
Analyzing the Impact of Annual Income on Credit Scores and Monthly Debt

A Detailed Examination of Lending Data

June 2024

Group 2

Project Introduction and Questions

Project Description:

The dataset examines the financial behavior of borrowers, analyzing various factors that influence their loan status.

Project Overview:

Our project aims to examine lending data to reveal insights into loan characteristics and borrower behavior. We concentrated on two primary questions related to credit scores and customer annual income.

Question 1: Is there a significant relationship between annual income and credit score?

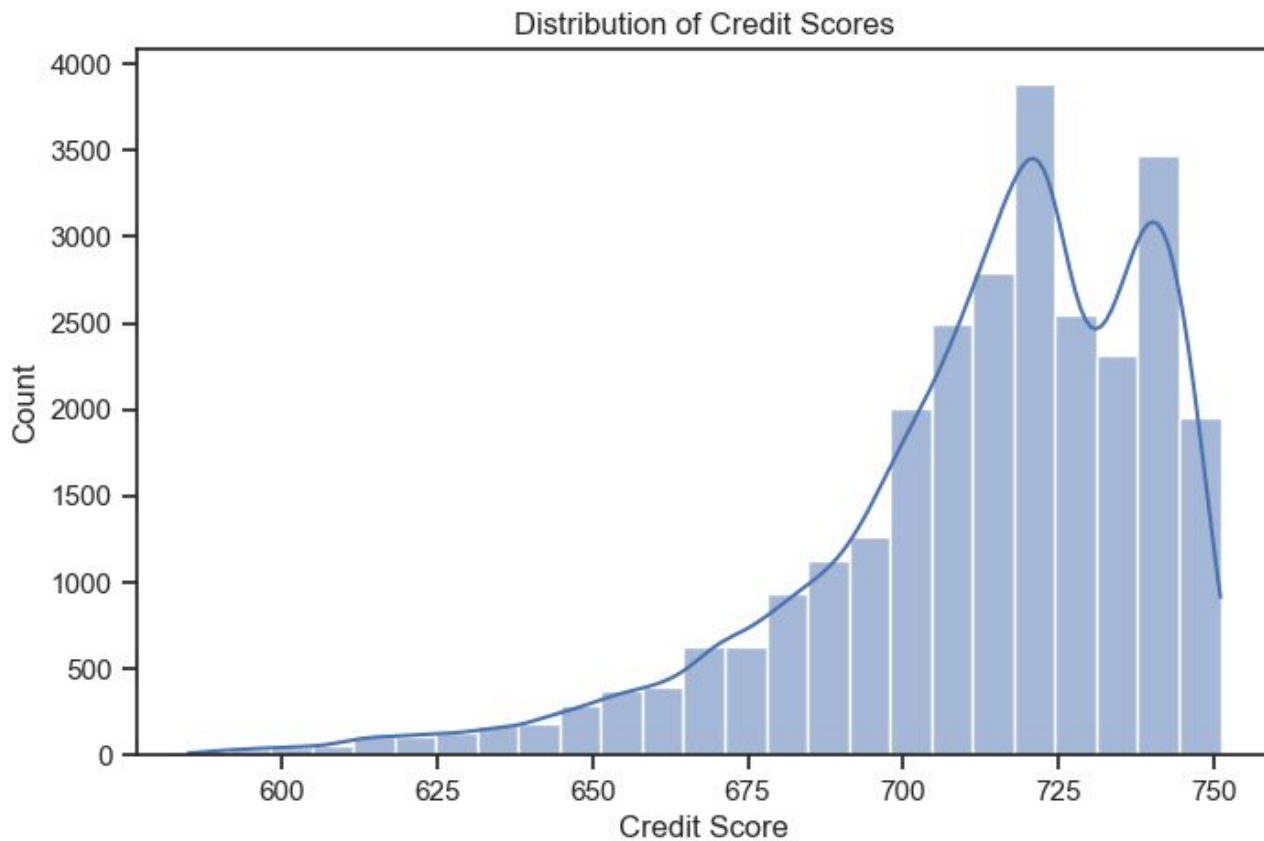
Question 2: What factors influence the likelihood of a loan being charged off or fully paid?

