ROCKET MORTGAGE

Marketing Strategies

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ROCKET
Mortgage

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Introduction

Rocket Mortgage, a subsidiary of Rocket Companies, is a leading online mortgage lender based in Detroit, Michigan. Established in 1985 as Quicken Loans, it rebranded as Rocket Mortgage in 2015 to reflect its groundbreaking digital mortgage process. The company revolutionized the home financing industry by introducing a streamlined, fully online application process, making home loans faster, easier, and more accessible.

Rocket Mortgage is also known for its extensive customer support, competitive rates, and commitment to financial education. By leveraging technology and focusing on user experience, Rocket Mortgage continues to set industry standards for efficiency and customer satisfaction.

Objective

The key marketing problem I will focus on is customer segmentation. Specifically, I will explore how we can segment borrowers based on their financial health (e.g., assets, liabilities, income) and credit behaviour to identify which segments are most profitable and likely to churn. This segmentation will help design targeted marketing strategies aimed at improving customer acquisition and retention, particularly for financially stable or high-potential customers.

Project Description

The primary objective of this project is to leverage predictive analytics to enhance customer segmentation by categorizing them into distinct clusters. By analyzing key variables such as income, job type, asset types, and liabilities, we aim to tailor targeted marketing strategies for each cluster. This approach will enable us to effectively address the unique needs and preferences of different customer segments, ultimately optimizing our marketing efforts and improving overall customer engagement.

Project Key Steps :

1. ## Situation Analysis:

A situational analysis helps a company like **Rocket Mortgage** understand its current position in the market by evaluating internal and external factors. It allows Rocket

Mortgage to identify opportunities, challenges, and key trends influencing the mortgage industry. By analyzing factors like customer preferences, market competition, economic conditions, and industry regulations, Rocket Mortgage can make informed decisions to refine its strategies, expand its services, and enhance customer satisfaction. This foundational step ensures the company is well-prepared to address challenges and capitalize on growth opportunities in a competitive landscape.

Strengths

- Strong Brand Recognition
- Technology Leadership
- Customer Experience
- Large Market Share
- Efficient Process

Weaknesses

- Dependence on the U.S. Market
- Limited Face-to-Face Interactions
- High Marketing Costs

Opportunities

- Expanding into New Markets
- Partnerships and Diversification
- Technological Advancements
- Rising Demand for Digital Services

Threats

- Regulatory Changes
- Intense Competition
- Economic Downturn
- Cybersecurity Risks

2. ## Data Exploration and Cleaning:

Data Exploration:

Borrower: This table contains information about the individuals or entities who are applying for or have obtained mortgages. It may include details such as are they the main borrowers or not.

Asset: This table contains information about the assets or possessions owned by the borrowers. It may include details such as cash accounts, investment, retirement accounts

(rrsp), real estate properties, vehicles, etc. Lenders may consider this information when evaluating the borrower's overall financial health and ability to repay the mortgage.

Credit Report: This table would likely store data related to the credit history of the borrowers like credit scores.

Income: This table contains details about the income of the borrowers. It includes information such as income, type of salaries , bonuses, and etc.

Liability: This table stores information about the financial liabilities or obligations of the borrowers. It includes details such as Balance, credit limit, type of loan, and etc. Lenders use this information to assess the borrower's overall debt burden and financial stability.

Mortgage: This table contains details about the specific mortgage loans that borrowers have obtained or are applying for. It includes information such as payment frequency, types of mortgages (e.g., fixed-rate or adjustable-rate) ,and any other relevant loan terms and conditions.

Data Cleaning :

Assets : has no missing value.

Borrowers :

- Remove 'DEPENDENTS', 'INCLUDERENTALAMOUNTMONTHLYTDS', 'MARITAL', 'RELATIONSHIPTOMAINBORROWER'
- Replace null with 'False' in 'FIRSTTIME'.
- Replace null with 0 in 'RENTALAMOUNTMONTHLY'.

