫

Key Finding: People with less debt compared to their income (lower DTI ratios) are much more likely to get approved.

III DTI Ratio Levels:

- Rejected Applicants: Middle DTI ratio around 30-35.
- Approved Applicants: Middle DTI ratio much lower, around 15-20.
- P Conclusion: Having a lower DTI ratio is really important for getting a loan.
- [3] Implication: Lenders worry about high DTI ratios, as they indicate a greater risk of not being able to pay back the loan.

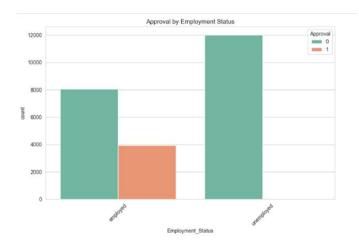


Employment and Loan Approval: A Clear Link

Key Finding: Being employed significantly increases the chance of loan approval.

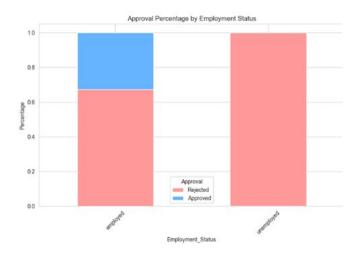
Approval Rates:

- Employed: Much higher approval rate (around 33%).
- Unemployed: Very low approval rate (close to 0%).
- P Conclusion: Employment status is a strong predictor of loan approval.
- Implication: Lenders strongly prefer employed applicants, likely due to perceived stability and ability to repay.



Loan Amount and Approval Chances 💰 🔁 🚺 🚫

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- Implication: Lenders aren't just saying yes or no based on loan size. Other things, like credit score and income, are probably more important.



Loan Purpose and Approval Numbers 6

Key Finding: The reason for the loan seems to have some effect on how many get approved.

III Loan Purposes (Number of Approvals):

- Other: Most applications overall, a good number approved
- Business: Lots of applications, a decent number approved \$\mathbb{e}\$ \$\delta\$
- Medical: Fewer applications, not many approved
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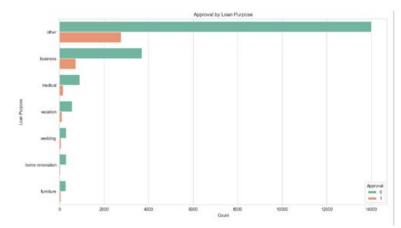
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- Vacation: Fewer applications, not many approved
 \(\frac{1}{4} \)
- Wedding: Fewer applications, but a better chance of approval \(\frac{\barch}{V} \)
- Home Renovation: Few applications, very few approved \(\bigotimes \)
- Furniture: Few applications, very few approved
- Conclusion: Some loan reasons (like weddings) might have a better approval rate than others (like home renovation).
- Implication: Lenders might see some loan purposes as riskier or less important.

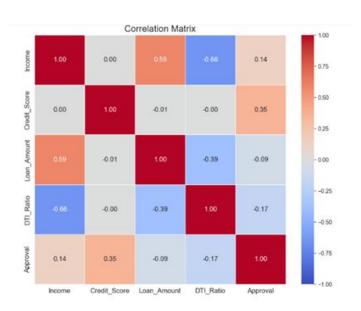


Getting a Loan: Does Having a Job Help?

Key Finding: People with jobs are much more likely to get their loan approved.

Approval Chances:

- Employed People: Higher chance of approval (around 33%).
- Unemployed People: Very low chance of approval (close to 0%).
- Conclusion: Having a job makes a big difference in whether your loan gets approved.
- Implication: Lenders really care if you have a job and a steady income to pay back the loan.



Comparing Features for Approved & Rejected Loans



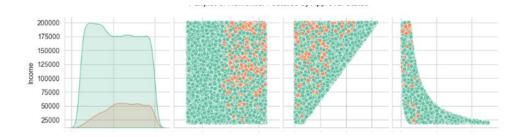
Key Finding: Approved loans tend to have better scores across the board (higher income, better credit, lower debt).

M Key Differences:

- **Income vs Loan Amount:** Higher income allows for bigger approved loans.
- **Income vs Credit Score:** Approved loans lean towards slightly higher credit scores at all income levels.
- Income vs DTI Ratio: Approved loans usually have lower debt compared to income.
- Loan Amount vs Credit Score: Higher credit scores can get larger loans approved.
- Loan Amount vs DTI Ratio: Approved loans often have less debt for the loan size.
- Credit Score vs DTI Ratio: Approved loans are linked to higher credit and lower debt.

Conclusion: Higher income, better credit, and lower debt (DTI) generally increase approval chances.

Implication: Lenders look at the whole picture, but good credit seems especially important.



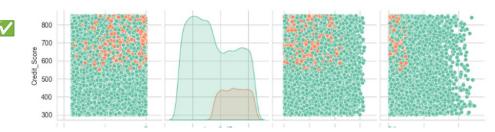
Loan Approval: Who Gets Approved Based on Job? $\bigcirc \longleftrightarrow \bigcirc$



Key Finding: Employed people get approved much more often than unemployed people.