	Loan ID	Customer ID	Loan Status	Current Loan Amount	Term	Credit Score	Annual Income	Years in current job	Home Ownership	Purpose	...	Years of Credit History	Months since last delinquent	Number of Open Accounts	Number of Credit Problems	Current Credit Balance	Maximum Open Credit	Bankruptcies	Tax Liens	Loan Status Numerical	Term Numerical
6	273581de-85d8-4332-81a5-19b04ce68666	90a75dde-34d5-419c-90dc-1e58b04b3e35	Fully Paid	217646.0	Short Term	730.0	1184194.0	< 1 year	Home Mortgage	Debt Consolidation	...	19.6	10.0	13.0	1.0	122170.0	272052.0	1.0	0.0	1	1
8	8af915d9-9e91-44a0-b5a2-564a45c12089	af534dea-d27e-4fd6-9de8-efaa52a78ec0	Fully Paid	548746.0	Short Term	678.0	2559110.0	2 years	Rent	Debt Consolidation	...	22.6	33.0	4.0	0.0	437171.0	555038.0	0.0	0.0	1	1
14	2e841c8f-3dc1-464d-91c1-3d3d51e64c38	2ac05980-7848-4692-89ae-9321afe650f8	Fully Paid	234124.0	Short Term	727.0	693234.0	10+ years	Rent	Debt Consolidation	...	24.7	46.0	10.0	1.0	28291.0	107052.0	1.0	0.0	1	1
17	24e8c8bd-d10b-4dac-8b81-1da470ff5ecb	967e8733-7189-49b7-a3ab-6a1d0e1abdac	Fully Paid	666204.0	Long Term	723.0	1821967.0	10+ years	Home Mortgage	Debt Consolidation	...	22.0	34.0	15.0	0.0	813694.0	2004618.0	0.0	0.0	1	0
20	150ebbad-ebcd-441e-b70d-2f350ad7dca6	40f729c9-54c7-4768-9fb5-2fa41d074c48	Charged Off	317108.0	Long Term	687.0	1133274.0	8 years	Rent	Debt Consolidation	...	17.4	53.0	4.0	0.0	60287.0	126940.0	0.0	0.0	0	0

Dataset Used:

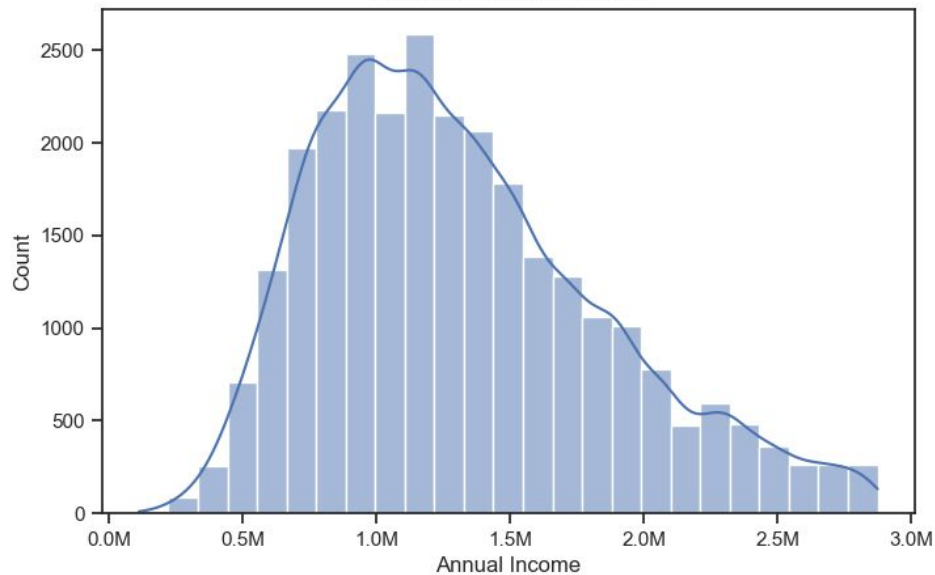
<https://github.com/scetx/datax/blob/master/01-data-x-fundamentals/m160-titanic/m160-hw-dataset.csv>

