Title : Mortgage Project Insights

Team : Sandbox

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, APPLICATIONID.

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 Preprocessing

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 ‘CREATEDAT’
- 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

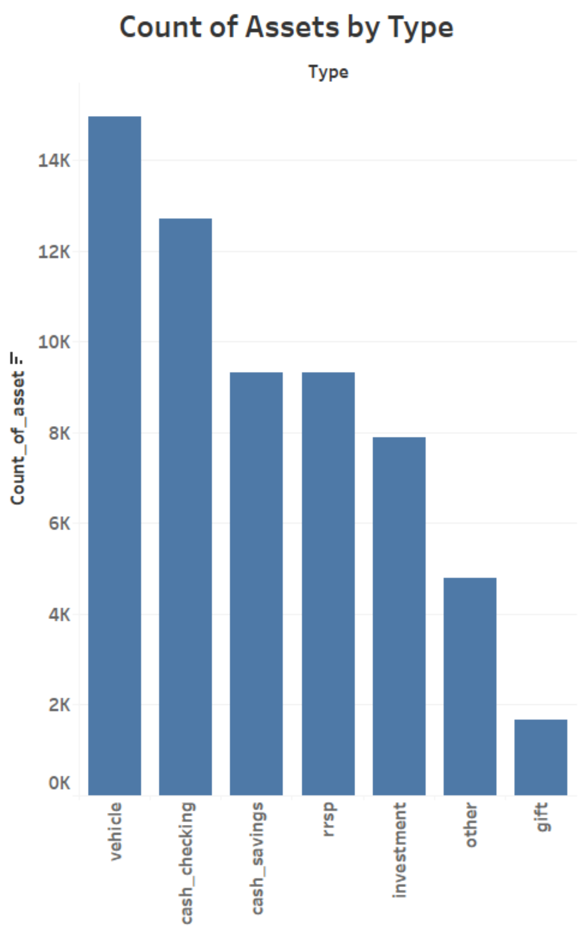
Liabilities :

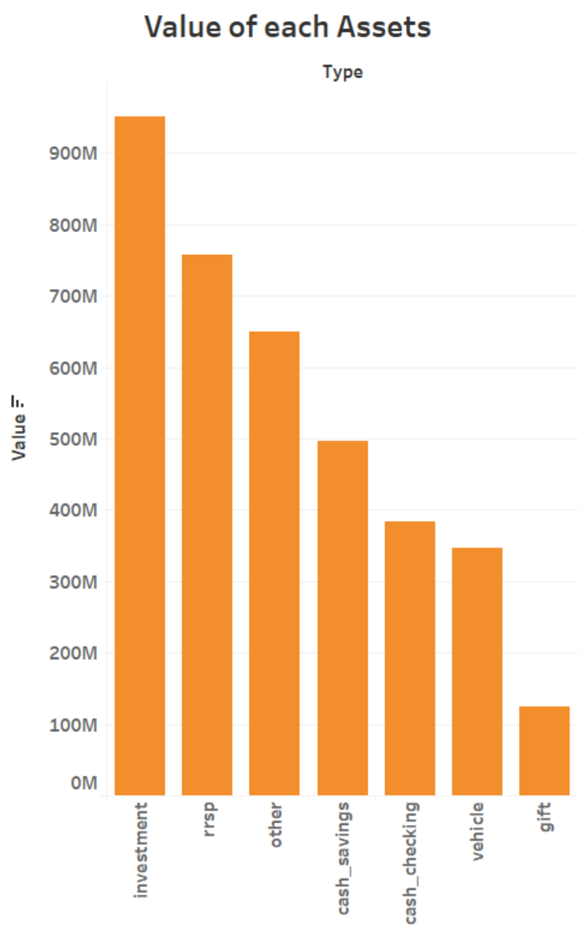
- Replace null with 0 in ‘CREDITLIMIT’, ‘BALANCE’, ‘MONTHLYPAYMENT’,
- Replace null with ‘other’ in ‘PAYOFFTYPE’, ‘TYPE’,
- Replace null with ‘False’ in ‘IMPORTEDFROMCREDITBUREAU’, ‘ISCREDITBUREAUSOURCE’.