Credit_Score :

- Generate 'Year' and 'Quater' column using 'CREATEDATE'
- Remove 'CREDITREPORT_ID' column

Income :

- Remove'BONUSES', 'INCOMEFREQUENCY', 'INCOMEPERIODAMOUNT', 'TITLE'.
- INCOMEFREQUENCY delete bi-weekly, monthly, semi-monthly, semi-monthly(use only annually)

- Replace null with 'other' in 'BUSINESSTYPE', 'INDUSTRYSECTOR', 'JOBTYPE', 'OCCUPATION', 'PAYTYPE', 'SOURCE'
- Drop rows which has 'ACTIVE' is True, INCOME is less than 10000 and STARTDATE is less than 01-01-2024(If they have started working before the year of 2024 and they are still working and their annual income is less than 10000 then they are noisy data as the basic survival amount in Canada is approximately 13000).
- Delete 'STARTDATE' more than 01-03-2024

Liabilities :

- Replace null with 0 in 'CREDITLIMIT', 'BALANCE', 'MONTHLYPAYMENT',
- Replace null with 'other' in 'PAYOFFTYPE', 'TYPE',
- Replace null with 'False' in 'IMPORTEDFROMCREDITBUREAU', 'ISCREDITBUREAUSOURCE'.

Mortgages:

- Remove 'ORIGINALMORTGAGEAMOUNT','FILE_CREATION_TIMESTAMP', 'REC_CREATED_TS', 'REC_UPDATED_TS'
- Remove null from 'LENDER' and there was value like scotia, SCOTia, ScotiBank, ScotiaBank, Scotia Bank , they all mean ScotiaBank, so I replaced all values to one value. (we did for other value)
- Replace null with 0 in 'PAYMENT', 'PAYMENTFREQUENCY', 'RATE', and 'REMAININGAMOUNT'
- Replace null with 'other ' in 'MORTGAGE_TERM' and 'MORTGAGE_TYPE'

3. EDA (Exploratory Data Analysis) :

To gain a comprehensive understanding of customer behavior, we conducted a detailed statistical analysis and visualization of various factors, including:

- **Financial Profile:**
    - Asset holdings
    - Borrowing patterns
    - Credit scores

- **Demographic Information:**

- o Occupation

- o Employment type

- **Liabilities:**

  - o Debt obligations

- **Mortgage Preferences:**

  - o Mortgage type

  - o Lenders' popularity
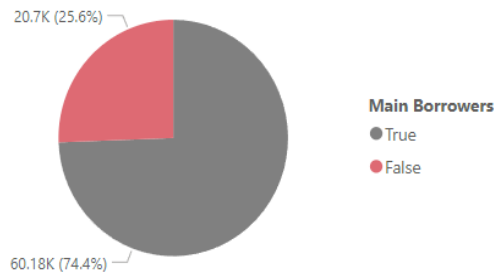
Assets:

Number of Different Assets and their Values
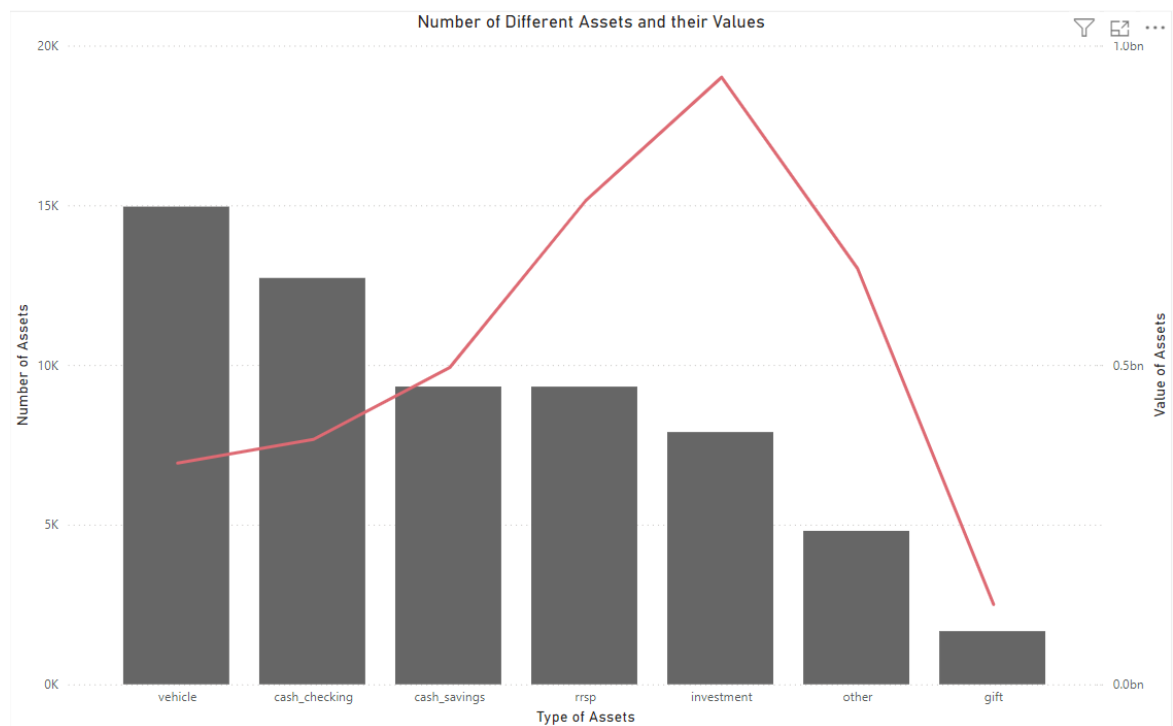
While most borrowers own vehicles, investments represent the asset class with the highest overall value. In contrast, gifts constitute the asset class with the lowest value and are the least commonly held asset among borrowers.

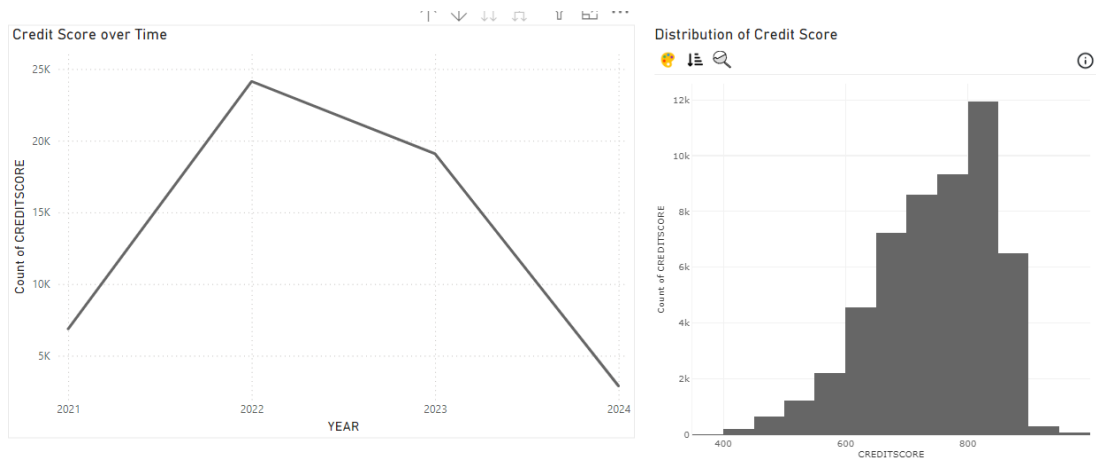# Borrowers:

Portion of Main Borrowers

Portion of New Borrowers

20.7K (25.6%)

Main Borrowers
● True
● False

60.18K (74.4%)

15.13K (18.7%)

New Borrowers
● False
● True

65.76K
(81.3%)
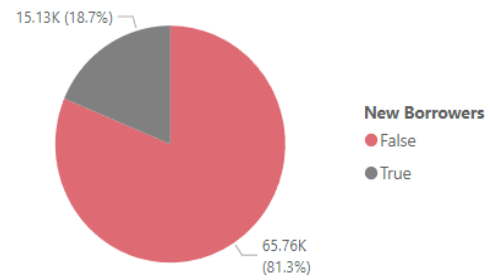
Our primary borrowers constitute approximately three-quarters of the total borrower base. Additionally, new borrowers account for 18.7% of the total, or approximately 15,130 individuals.