Credit Score Distribution

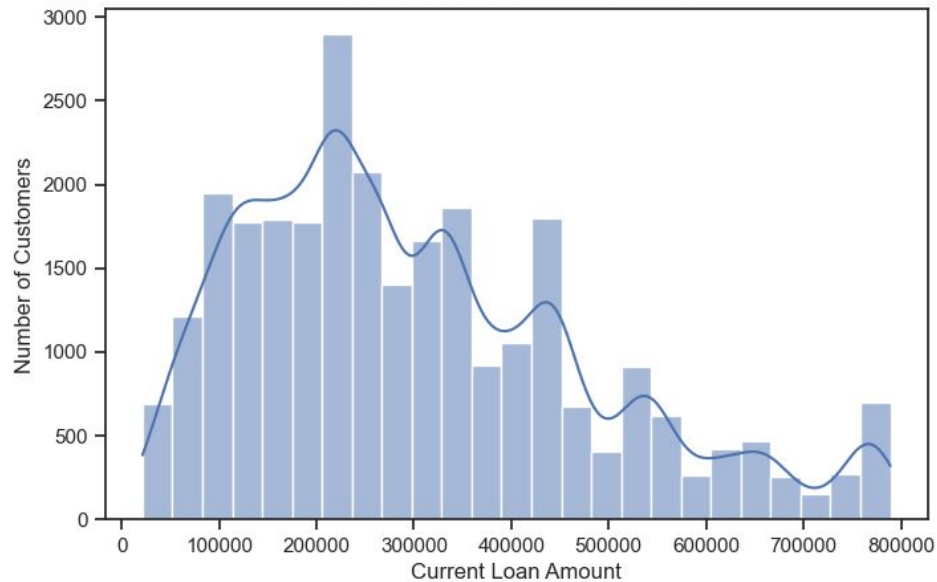


Distribution of Annual Income and Current Loan Amount

Distribution of Annual Income



Distribution of Current Loan Amount



Hexbin Plot of Annual Income vs Credit Score



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Hypothesis 1

Null: There is no significant relationship between annual income and credit score.

Alternate: There is a significant relationship between annual income and credit score.



