

Developing a Unified Customer Segmentation Framework using Multi-Industry Behavioral Data

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Motivation

- RFM segmentation, we got an opportunity to unlock the true potential of e-commerce business using RFM modeling.
- RFM analysis, soars to new heights, fueled by a deep understanding of customers and their needs.
- Develop successful strategies adaptable to each cluster, optimize advantages and establish a win-win scenario for the organization and its customers.



Table 1: Literature Survey

Sr.no	Author	Technique Used	Advantages	Gaps
1	Juan Liao et.al. [2022]	Two Statistical methods entropy and superiority chart method	Application utilization and improve targeted promotion	Performance Evaluation Measures are not elaborated
2	A.Joy Christy et.al [2018]	Repetative K-Means Algorithm	Proposed Algorithm has good complexity	RM K-Means problem with clusters



3	A. Syai-fudin et.al [2023]	Fuzzy C-Means clustering, Genetic Programming to optimize FCM	GP overcomes local minimum issue in FCM.	Comparison with other clustering algorithms not shown.
4	Hanaa Hachimi et.al [2023].	statistical clustering method	Improved Customer Segmentation considering diversity.	Insufficient explanation of CLV factor calculation in RFM-D model



Problem Statement

To enhance the previous RFM modeling technique to integrate different customer behaviours and implement effective marketing strategy.



Resolve Problem of Literature Survey Papers

- To divide customers into homogeneous clusters based on their RFM values, identify distinct customer segments with specific characteristics and properties.
- Gain insights into customer preferences and needs and understand product development and innovation.
- Develop targeted acquisition strategies to attract new customers who align with existing segments.
- To compare the performance of traditional K-means clustering, Fuzzy C-Means clustering, RM Kmeans, DBSCAN for customer segmentation.



System Architecture

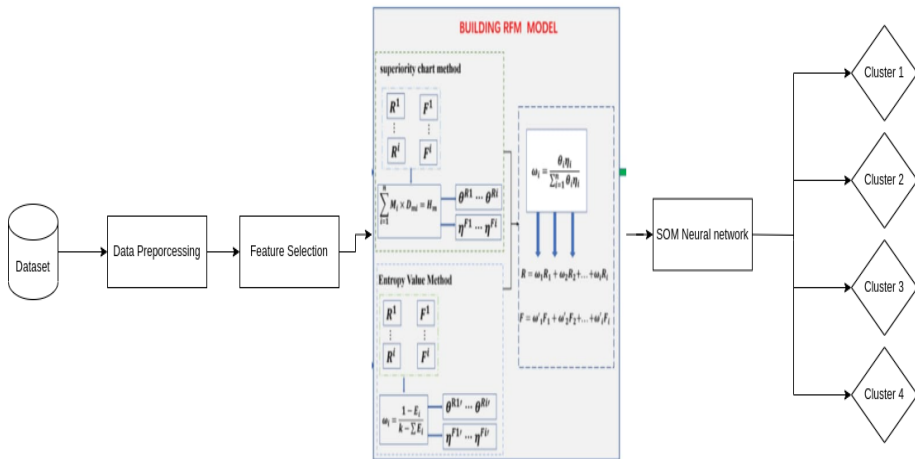


Figure: Architecture



Software Requirement Specification

Software Requirements :

- Operating System: Linux
- OS Type: 64-bit
- Python Version: 3.11.4
- Tools: Google Colaboratory / Jupyter Notebook.

Hardware Requirements :

- Disk Space: 200 GB
- Processor: 11th Gen Intel Core i5
- GPU: NVIDIA Corporation.
- RAM: 8 GB