Credit Scores:

Credit Score over Time

Count of CREDITSCORE

25K

20K

15K

10K

5K

2021   2022   2023   2024
YEAR

Distribution of Credit Score

Count of CREDITSCORE

12k

10k

8k

6k

4k

2k

0

400   600   800
CREDITSCORE

We've observed a decline in credit scores since 2022. The majority of borrowers currently possess credit scores ranging from 800 to 850.

Incomes:

Portion of Different JobType
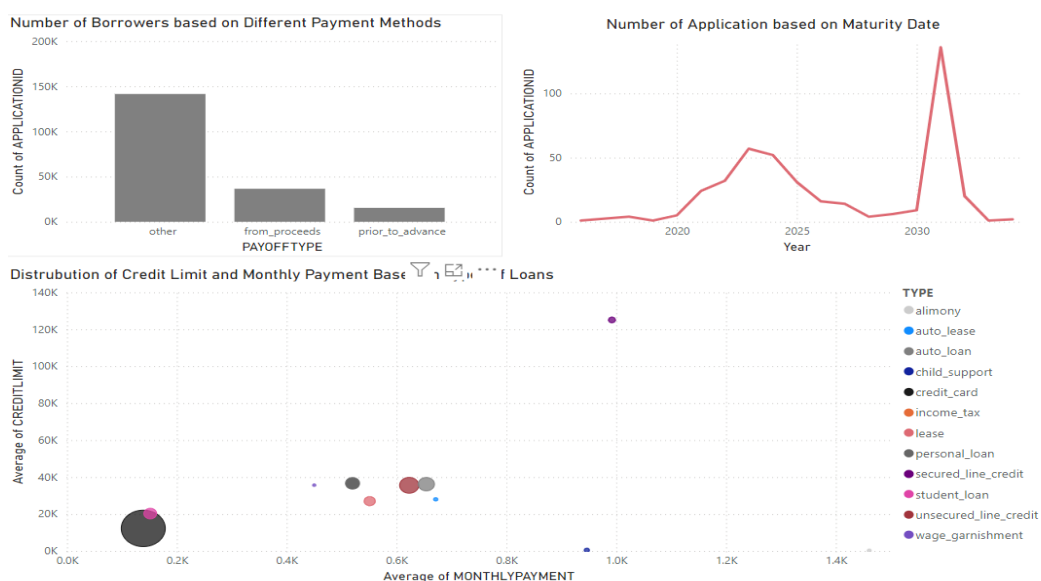
0.11bn (2.01%)
1.1bn (20.48%)
4.14bn (77.03%)

JOBTYPE
- full_time
- other
- part_time
- seasonal

Borrowers by Occupation

Income of borrowers over time

Number of Borrowers by Industry Sector

Number of Borrowers by Business Type

**number of applications over time**
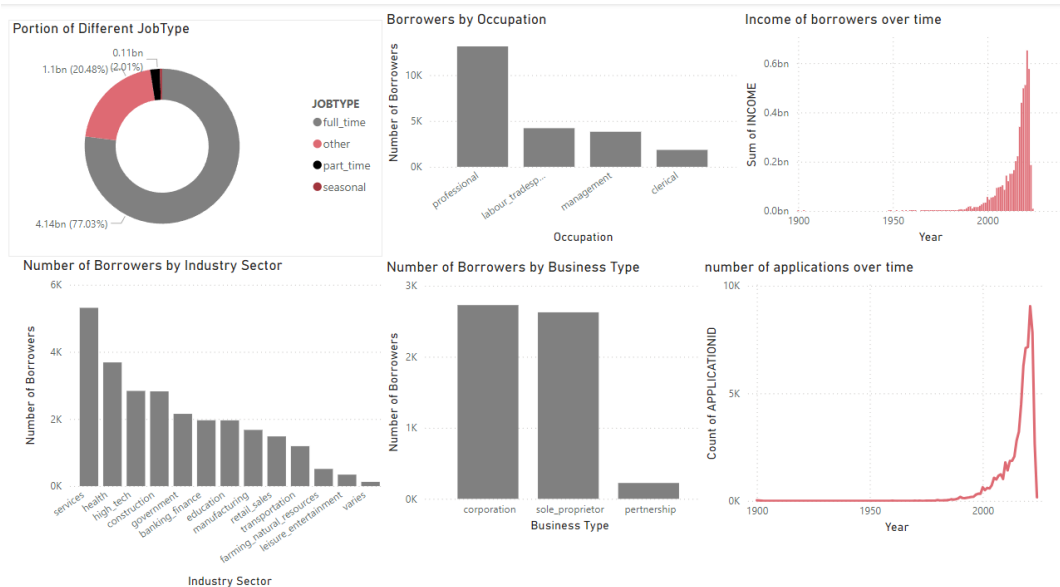
- Majority of borrowers are employed full-time.