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’

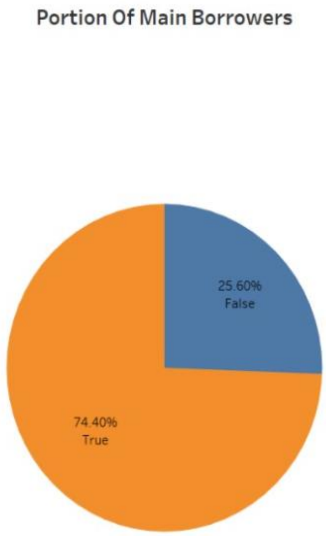
Data Mining

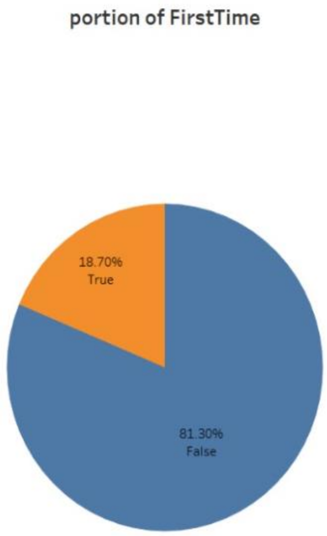




From Assets:
Upon examining the asset data, it becomes evident that vehicles are the predominant asset utilized by customers to substantiate their financial standing. This is closely followed by cash checking and cash savings, indicating a significant reliance on liquid assets.

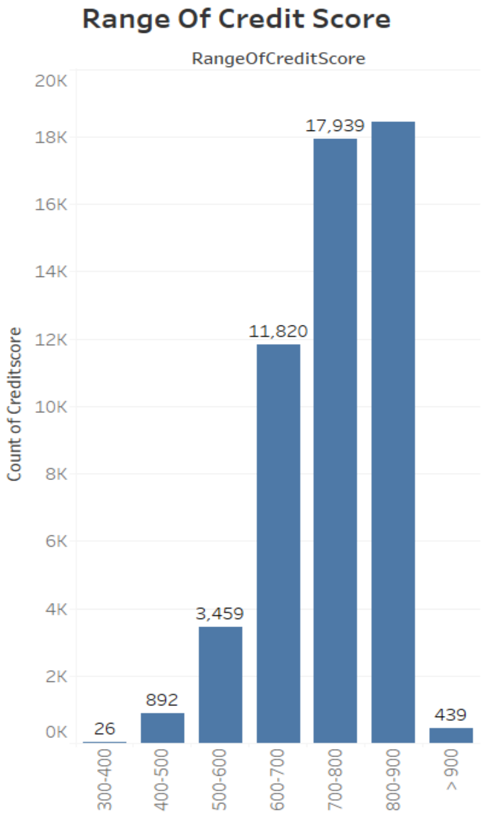
Conversely, when evaluating the value of assets and investments deemed secure emerge as the primary contributors. This is unsurprising given their inherent value and stability.

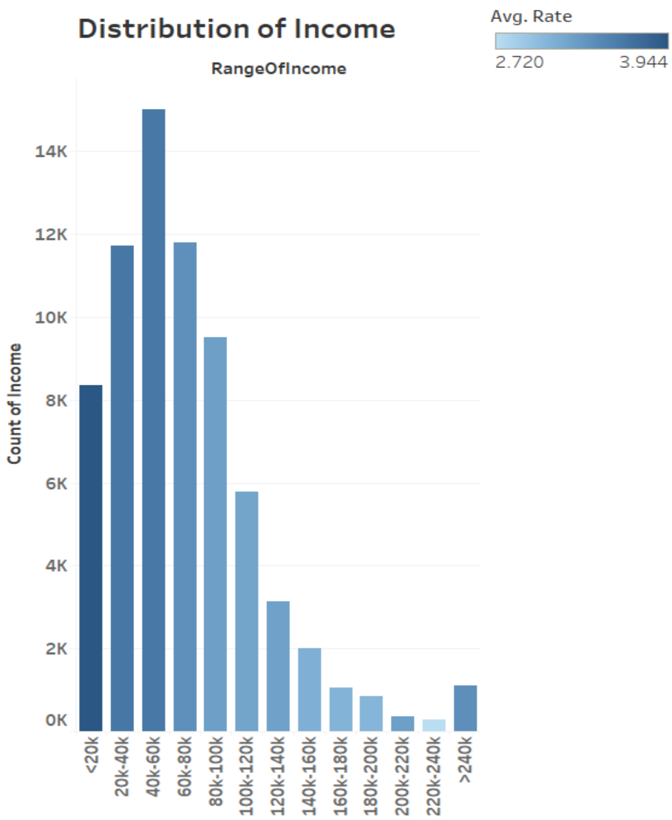




From Borrowers:

Analysis of the borrower data reveals that the primary borrowers constitute the majority, indicating that they are the main individuals responsible for the mortgage. Additionally, it's noteworthy that a significant portion of these borrowers have engaged in multiple mortgage transactions, suggesting a recurrent pattern of mortgage activity among them.



