Customer Segmentation based on Transactional Data in Banking

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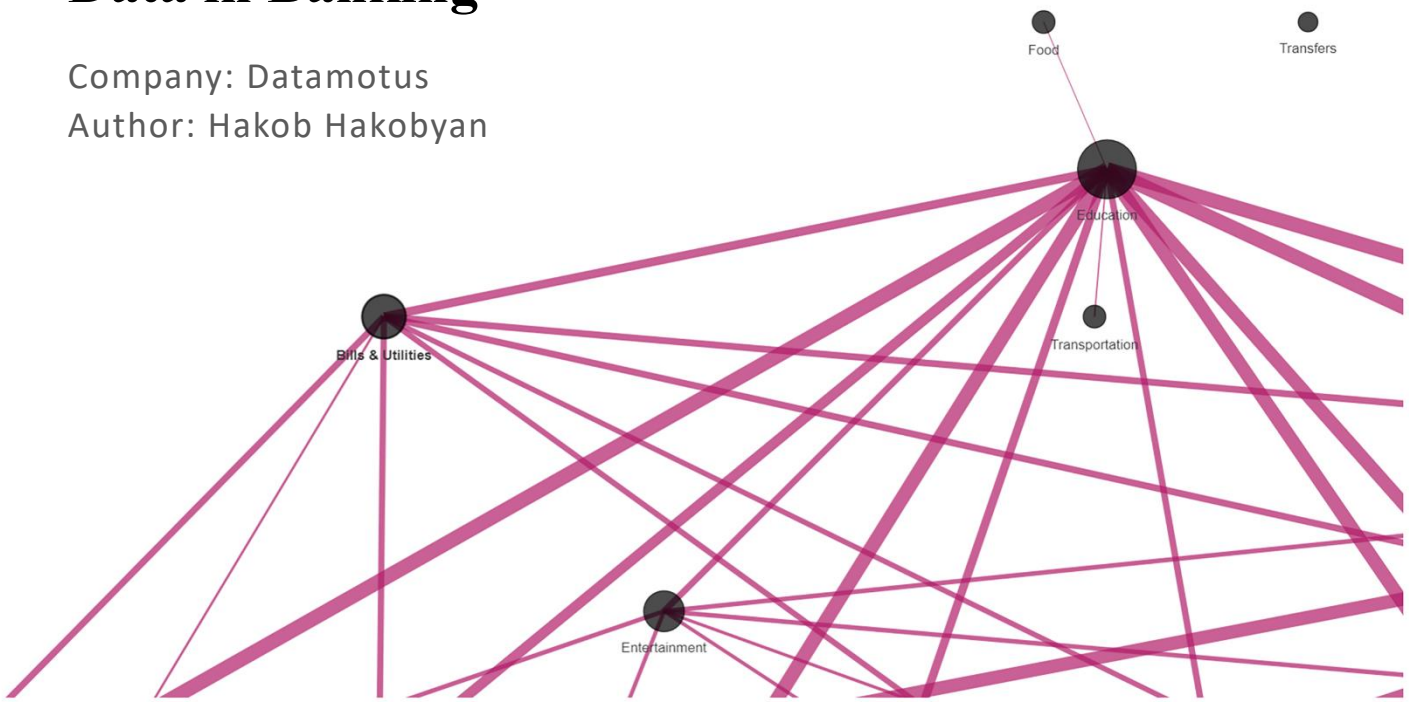


The goal of the project is to segment bank customers based on their transactional data by identifying patterns in customers' behaviors, understanding their preferences and needs, and propose new products or services tailored to each customer segment.

Part 1: Customer Segmentation

One of the models of segmentation is based on ***RFM*** attributes (Recency, Frequency, and Monetary), which are three key dimensions used to analyze customer behavior.

> Recency: Time elapsed since a customer's last purchase. Customers who have made a recent transaction are considered more engaged and likely to make another transaction in the near future.
>
> Frequency: Number of transactions made by a customer within a specific timeframe. Customers who make frequent transactions are generally more loyal and valuable.
>
> Monetary Value: Total amount of money spent by a customer over a given period. Customers with higher monetary value indicate larger revenue potential for the bank.

By analyzing these dimensions, different customer segments can be identified, such as loyal customers, at-risk customers, or inactive customers, etc. These segments can be used in marketing and customer retention strategies.

Figure 1 illustrates the k-means clustering results with 3 clusters.