- The most common occupation among borrowers is professional.

- The primary industry sector for borrowers is Services.

- The most prevalent business types among borrowers are corporations and sole proprietorships.

- Both borrower income and loan application numbers have shown a consistent upward trend over time.

Liabilities :

Number of Borrowers based on Different Payment Methods

Number of Application based on Maturity Date

Distrubution of Credit Limit and Monthly Payment Base... f Loans

TYPE
- alimony
- auto_lease
- auto_loan
- child_support
- credit_card
- income_tax
- lease
- personal_loan
- secured_line_credit
- student_loan
- unsecured_line_credit
- wage_garnishment

Borrowers primarily use three payment methods: "prior to advance," "from proceeds," and "other." The "other" category, which is the most common, likely includes non-standard methods like direct cash payments, checks, or third-party transfers. Maturity dates are increasing after 2030, reflecting that many borrowers are taking on loans with longer terms rather than nearing the end of their contracts. Most borrowers are paying for credit cards, but their average monthly payments and average credit limits are lower compared to other types of liabilities. Fewer borrowers are paying for secured line credit, but their average monthly payments and credit limits are much higher. The data suggests a linear relationship between monthly payments and credit limits across loan types.

Mortgages:
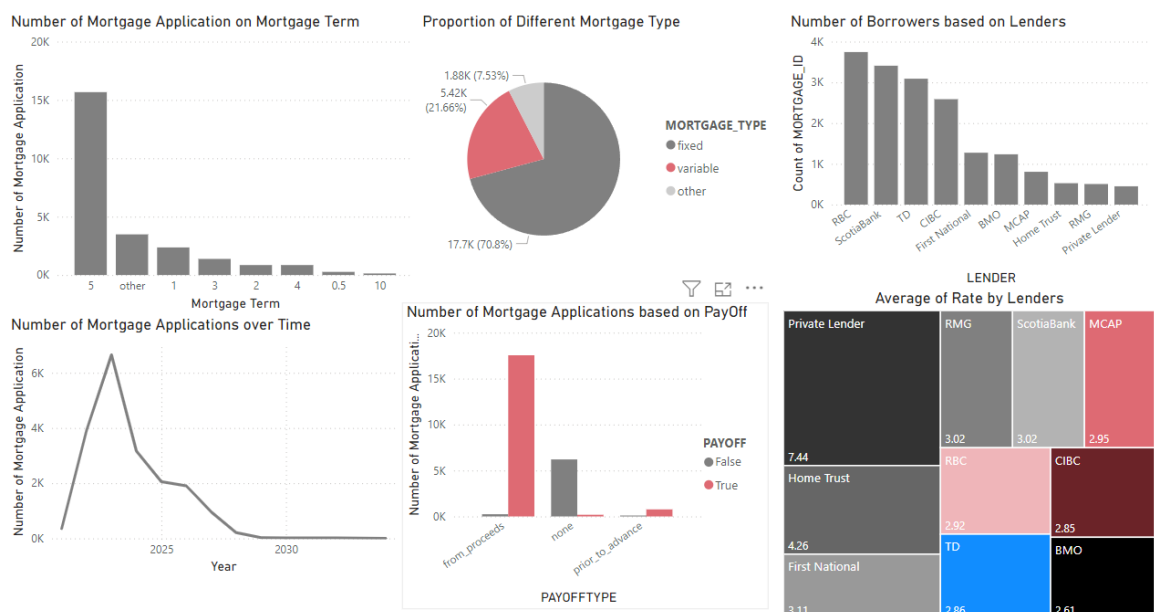
- Borrowers are leaning towards stability with fixed mortgages and trusted banks like RBC and Scotiabank.
- The declining trend in mortgage applications after 2024 could indicate an opportunity for Rocket Mortgage to innovate or launch new products to reignite interest.

