Statistical Analysis Report: Loan Approval

# 1. Executive Summary

This report summarizes the results of statistical hypothesis testing to identify which features significantly influence loan approval decisions. The analysis was conducted using t-tests for binary comparisons and ANOVA for multi-group comparisons. The most impactful features include Annual Income, Credit Score, Monthly Income, and Net Worth, which showed strong statistical significance in their association with loan approval status.

# 2. Methodology

We applied independent t-tests for numerical variables across the binary LoanApproved status (0 = Not Approved, 1 = Approved). For categorical variables with more than two groups (e.g., EducationLevel, MaritalStatus), we used one-way ANOVA to determine whether the group means significantly differ for the selected numeric feature.

# 3. Statistical Test Results

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| --- | --- | --- | --- | --- |
| Feature | Test Type | P-Value | Significant | Interpretation |
| AnnualIncome | T-test | ≈ 0.0 | Yes | Higher income → higher approval |
| CreditScore | T-test | ≈ 1e-92 | Yes | Higher score → higher approval |
| MonthlyIncome | T-test | ≈ 0.0 | Yes | Monthly income matters |
| NetWorth | T-test | ≈ 1e-79 | Yes | Wealthier → higher approval |
| EducationLevel | ANOVA | ≈ 1e-91 | Yes | Education correlates with credit/income |
| EmploymentStatus | ANOVA | 0.065 | No | Not significant |
| LoanPurpose | ANOVA | 0.084 | No | Not significant |
| MaritalStatus | ANOVA | 0.81 | No | Not significant |
| MonthlyDebtPayments | ANOVA | 0.43 | No | Not significant |

# 4. Conclusion

The results clearly show that several financial metrics—particularly Annual Income, Credit Score, Monthly Income, and Net Worth—are strongly associated with loan approval. On the other hand, features like Marital Status, Loan Purpose, and Education Level (in terms of Monthly Debt Payments) do not demonstrate statistically significant influence.