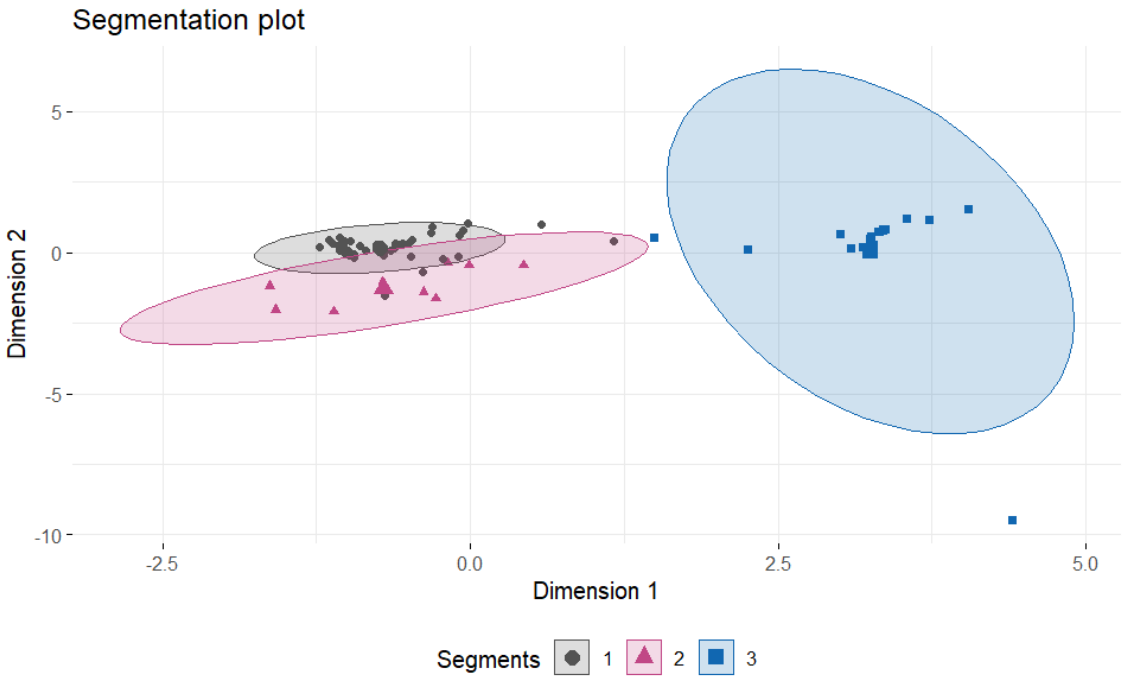


Figure 1 Customer segments with K-means clustering

How the identified segments differ from each other?

Figure 2 presents distribution of numeric attributes, including RFM variables. Figure 3 shows gender structure of the clusters[1].

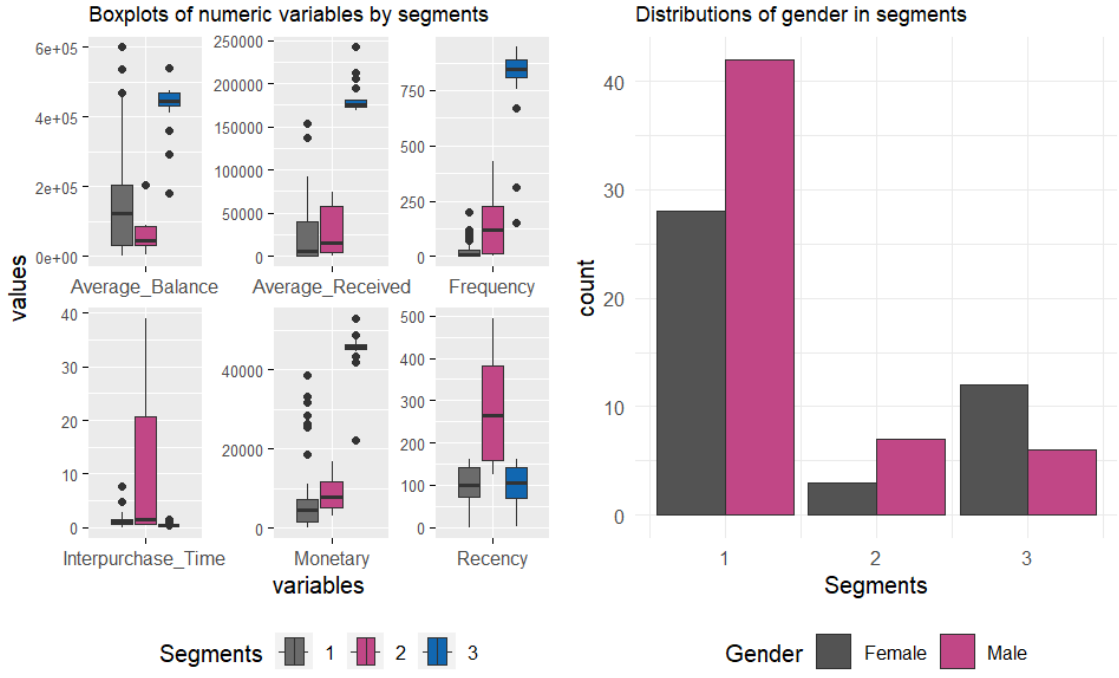
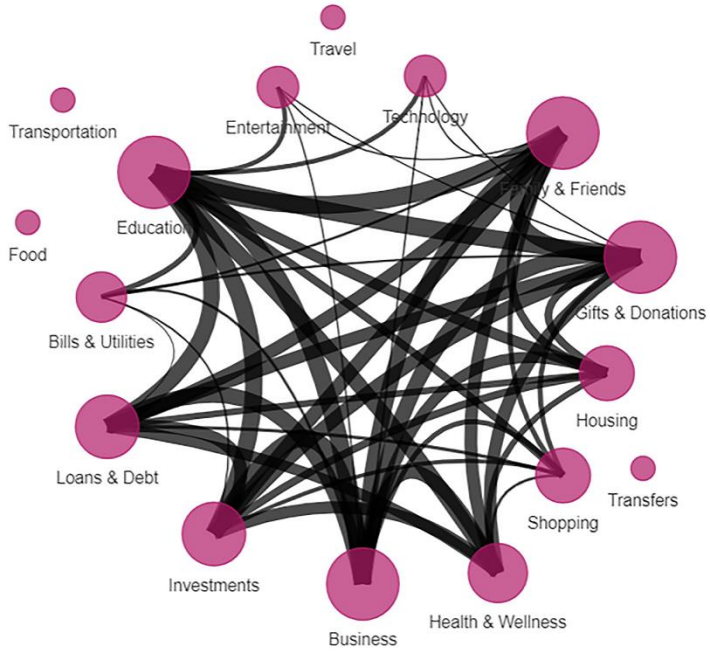