- Private lenders' high rates suggest a niche market where Rocket Mortgage could provide competitive solutions to attract these borrowers.
- Marketing campaigns emphasizing affordable rates like BMO or flexible payoff options could draw in more customers.

Customer Segmentation:

Customer segmentation is a critical strategy for Rocket Mortgage to understand and categorize its diverse borrower base. By analyzing data on income levels, credit scores, loan types, and payment patterns, we can identify distinct groups of borrowers with shared characteristics. For instance, borrowers with higher incomes and excellent credit scores can be targeted with premium loan offers or additional financial products, while younger borrowers or students may benefit from educational content on loan management. This segmentation approach enables Rocket Mortgage to craft personalized marketing strategies, improve customer retention, and enhance overall service delivery. Moreover, segmentation insights can assist in resource allocation and strategic planning, ensuring a focused and data-driven approach to meeting the needs of different customer groups.

1. **Data Preprocessing**:

   o Removed irrelevant columns such as IDs, binary variables, and dates because:

      ▪ **IDs** don't provide meaningful information for segmentation.

      ▪ **Binary variables** (e.g., true/false) are not effective for clustering.

      ▪ **Dates** are more useful for trends or real-time analysis, not grouping.

   o Aggregated values for each APPLICATIONID:

      ▪ Borrowers often have multiple liabilities, incomes, or credit scores across different accounts.

      ▪ Combined these values into a single representation per customer for accurate clustering.

2. **Merging Data**:

   o Merged all datasets using APPLICATIONID as the key.

  o Filled any missing values in the merged dataset with the **mode** (most common value) to ensure consistency.

3. **Encoding Categorical Variables**:

  o Applied **one-hot encoding** to categorical columns to make them suitable for modeling.

4. **Feature Scaling**:

  o Used **StandardScaler** to standardize features, ensuring:

    ▪ All variables have a mean of 0 and a standard deviation of 1.

    ▪ This step avoids biases from features with larger numerical ranges (e.g., income vs. credit score).

StandardScaler:
StandardScaler transforms data to a standard scale, making all features equally important for clustering. Without scaling, variables with larger values (e.g., income) could dominate the clustering process, skewing the results.

5. **Clustering with K-Means**:

  o Chose **K-Means** for its efficiency and ability to handle large datasets like ours.

  o Set the number of clusters to **5**, representing distinct customer groups based on shared traits.