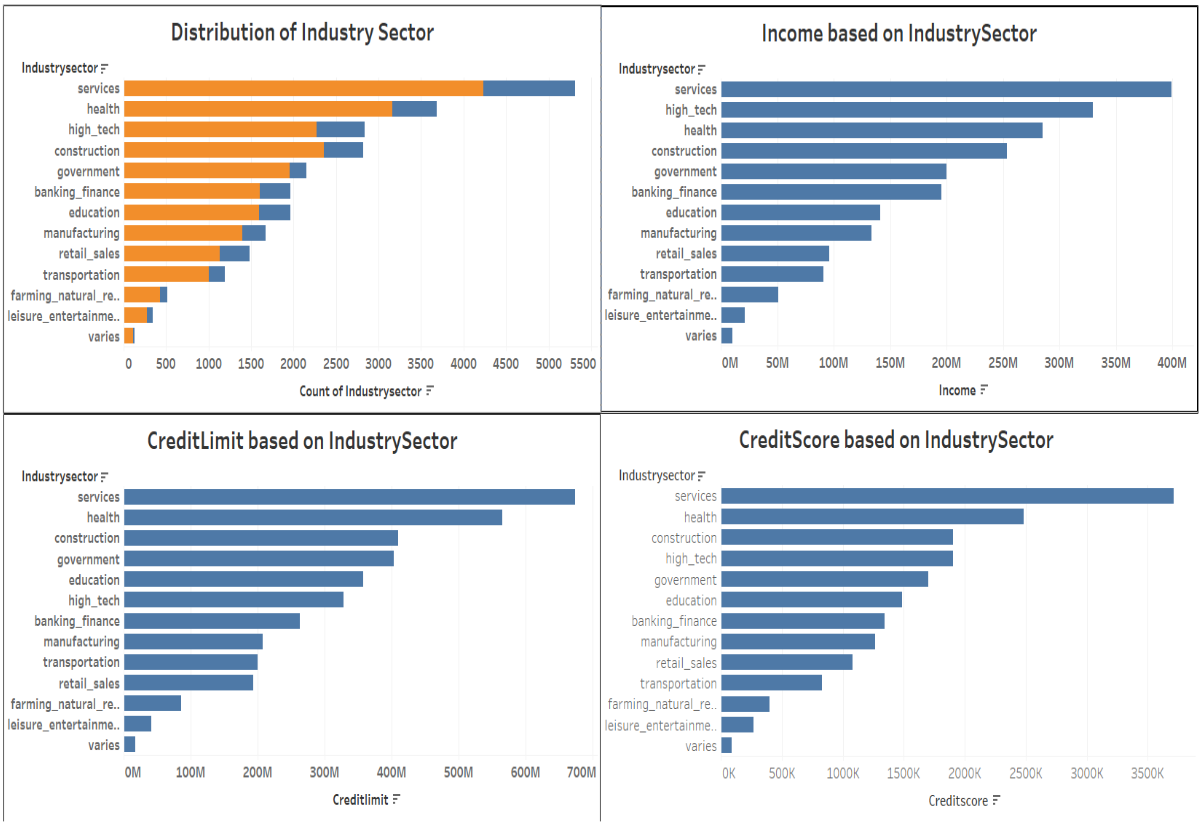


From Credit Scores :

Analysis of the credit score distribution reveals that most customers fall within the range of 700 to 900, indicating a prevalence of good credit scores among the clientele. This observation underscores a positive creditworthiness profile across the dataset.

Furthermore, examination of the income distribution through a bar chart illustrates that the highest concentration of customers' income lies within the range of $40,000 to $60,000. This income bracket aligns with the commonly accepted definition of the middle class. It denotes a segment of the population that typically enjoys a moderate level of financial stability and purchasing power. Also, the trend of average interest rate is inversely proportional to income, which means that people with the income above the average are more likely to get loan at lower rate.