Approval Numbers:

- Employed: Many rejections, but a good number of approvals V
- Unemployed: Many rejections, very few approvals \(\infty \)
- Conclusion: Having a job greatly increases your chances of getting a loan approved.
- **Implication:** Lenders really look at whether you're employed when deciding to approve a loan.



How Loan Amounts are Spread Out 🏦

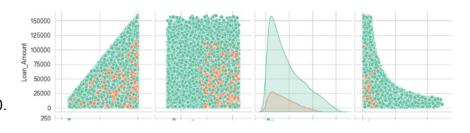
Key Finding: Most loan requests are in the lower to middle range, with a few very high ones.

Distribution:

- Middle Point: Around \$30,000 \$35,000 (Half of requests are below this, half above).
- Typical Range (Middle 50%): From about \$17,500 to \$62,500.
- Overall Range (Most requests): From almost \$0 up to \$140,000.
- Some Very High Requests: A few applications go above \$140,000.

Conclusion: While many ask for smaller amounts, there's a considerable spread, and some seek very large loans.

Implication: Lenders need to handle a wide variety of loan sizes, potentially with different risk profiles.

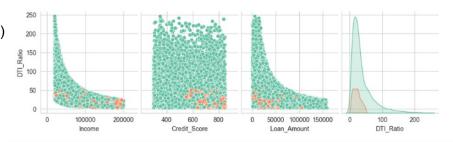


Credit Score Distribution: Seeing the Spread 👀

Key Finding: Credit scores show a good range with the middle around 570-580.

III Distribution Highlights:

- Median Credit Score: Around 570-580 (Middle point)
- Interquartile Range (IQR): Around 440 710 (Middle 50% of scores)
- Overall Range: 300 850 (Full spectrum)
- Symmetry: Looks reasonably balanced
- Outliers: None significant detected 👍
- Conclusion: A wide variety of credit scores exist among applicants, with the typical range for the middle half being 440 to 710.
- Implication: Lenders likely use this range to assess risk, with higher scores generally being more favorable.



Income and Loan Amount vs. Approval 💰 🏦 🔽 / 🚫



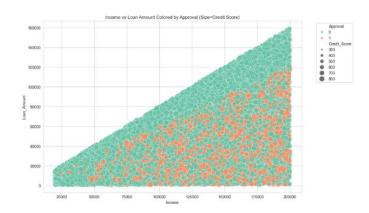
Key Finding: While higher income and larger loans often go together, credit score is key for approval.

Ⅲ What the Data Shows:

- Higher income generally linked to higher loan requests for both approved and rejected cases.
- Approved loans are more common when both income and credit score are high.
- Rejected loans often occur when credit scores are low, even with high income or low loan amounts.

Conclusion: Credit score is a major factor. You might get a big loan if your income is high and your credit is great, but you could be denied even with a good income if your credit score is low.

Implication: Lenders consider both income and loan amount, but creditworthiness (score) is a critical gatekeeper for loan approval.



Income vs. Loan Amount by Employment Status 💼 💰

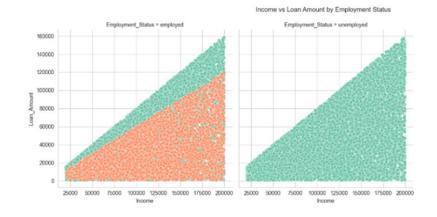
 Key Finding: The relationship between income, loan amount, and approval differs based on employment status.

• III Employed Applicants:

- Higher income generally linked to higher loan amounts.
- Approvals happen across income/loan amounts, but more common with higher income.

• III Unemployed Applicants:

- Almost all applications are rejected, regardless of income or loan amount.
- Conclusion: Having a job is crucial. For employed people, higher income helps with larger loan approvals. Unemployed people rarely get approved.
- **[Proof of the Proof of the P**



Loan Approval Insights: Key Factors & Trends 📊

Applicant Snapshot: Diverse group with varying incomes (\$20K-\$200K) and credit scores (300-850). Most have low debt (DTI < 50%).

W Key Approval Factors:

- Employment: Employed applicants have much higher approval rates (~33% vs ~0%).
- Credit Score: Higher scores = much better approval chances (e.g., "Fair" ~30% vs "Poor" ~3%).
- DTI Ratio: Lower debt compared to income = higher approval (DTI < 40% is good).

Ney Rejection Factors:

- Unemployment: Very strong negative indicator.
- Poor Credit: Very low approval rates.
- High DTI: DTI > 60% drastically reduces approval chances.

Other Points:

- Loan purpose has a minor influence (Weddings & Debt Consolidation slightly higher).
- Loan amount alone isn't a strong predictor. 💰

Final Thought: Credit score and employment status are critical for loan approval. Managing debt (low DTI) also significantly increases chances.