K-Means?
K-Means is computationally efficient, easy to interpret, and effective in partitioning data into well-separated clusters. It works best when groups are compact and distinct.
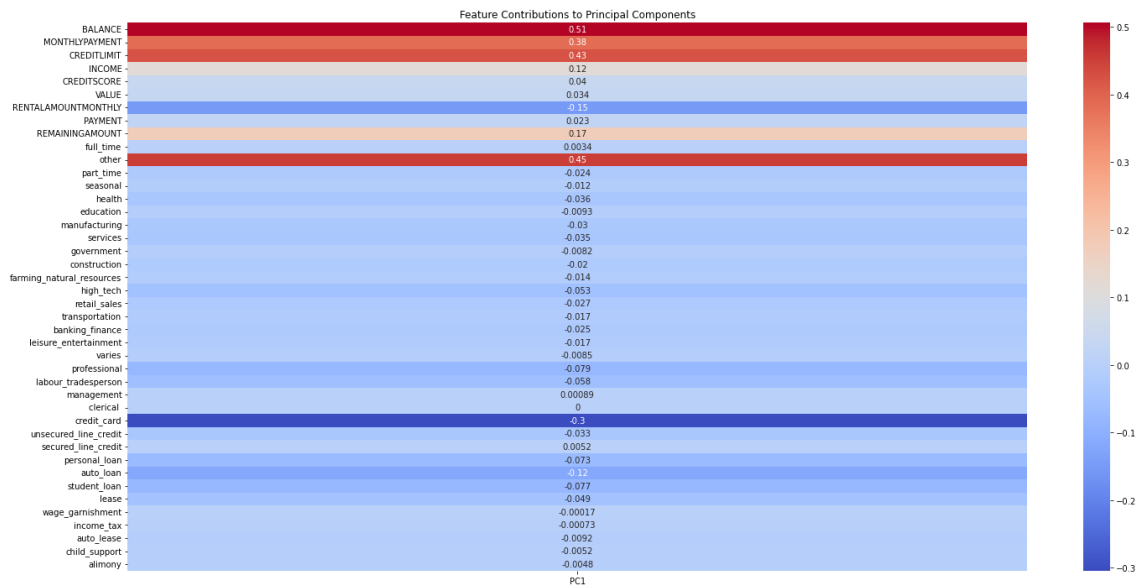
Cluster Visualization
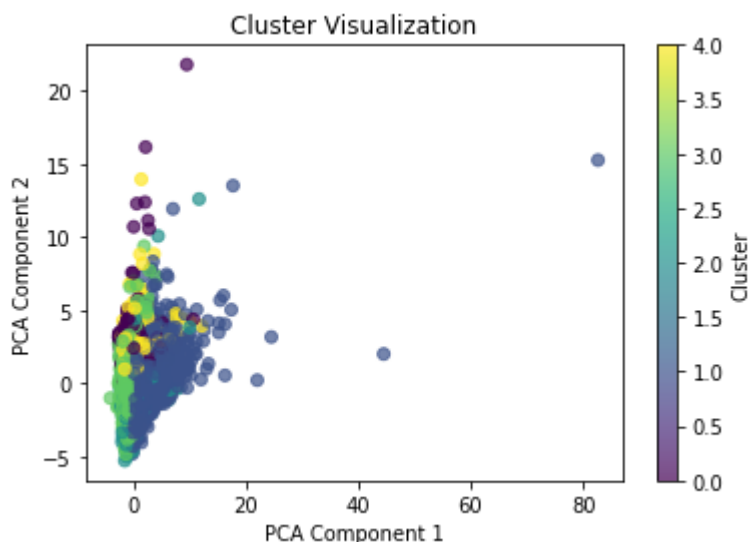
6. **Dimensionality Reduction with PCA**:

    o   Used **Principal Component Analysis (PCA)** to reduce data dimensions for:

        ▪   Better visualization of clusters.

        ▪   Identifying key features that explain most of the variance in the data.

PCA transforms data into fewer dimensions while retaining most of the variability. Each dimension (component) represents a combination of original features, helping us focus on the most significant ones.

Why use PCA?:

    o   Simplifies data by reducing complexity.

    o   Helps eliminate redundant or less important features.

   o   Improves clustering results by focusing on meaningful patterns.

Feature Contributions to Principal Components

Feature	PC1
BALANCE	0.51
MONTHLYPAYMENT	0.38
CREDITLIMIT	0.43
INCOME	0.12
CREDITSCORE	0.04
VALUE	0.034
RENTALAMOUNTMONTHLY	-0.15
PAYMENT	0.023
REMAININGAMOUNT	0.17
full_time	0.0034
other	0.45
part_time	-0.024
seasonal	-0.012
health	-0.036
education	-0.0093
manufacturing	-0.03
services	-0.035
government	-0.0082
construction	-0.02
farming_natural_resources	-0.014
high_tech	-0.053
retail_sales	-0.027
transportation	-0.017
banking_finance	-0.025
leisure_entertainment	-0.017
varies	-0.0085
professional	-0.079
labour_tradesperson	-0.058
management	0.00089
clerical	0
credit_card	-0.3
unsecured_line_credit	-0.033
secured_line_credit	0.0052
personal_loan	-0.073
auto_loan	-0.12
student_loan	-0.077
lease	-0.049
wage_garnishment	-0.00017
income_tax	-0.00073
auto_lease	-0.0092
child_support	-0.0052
alimony	-0.0048

7. **Initial Results and Refinements**:

   o Plotted the clusters and found significant overlap between them.

   o Checked **inertia** (a measure of clustering performance) and found it high at **1268505**, indicating suboptimal clustering.

   o Based on PCA variance ratios, identified features with high correlations and removed:

     ▪ BALANCE, other, CREDITLIMIT, and credit_card.