Comparison Between Annual Income and Credit Score

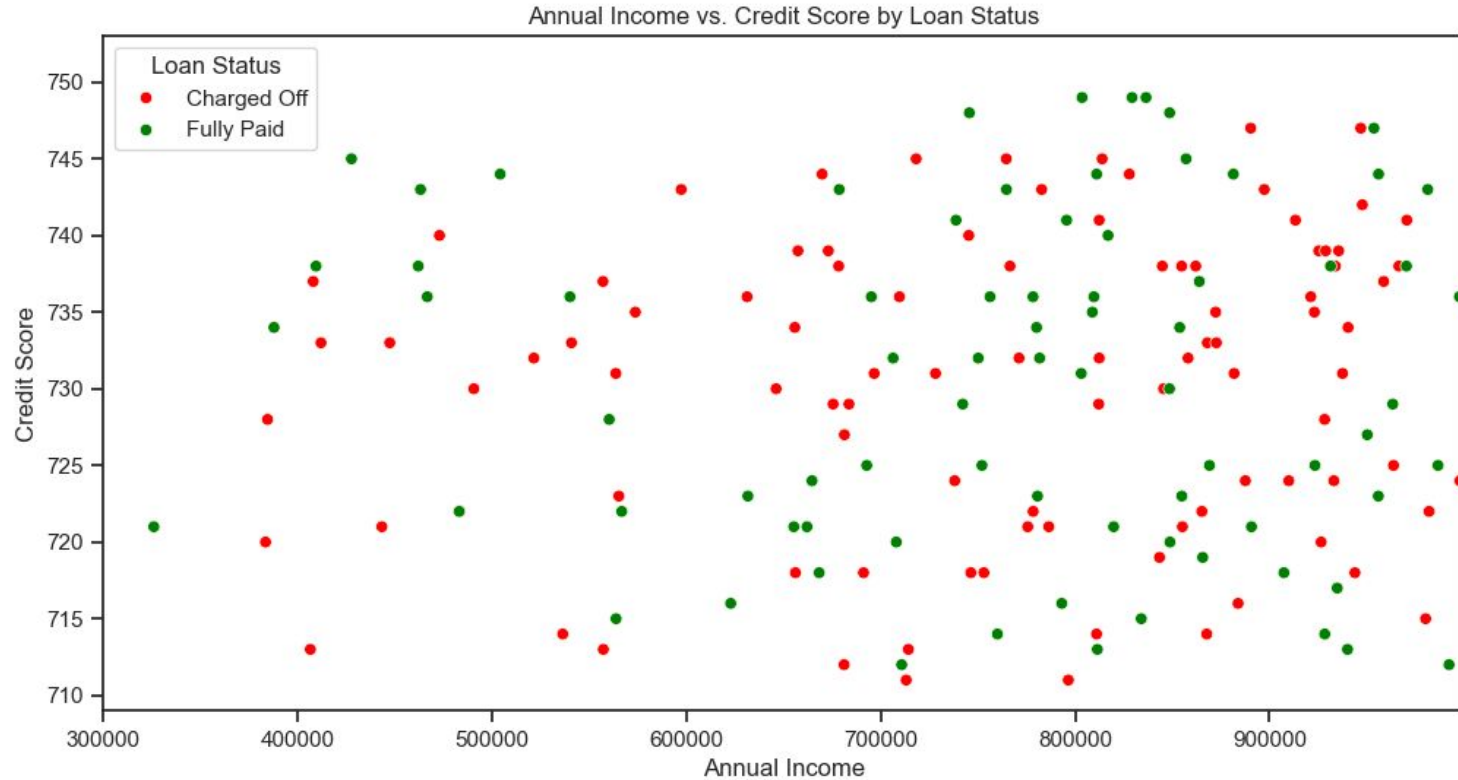
Objective: Explore the relationship between annual income and credit score.

Method:

- Plot a scatter plot of annual income versus credit score
- Calculate the correlation coefficient
- Perform a t-test