Rocket Mortgage

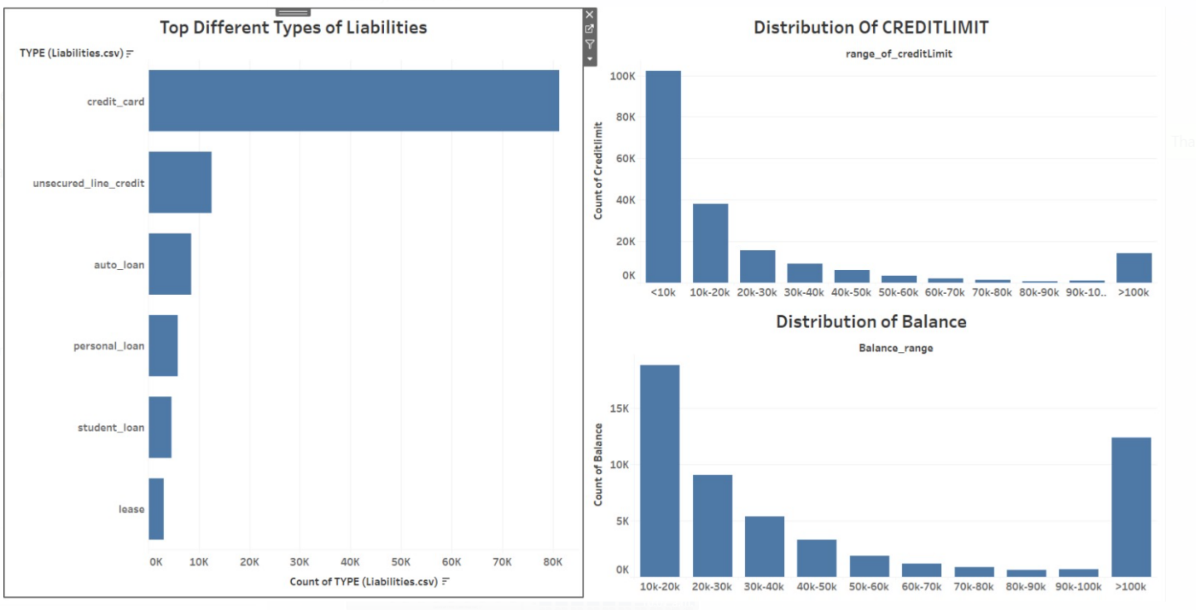


From Industry sector (Income):

Furthermore, an evaluation of the distribution of industries reveals a hierarchical pattern. The service sector exhibits the highest prevalence, followed by healthcare and high-tech industries, with construction ranking third. Notably, all these sectors demonstrate significant activity as indicated by the stacked column chart.

Delving deeper into income based on industries, it is evident that the service sector maintains the highest income levels. This correlation can be attributed to its substantial distribution within the population. Following closely behind, healthcare and construction sectors exhibit noteworthy income levels as well.

Similarly, when assessing metrics such as credit scores and credit limits, the service sector emerges as the leader, underscoring its dominant position within the economic landscape. Healthcare and construction sectors subsequently follow, albeit with lower credit scores and credit limits in comparison to the service sector.

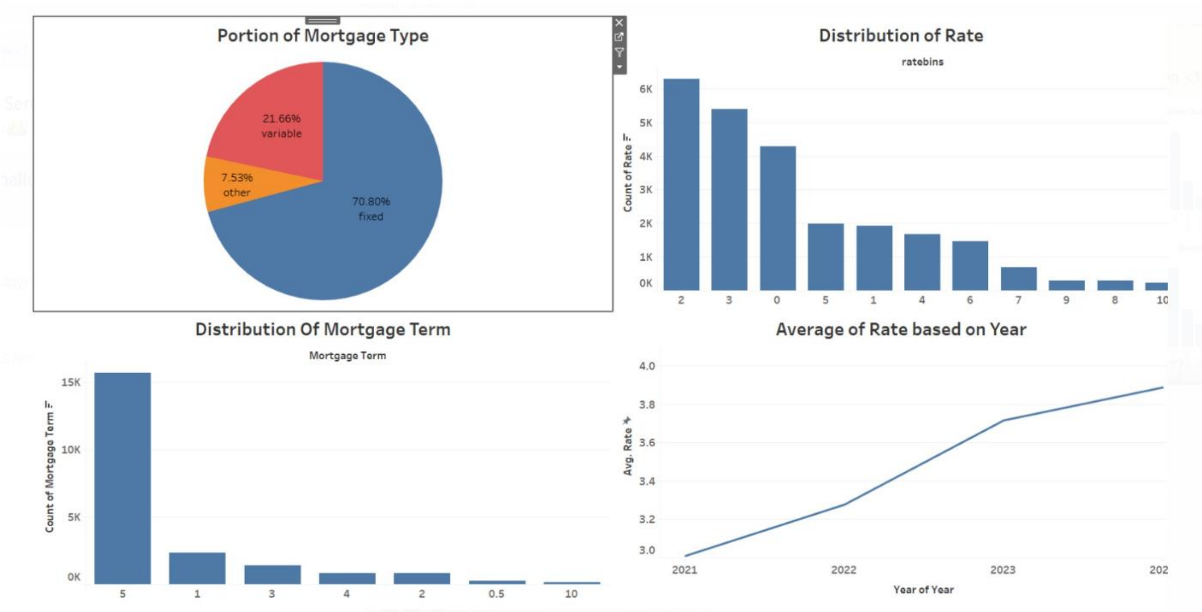


From liabilities:

Analysis of the top types of liabilities by count reveals that credit cards dominate the landscape. This observation can be attributed to the accessibility and streamlined application process associated with credit cards compared to other forms of liabilities. The widespread availability and ease of obtaining credit cards contribute significantly to their prevalence among consumers.

Moreover, when examining the highest distribution of credit limits and balance ranges, a notable trend emerges. Both ranges—less than $10,000 for credit limits and less than $10,000 to $20,000 for balance ranges—coincide with the lower end of the spectrum. Despite being relatively modest in comparison to higher credit limits and balances, these ranges align closely with the characteristics of credit card liabilities.

Taken together, these insights underscore the significance of credit cards as the primary form of liability, with a considerable portion of consumers falling within the lower range of credit limits and balances. This highlights the pivotal role of credit cards in the financial landscape, serving as a cornerstone of consumer credit and financial transactions.



From Mortgage:

Analysis of the mortgage data reveals that fixed-rate mortgages comprise the majority, representing approximately 70.80% of all mortgages. This observation underscores a preference for stability and predictability in mortgage payments among borrowers.

Furthermore, examination of the distribution of mortgage rates illustrates that the most prevalent rate falls around 2-3 %.

Additionally, the mortgage term distribution indicates that around 5 years of mortgages have terms suggestive of shorter durations. Notably, the observed trend of increasing rates annually may be attributed to adjustments made to account for inflation rates and other economic factors impacting borrowing costs.

Conclusion

Customer Profile:

-Demographics: The typical customer falls within the middle-class demographic, with an income range predominantly concentrated between $40,000 to $60,000 USD.

-Asset Holdings: Customers primarily rely on vehicles as their main asset, followed by liquid assets such as cash checking and savings accounts. Secure investments also play a significant role in their financial portfolio.

-Borrowing Behavior: The majority of customers are primary borrowers responsible for mortgage transactions, with a significant portion engaging in repeat mortgage activities, suggesting a recurrent pattern of mortgage activity.

-Creditworthiness: Customers exhibit good credit scores, with the majority falling within the range of 700 to 900, indicating a positive creditworthiness profile.

-Industry Sector: The service sector dominates both in terms of income levels and prevalence among customers, followed by healthcare, high-tech, and construction sectors.

Marketing Strategies

-Targeted Messaging:

Craft marketing messages that resonate with the middle-class demographic, emphasizing affordability, stability, and security in mortgage financing.

Highlight the convenience and accessibility of Rocket Mortgage's services, tailored to customers' diverse asset holdings and financial needs.

-Industry-Specific Campaigns:

Develop targeted campaigns tailored to customers employed in the service, healthcare, high-tech, and construction sectors, addressing their unique financial requirements and preferences.

Showcase Rocket Mortgage's understanding of industry-specific challenges and offer customized mortgage solutions to cater to the needs of professionals in these sectors.

-Financial Education:

Provide educational resources and tools to empower customers to make informed decisions about their mortgage options, asset management, and credit utilization.

Offer guidance on improving credit scores, optimizing asset portfolios, and navigating the mortgage application process effectively.

-Digital Engagement:

Utilize digital marketing channels, including social media, email marketing, and targeted online advertising, to reach and engage customers effectively.

Leverage data-driven insights to personalize marketing communications and offers based on customers' asset holdings, borrowing behavior, and industry affiliations.

-Partnerships and Collaborations:

Establish strategic partnerships with companies and organizations in key industries, offering exclusive mortgage benefits and incentives to their employees.

Collaborate with automotive dealerships to integrate mortgage financing options seamlessly into vehicle purchase transactions, leveraging customers' reliance on vehicles as assets.

By implementing these targeted marketing strategies, Rocket Mortgage can effectively reach and engage its target customers, driving customer acquisition, retention, and satisfaction in the competitive mortgage market. Moreover, continuous monitoring and analysis of customer feedback and market trends will be essential for refining marketing approaches and maintaining a competitive edge in the industry.

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