Figure 2, 3 Segment analysis of different variables

[1] Such analysis will be done for relevant demographic factors and behavioral variables to better describe the differences between segments

Part 2: Using transaction Tags to investigate customers' needs and preferences

By analyzing transaction tags (nature of transaction), bank can gain insights about customer behavior, preferences, and needs. For example:



Spending Habits: Customers can be grouped based on their spending patterns, such as frequent dining out, travel expenses, online shopping, or utility bill payments, etc. This information helps bank offer targeted promotions, discounts, or rewards that align with customers' interests.

Financial Goals: Customers can be segmented based on their financial goals, such as saving for a down payment, planning for retirement, or investing in stocks. Bank can then provide investment options, or financial planning tools to assist customers in achieving their goals.

Life Events: Transaction tags can help identify life events such as weddings, births, or home purchases. Banks can leverage this information to provide relevant services, such as mortgage loans, education savings plans, or insurance coverage.

Figure 4 Co-occurrence of tags of transactions

Association Rule Mining algorithm will help identify which items or services are frequently purchased together, providing insights into customer behavior. The below network graph reveals which tags tend to co-occur together frequently[2].

IF	THEN	support	confidence	lift	Count
{Travel, Entertainment}	{Credit Cards}	0.15	0.88	3.76	15
{Food, Housing}	{Loans & Debt}	0.18	0.95	4.02	18
{Education, Books}	{Investments}	0.16	0.89	4.45	16
{Health & Wellness, Food}	{Insurance}	0.17	0.94	4.33	17
{Loans & Debt, Bills & Utilities}	{Family & Friends}	0.14	0.86	3.66	14

Table 1 Example of association rules

According to the Rule 1: {Travel, Entertainment} → {Credit Cards}, 15% of the customers' transactions refer to both "Travel" and "Entertainment"; 88% of customers with "Travel" and "Entertainment" categories, also have "Credit Cards" transactions; the presence of "Travel" and "Entertainment" is 3.76 times more likely for customers having "Credit Cards" type transactions compared to customers in general. Overall there are 15 customers who satisfy this rule.

[2] The strength of the relationship is represented by the thickness of the edges connecting the nodes. Stronger relationships indicate a higher likelihood of the items appearing together.

Part 3: Integration of Customer segmentation with CRM and Open AI

To ensure the accuracy and relevance of the segmentation, CRM system will be integrated with the segmentation algorithm. This integration will enable real-time updates of customer data, ensuring the segmentation is based on the most up-to-date information.

Furthermore, artificial intelligence platforms (like Chat GPT) will be utilized, which will help to develop more effective marketing offers for different segments, like targeted emails, promotional offers, etc. By leveraging Chat GPT, the bank can deliver more engaging and relevant interactions, enhancing the customer experience and fostering stronger customer relationships.