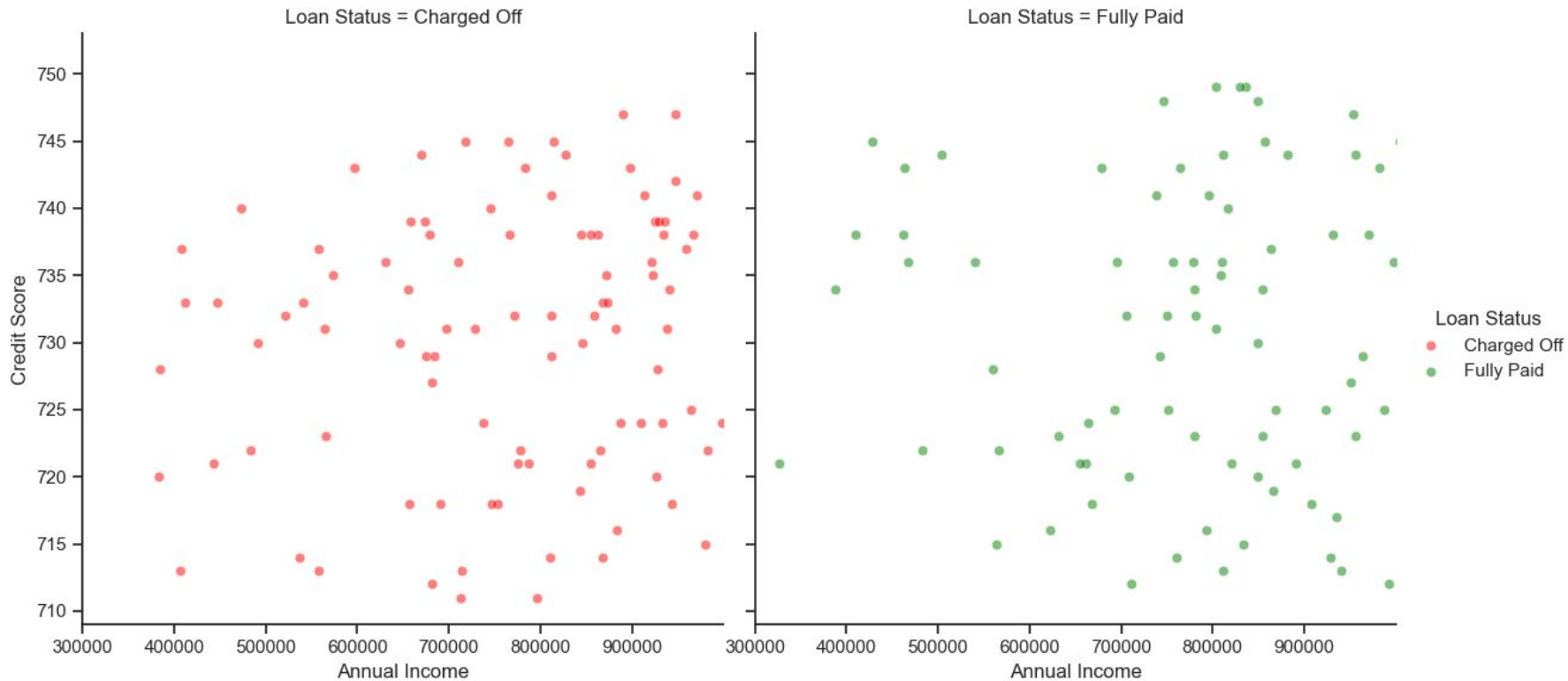


Annual Income vs Credit Score By Loan Status



Correlation: Main focus, created range of 300k-1 M\$ within a random sample of 500 pts. To further understand difference we split it into two charts (next chart) so you can better see status and points

Loan Status: 'Fully Paid' vs 'Charged Off'



Correlation Analysis of Loan Status

Correlation Analysis:

Charged Off:

Pearson correlation coefficient: 0.08378435072441298

P-value: 0.1866912558834643

Fully Paid:

Pearson correlation coefficient: 0.060551227688365516

P-value: 0.3403488889013202



Closer Look at Charged Off Loans : Annual Income vs Credit Score

Correlation between Annual Income and Credit Score

- Correlation Coefficient: 0.0701
- P-value: 0.2694

Correlation between Annual Income and Current Loan Amount

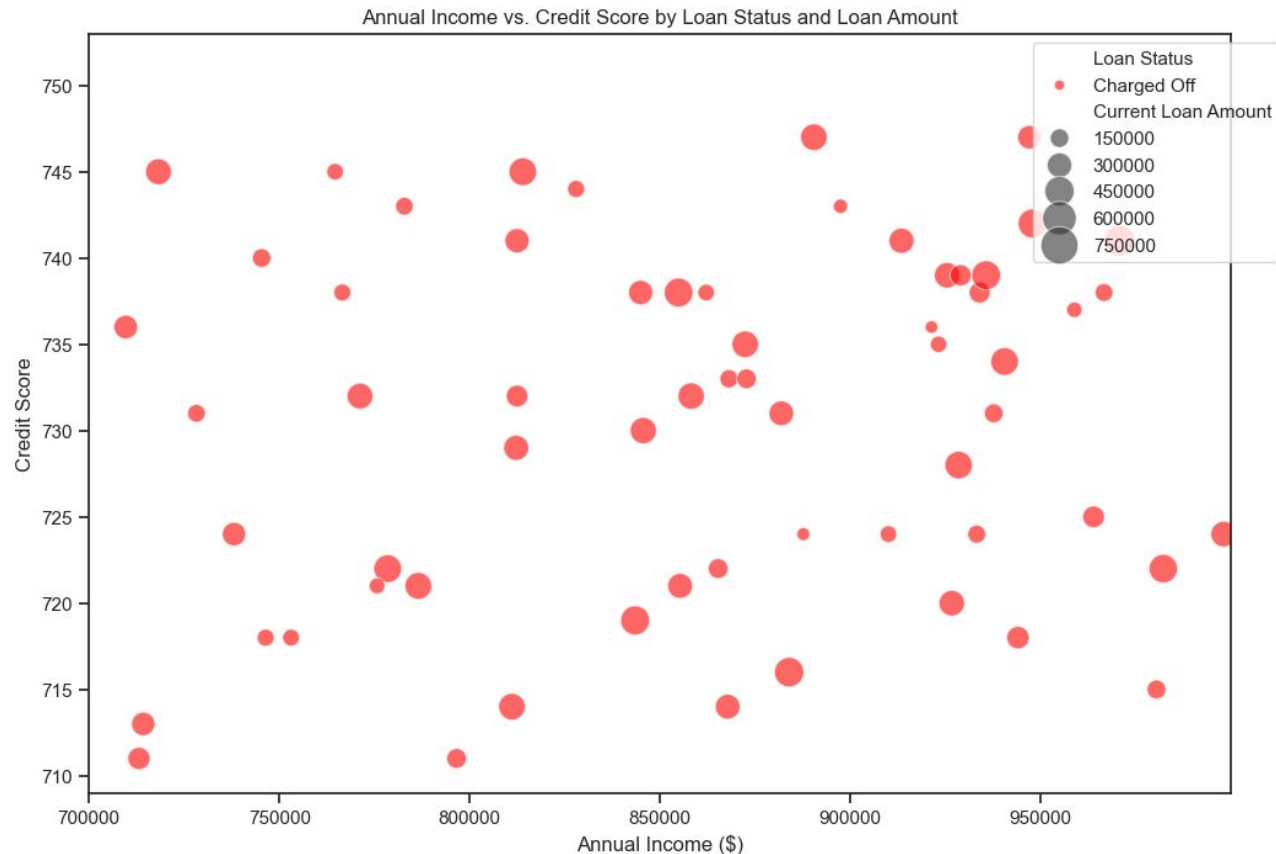
- Correlation Coefficient: 0.0932
- P-value: 0.1418

