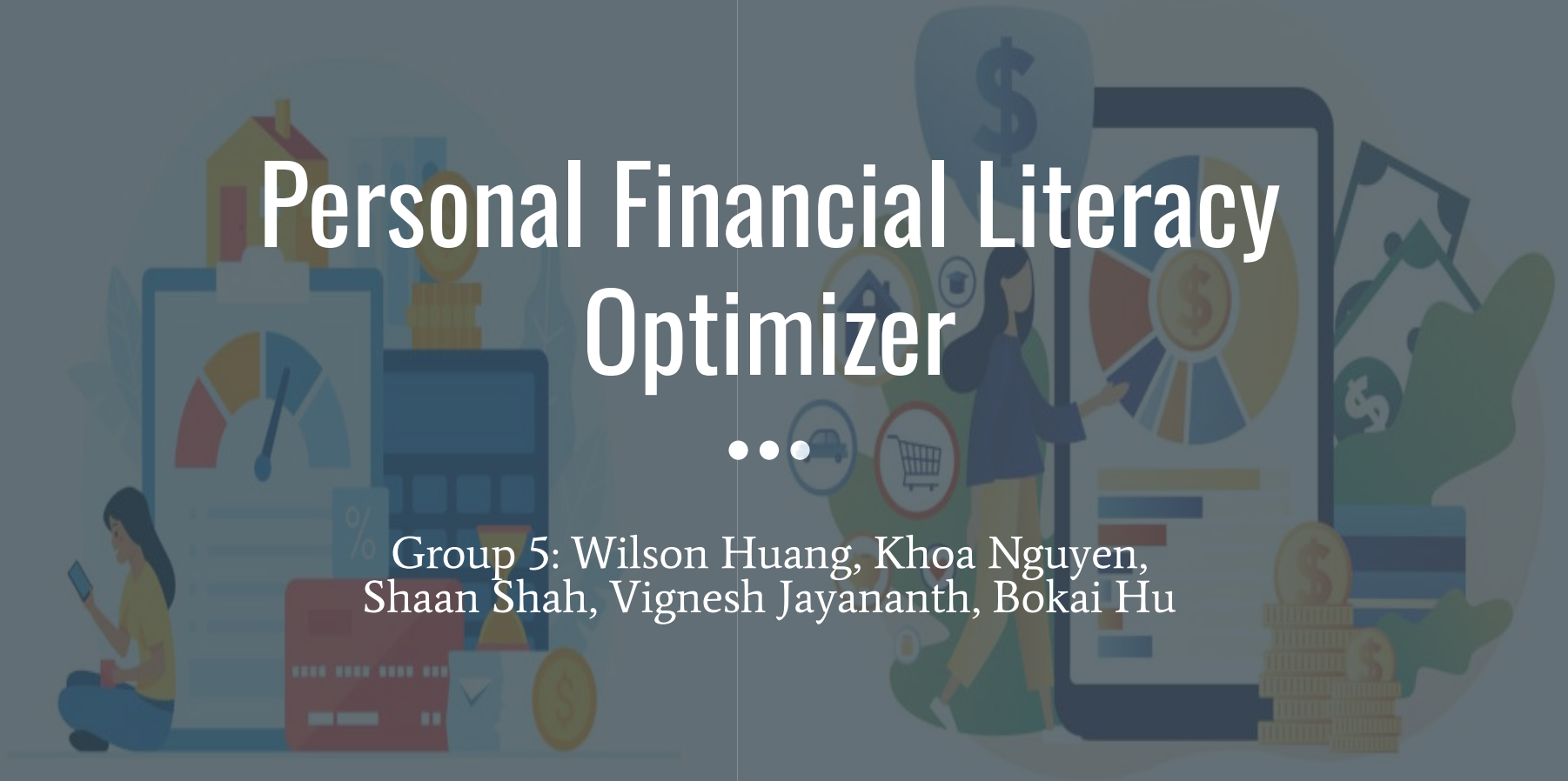


Personal Financial Literacy Optimizer

...