8. **Reapplied Clustering**:

   o Repeated StandardScaler, PCA, and K-Means steps with the updated dataset.

   o Achieved better results with reduced inertia at **1146048**, indicating improved cluster separation.

Cluster Visualization
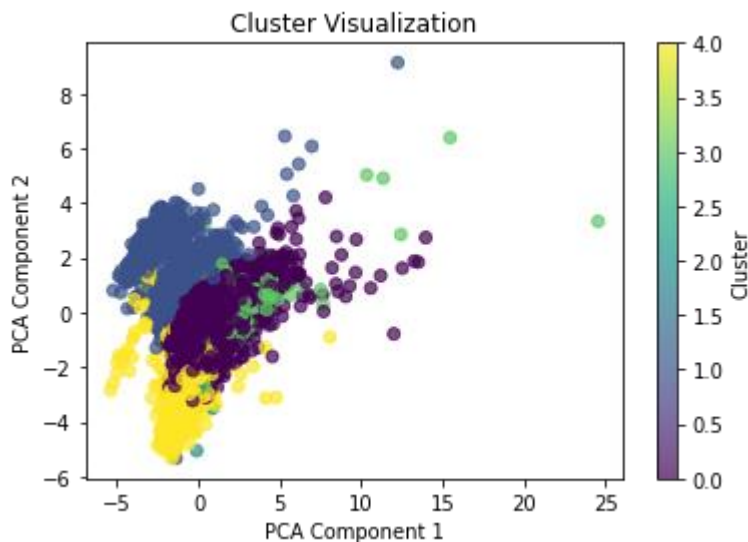
Marketing Strategies:

1. Targeted Email Promotions for High-Income and High-Credit Score Borrowers

Personalized email campaigns targeting borrowers with high incomes and strong credit scores can significantly enhance marketing effectiveness. By offering tailored loan products and showcasing premium benefits, Rocket Mortgage can foster trust and encourage engagement with their services. These campaigns can also include incentives like lower interest rates or exclusive benefits for early applications.

2. Loan Education for Students Through Seminars or Tutorials

Students represent a growing demographic for loans, especially for educational and personal needs. Hosting seminars or providing digital tutorials to educate them about loan options, repayment strategies, and financial planning can position Rocket Mortgage as a trusted financial partner. This initiative would not only create awareness but also build long-term customer loyalty.

3. Bank Partnerships

Collaborating with reputable financial institutions can improve Rocket Mortgage's visibility and reliability. These partnerships could include co-branded campaigns, shared customer databases, and promotional offers, making loan products more accessible and appealing to a broader audience.

4. Billboards at Labor and Trade Locations

Labor and trade locations attract a diverse audience actively seeking financial solutions. By placing billboards in such areas, Rocket Mortgage can maximize visibility among working professionals who may be considering home loans or other financial products.

5. Expanding with Geographical Segmentation

Rocket Mortgage can tap into untapped markets by analyzing geographical data to identify regions with high demand for home loans. By tailoring marketing strategies to the specific needs of these areas, the company can drive growth and establish a stronger market presence.

Conclusion:

Through this project, we successfully applied data-driven methods to segment Rocket Mortgage's customers into meaningful groups. By preprocessing and aggregating data, addressing missing values, and employing advanced techniques like PCA and K-Means clustering, we identified distinct customer profiles based on shared characteristics. This segmentation provides actionable insights that can enhance targeted marketing strategies, improve customer engagement, and optimize service offerings. While initial clustering results showed overlaps, iterative refinements, including feature selection and dimensionality reduction, led to better-defined clusters. These findings lay the foundation for more personalized and efficient approaches to meeting borrower needs and driving business growth.

References :

1. https://rocketmortgage.ca/?utm_source=rmus_redirect
2. https://scikit-learn.org/dev/modules/generated/sklearn.neighbors.KNeighborsClassifier.html