Correlation between Credit Score and Current Loan Amount

- Correlation Coefficient: -0.0022
- P-value: 0.9727

T-test

- T-statistic: -1.2846
- P-value: 0.2038



Comparison Between Annual Income and Credit Score

Correlation Analysis:

- There are no significant correlations between annual income, credit score, and current loan amount. All p-values are greater than 0.05.

T-test Analysis:

- The t-test indicates no significant difference in credit scores between short-term and long-term loans (p-value = 0.2038).

Conclusion:

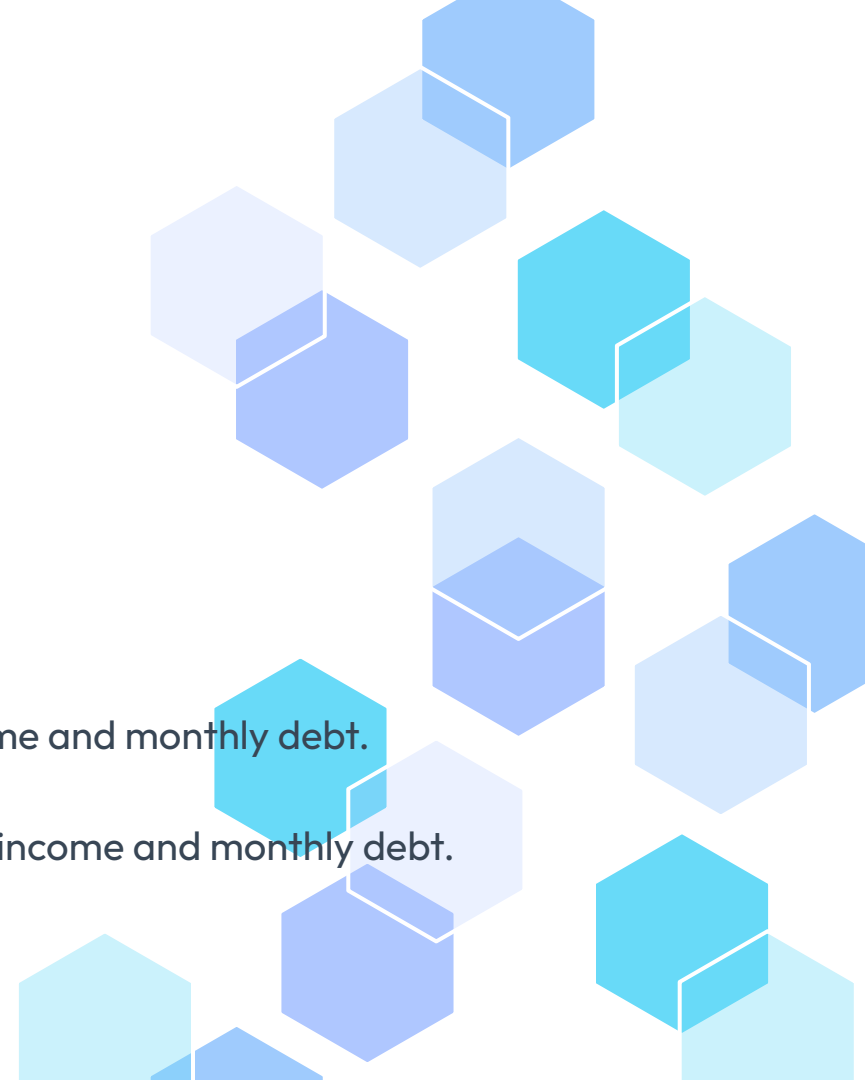
- Since the p-value is less than 0.05, we reject the null hypothesis. There is a statistically significant difference in credit scores between short-term and long-term loans.