Group 5: Wilson Huang, Khoa Nguyen,
Shaan Shah, Vignesh Jayananth, Bokai Hu



Motivation

- Credit Score: score used by creditors to determine credit behavior
- Factors that generally affect credit score
 - Payment History
 - Amount Owed / Credit Utilization Ratio
- Some aspects of our lives can indirectly affect credit score
 - Lifestyle Choices
- Hard Inquiries will lower one's credit scores



CREDIT SCORE



Data Overview

Credit Score Classification:

<https://www.kaggle.com/datasets/paarisrohan/credit-score-classification?select=train.csv>

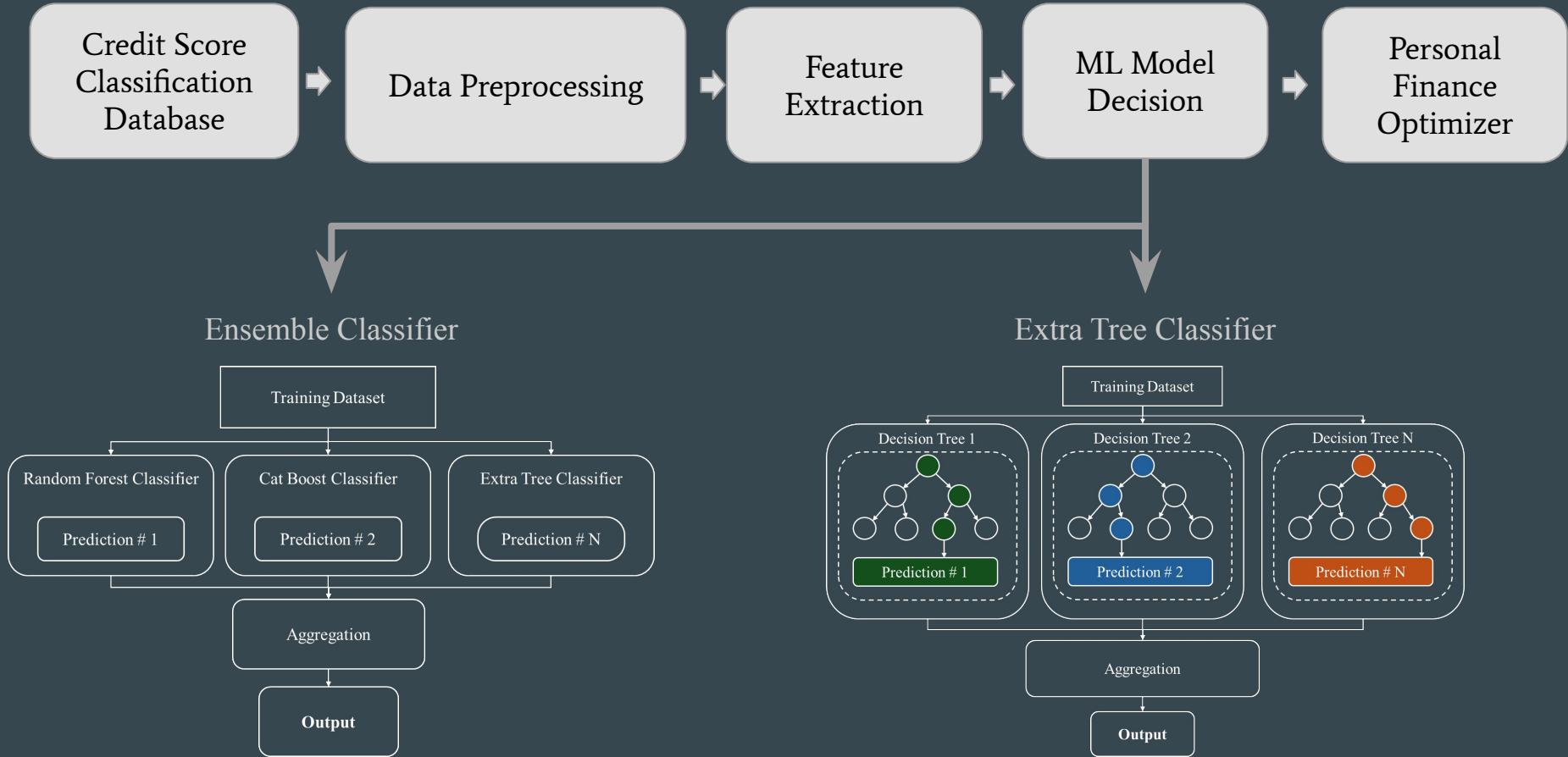
- 100,000 data points
- 28 features
- Basic bank details and credit-related information



Dataset Features:

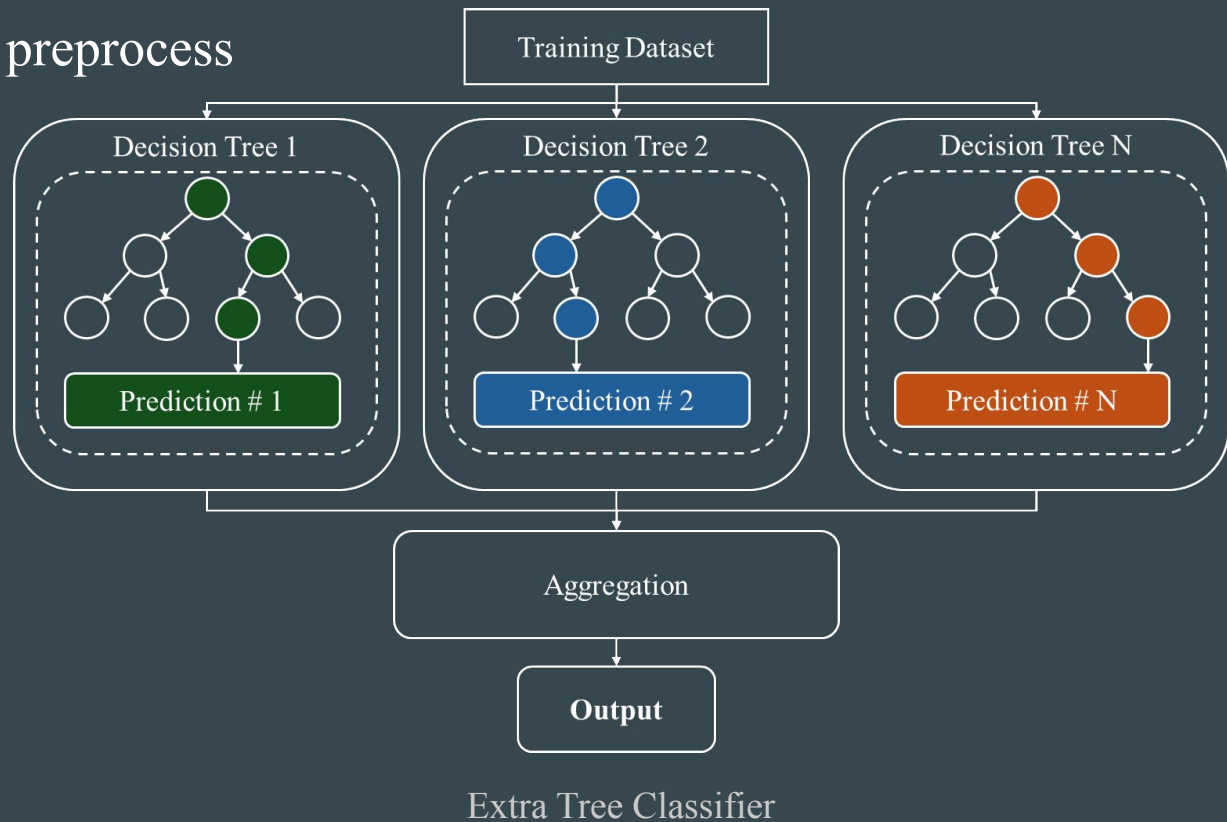
- Name, Age, Occupation
- Annual Income, Monthly In-Hand Salary
- Number of Bank Accounts, Credit Mix
- Outstanding Debt, Credit Utilization Ratio
- Credit History Age, Payment of Min Amount
- EMI per Month, Amount Invested Monthly
- Payment Behavior, Monthly Balance
- Credit Score

The Project Pipeline



Methodology

- Data cleaning and data preprocess
- Modeling
- Reverse optimization



What Can't People Change?

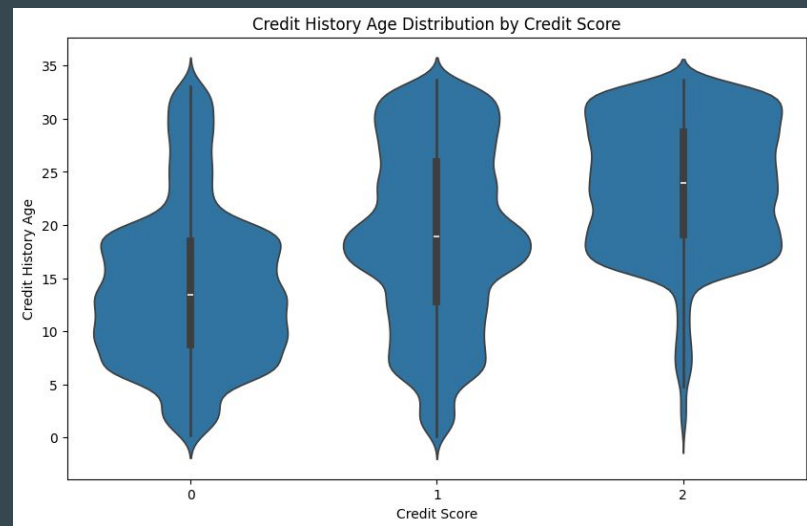
- Name, Age, Occupation
- Annual/Monthly Income

Data Analysis (1): Feature Selection

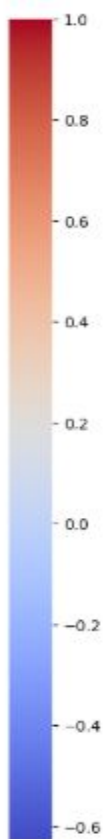
What are the some of the most important features?