Customer Segmentation Sequence Diagram

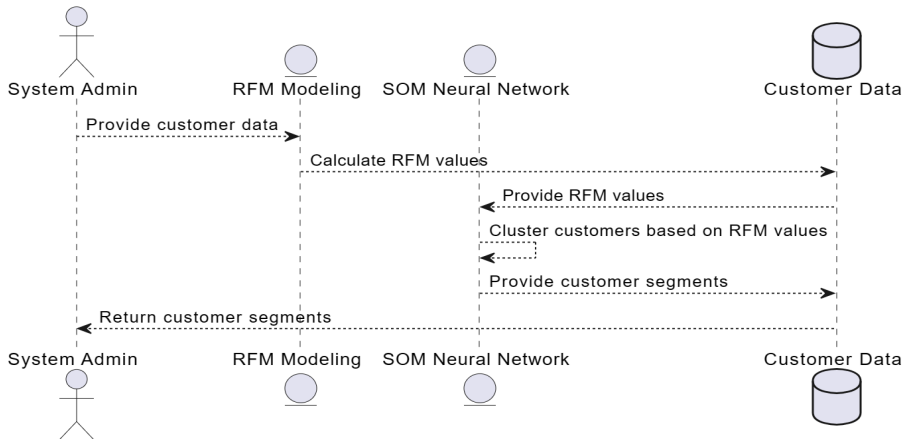


Figure: Sequence Diagram



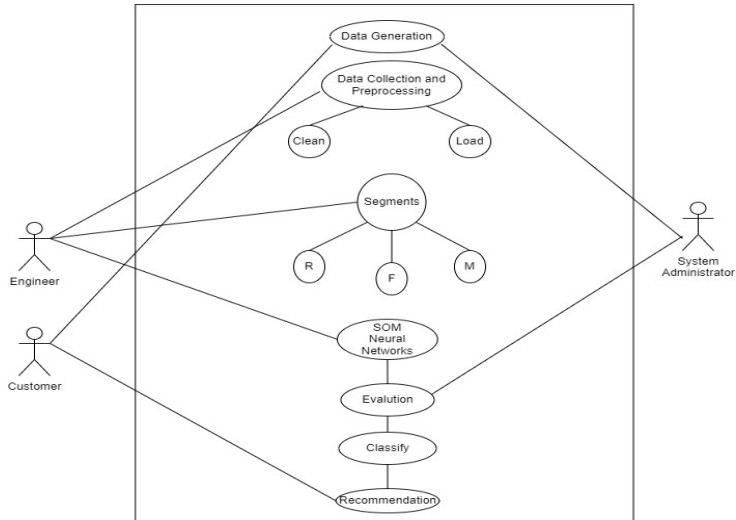


Figure: Use Case Diagram



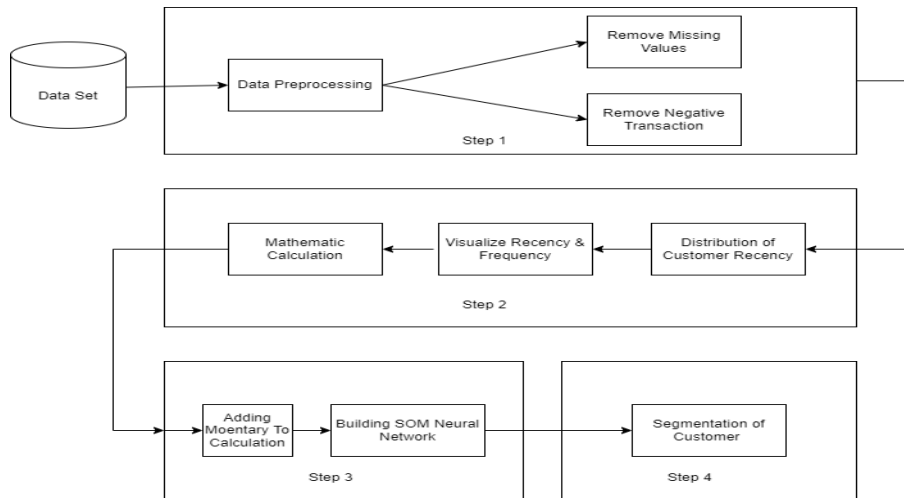


Figure: Data Flow Diagram



Recurrent Neural Networks (RNN):

- For time-series behavioral data, RNNs like LSTMs capture sequential patterns influencing customer segments.

SOM Neural Network:

- SOMs work by projecting high-dimensional customer data onto a lower-dimensional grid . This clustering process allows SOMs to identify groups of customers with similar characteristics.



- Module 1 : Data Gathering
 - ① Dataset
 - ② Data Preprocessing
- Module 2 : Recency and Frequency Value Calculation
 - ① Superiority Chart Method
 - ② Entropy Value Method
- Module 3 : Calculate Omega Value
 - ① Add Monetary Value to Calculated Recency and Frequency Values .



- Module 4 : Neural Network Architecture
 - ① Model Building Using SOM Neural Network
 - ② Training model
 - ③ Testing model
- Module 5 : Results and Experiments
 - ① Evaluation Metrics
 - ① Accuracy
 - ② Recall
 - ③ Precision
 - ④ F1 score
- Module 6 : Clusters as Output
 - ① Segmentation of Customers based on various properties .



Project plan 2.0

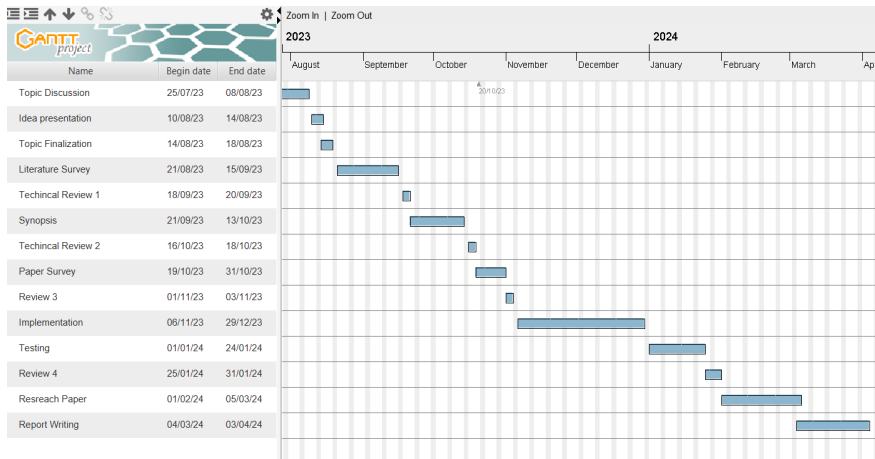


Figure: Gantt Chart



Conclusion

Customer segmentation is critical for business to leverage the power of data analysis for improving profitability . Various clustering techniques divides data into categories of clusters and patterns gives idea for complementary marketing strategies .



References

- RFM ranking – An effective approach to customer segmentation, A. Joy Christy a, A. Umamakeswari a, L. Priyatharsini b, A. Neyaa 2018
- New RFM-D classification model for improving customer analysis and response prediction, Moulay Youssef SMAIL, Hanaa HACHIMI, 2023
- Customer Segmentation Using Fuzzy-AHP and RFM Mode, Anu Gupta Aggarwal, Shweta Yadav, 2020.
- Customer Segmentation with RFM Model using Fuzzy C-Means and Genetic Programming, Anas Syaifudin , Purwanto , Heribertus Himawan , M. Arief Soelema, 2023.
- Customer Segmentation Based on RFM Model Using K-Means, K-Medoids, and DBSCAN Methods, Rahma Wati Br Sembiring Berahmana, Fahd Agodzo Mohammed, Kankamol Chairuang, 2020



Thank You