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Hypothesis 2

Null: There is no relationship between annual income and monthly debt.

Alternate: There is a relationship between annual income and monthly debt.



Influence of Annual Income on Monthly Debt

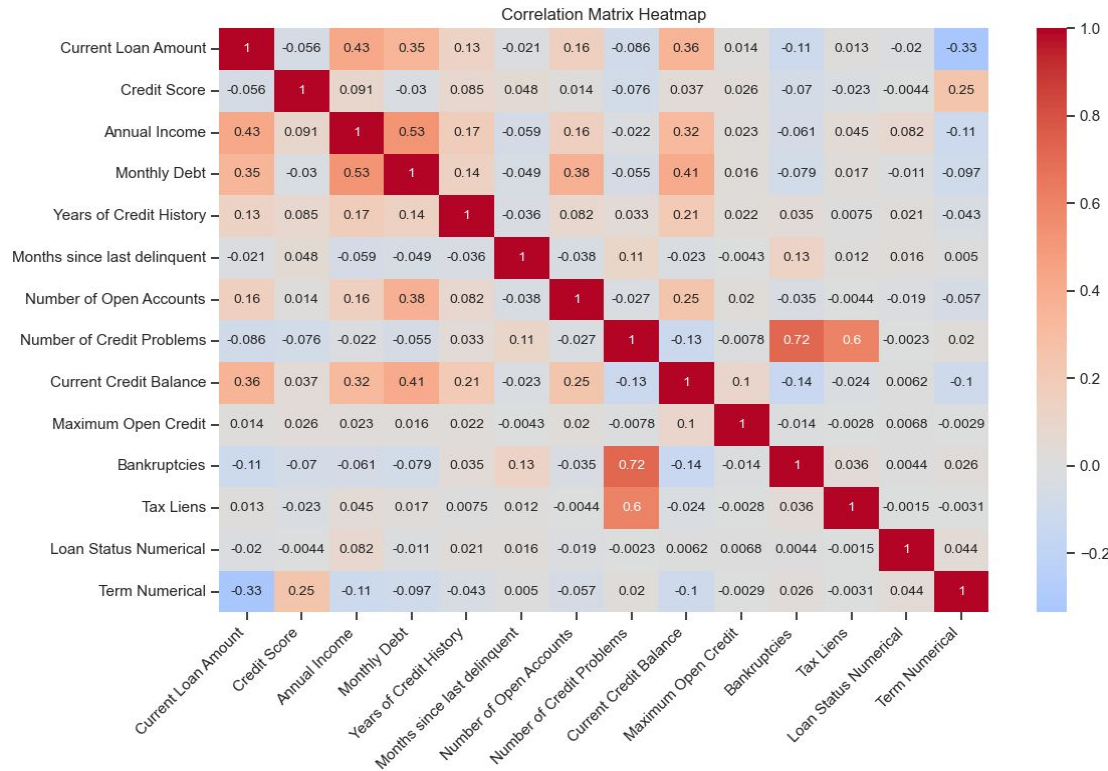
Objective: Explore the relationship between annual income and monthly debt.