- Payment of Min Amount
- Number of Credit Card Inquiries
- Delay from Due Date
- Number of Credit Cards

Note: Some features like Annual Income cannot be easily changed



Correlation heatmap

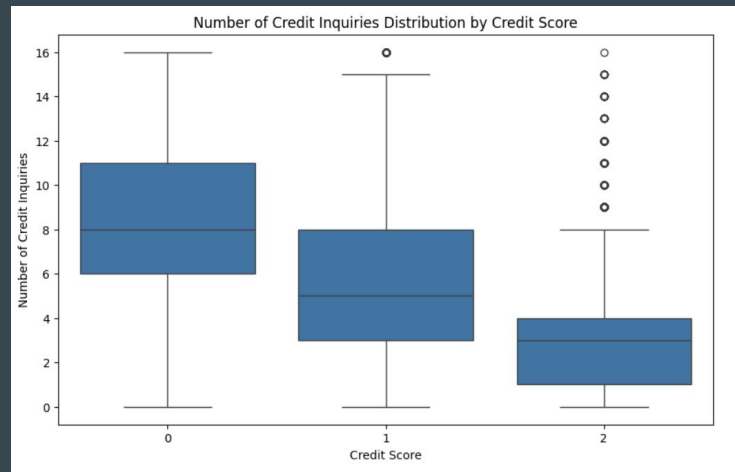


**Correlation
Heatmap**

Data Analysis (2): Correlations

How do credit inquiries indicate financial behavior?

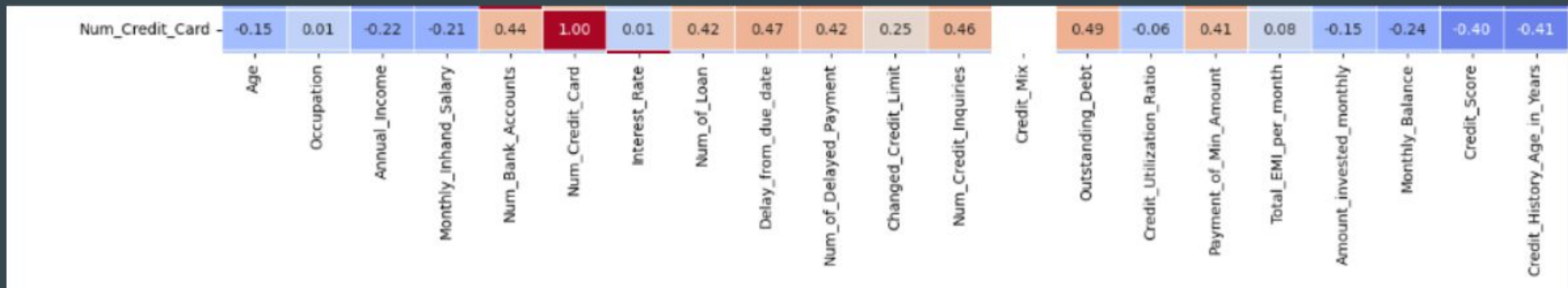
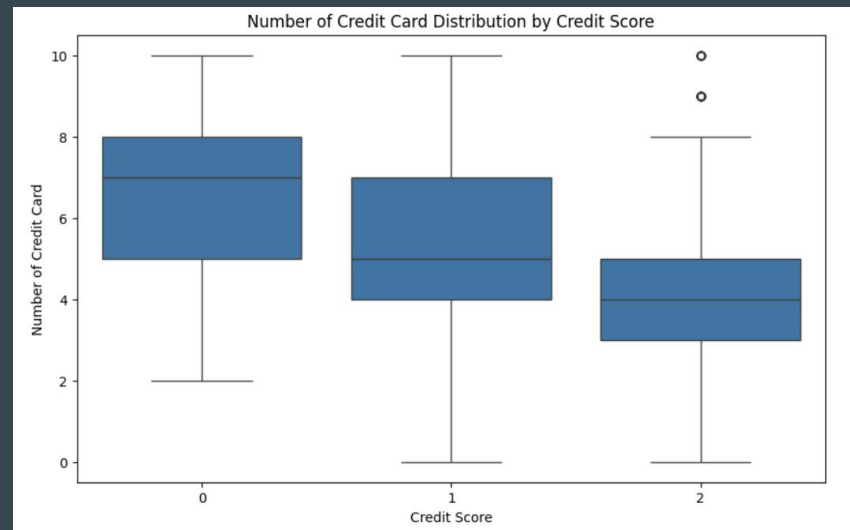
- Bad behaviors have positive correlation
- Hard Inquiries lower credit score