Method:

- Generate a heatmap connecting the data.
- Plot a scatter plot of annual income versus monthly debt.
- Calculate the correlation coefficient.



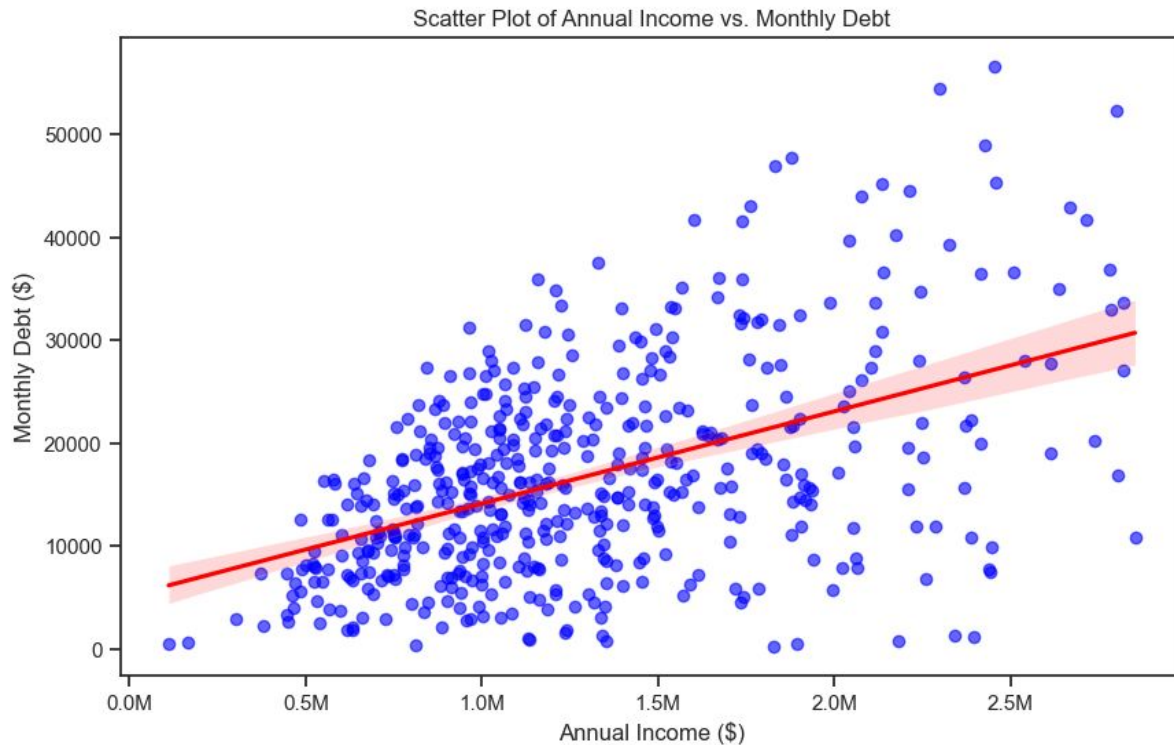
Influence of Annual Income on Monthly Debt



Heatmap showing the correlation between various financial variables including annual income and monthly debt.

Pearson correlation coefficient: 0.483, P-value: 1.58e-30

Influence of Annual Income on Monthly Debt



Scatter plot showing the relationship between annual income and monthly debt with a fitted regression line from a random sample of 500.

T-statistic: -8.4779, **P-value:** 2.62e-16

Influence of Annual Income on Monthly Debt

Results:

- Pearson Correlation Coefficient: 0.48
- P-Value: 1.58
- T-statistic: -8.48
- P-value: 2.62

Conclusion:

While the Pearson correlation coefficient of 0.48 indicates a moderate positive relationship between annual income and monthly debt, the high p-value of 1.58 suggests that this result is not statistically significant, leading us to fail to reject the null hypothesis.



Thank you :)