Num_Credit_Inquiries	-0.25	0.00	-0.28	-0.28	0.52	0.46	0.00	0.56	0.54	0.50	0.38	1.00		0.60	-0.07	0.63	0.13	-0.19	-0.32	-0.43	-0.61
	Age	Occupation	Annual_Income	Monthly_Inhand_Salary	Num_Bank_Accounts	Num_Credit_Card	Interest_Rate	Num_of_Loan	Delay_from_due_date	Num_of_Delayed_Payment	Changed_Credit_Limit	Num_Credit_Inquiries	Credit_Mix	Outstanding_Debt	Credit_Utilization_Ratio	Payment_of_Min_Amount	Total_EMI_per_month	Amount_invested_monthly	Monthly_Balance	Credit_Score	Credit_History_Age_in_Years

How do number of credit cards indicate financial behavior?

- Bad Behaviors have positive correlation
- People with more credit cards tend to have bad credit scores



Data Analysis (4): Choosing the Best Model

How accurate is the best model?

ExtraTreeClassifier performed the best


Accuracy and F1 score of over 85%



	Model	Accuracy	AUC	Recall	Prec.	F1	Kappa	MCC	TT (Sec)
et	Extra Trees Classifier	0.8527	0.9504	0.8527	0.8516	0.8514	0.7790	0.7797	8.2790

The Financial Optimizer Website for Users

Outstanding Debt	3598.39
Credit Utilization Ratio	0.25
Credit History Age (years)	5
Payment of Minimum Amount	1
Total EMI per Month	64.5
Amount Invested Monthly	195.11
Payment Behaviour	Low
Spent Amount:	Small
Monthly Balance	100000
Submit	



Results

Credit Level: Poor

Some Suggestions:

- We suggest that you change Num Bank Accounts from 6 to 2. This change aligns better with your financial goals. - [More details](#)
- We suggest that you change Num Credit Card from 8 to 1. This change aligns better with your financial goals. - [More details](#)
- We suggest that you change Delay from due date from 24.00 to 0.95 to optimize your financial health. If possible, keep Delay from due date within the range of (0.00, 30.00). - [More details](#)
- We suggest that you change Num Credit Inquiries from 10 to 3. This change aligns better with your financial goals. - [More details](#)
- We suggest that you change Outstanding Debt from 3598.39 to 2515.88 to optimize your financial health. If possible, keep Outstanding Debt within the range of (359.84, 1547.31). - [More details](#)
- You can find more data about Age here: - [More details](#)
- You can find more data about Occupation here: - [More details](#)
- You can find more data about Annual Income here: - [More details](#)
- You can find more data about Monthly Inhand Salary here: - [More details](#)
- You can find more data about Interest Rate here: - [More details](#)
- You can find more data about Num of Loan here: - [More details](#)
- You can find more data about Type of Loan here: - [More details](#)
- You can find more data about Num of Delayed Payment here: - [More details](#)
- You can find more data about Changed Credit Limit here: - [More details](#)
- You can find more data about Credit Mix here: - [More details](#)
- You can find more data about Credit Utilization Ratio here: - [More details](#)
- You can find more data about Credit History Age here: - [More details](#)
- You can find more data about Payment of Min Amount here: - [More details](#)
- You can find more data about Total EMI per month here: - [More details](#)
- You can find more data about Amount Invested monthly here: - [More details](#)
- You can find more data about Payment Behaviour here: - [More details](#)
- You can find more data about Monthly Balance here: - [More details](#)

[Check another case](#)

Conclusions

- Many different features can negatively impact or positively affect one's credit score despite not having a direct relationship.
 - For example, number of credit cards does not always negatively impact credit score if one pays off all their credit card debt in time
 - Encourages bad practices (Increased credit inquiries, outstanding debt)
- Our goal is to use the data analysis on the features and give positive feedback on how to change different features to improve credit score
 - Decreasing Number of Credit Cards, Decreasing Outstanding Debt

Thank You!
Any Questions?