

Segmentation of Point-of-Sale Merchants in the Electronic Payments Industry

ABSTRACT

In the highly competitive market we experience currently, companies race over acquiring new customers and keeping them loyal instead of making new ones. Fawry in the e-payment industry needs to effectively apply the loyalty program to merchants in various cities with various business sizes, based on their behavior as there is no attribute to be chosen to reflect loyalty alone, loyalty involves various aspects. In addition, discovering other aspects of the rest of the merchants based on their behavior too, to target them separately. Using RF*M* model for merchants behavior analysis and with the use of various machine learning clustering algorithms, merchants are grouped based on their behavior. Each type will be tackled differently based on their behavior to further improve the revenue generated by them. In addition to an interactive operation dashboard for Fawry to monitor their merchants and KPIs progress per quarter.

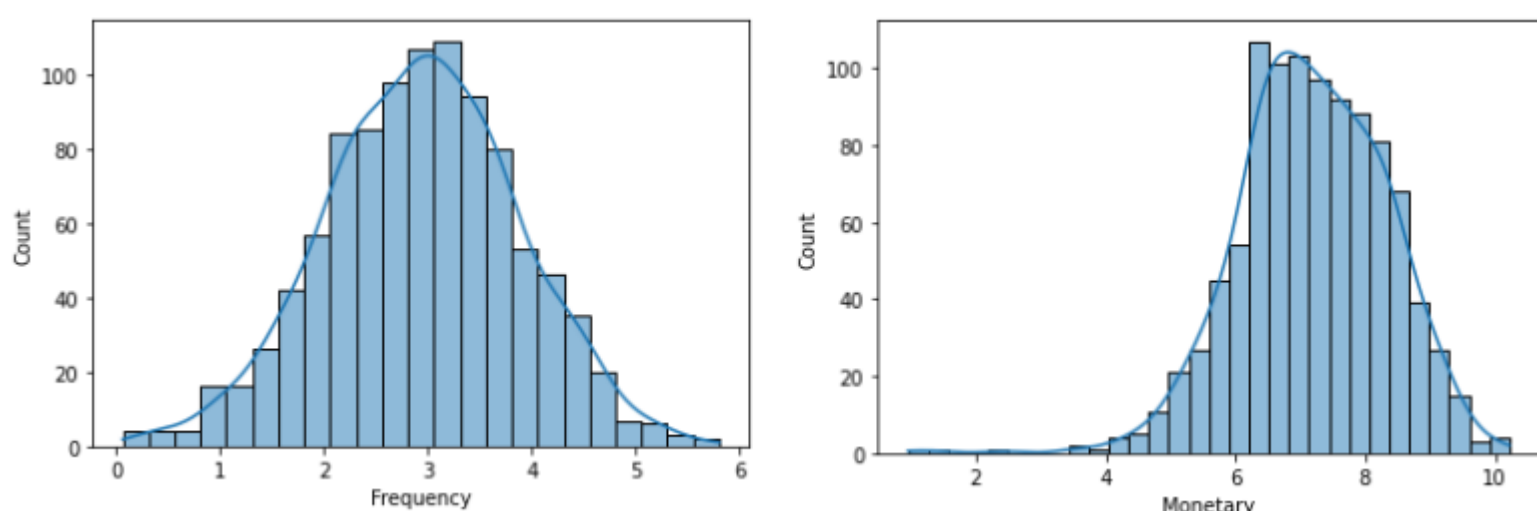
OBJECTIVE

- To develop a machine learning model to cluster Fawry's merchants.
- To apply the RFM technique, specifically RF*M* model for merchants to determine the loyal segment.
- To provide Fawry with an interactive dashboard to get more insights on their merchants' behavior.
- Provide business recommendations based on each cluster's behavior.

METHODOLOGY

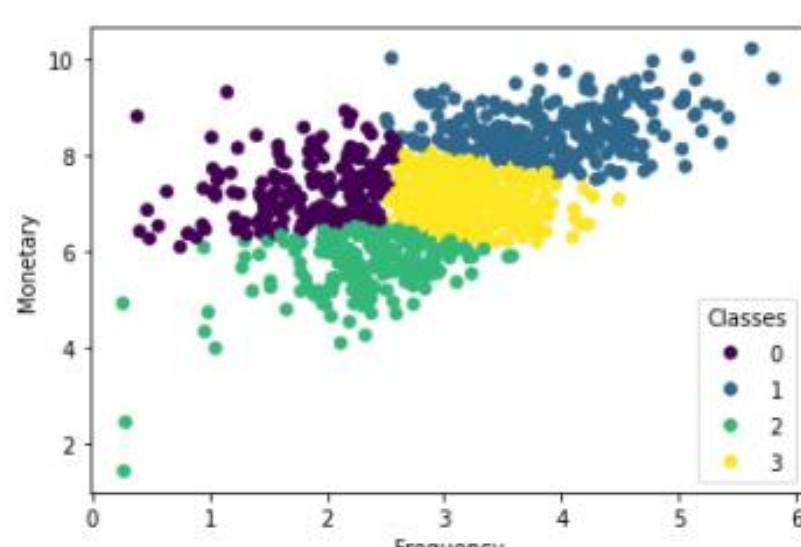
1- Preprocessing:

- Data Transformation: transformed the month_cd column into two timelike datatype columns, month and quarter.
- Feature engineering: Created Recency, Frequency*, and Monetary* features.
- Data normalization: normalized Frequency* and Monetary* features using Log transform.



2- Clustering algorithms:

- Phase1: used K-Means and Gaussian Mixture model, both models performed the same. K-Means was chosen as the champion due to its simplicity.
- Phase2: used cluster0 from phase1 for further clustering. In this phase 4 models were used, K-Means, GMM, DBSCAN, Hierarchical Clustering models, K-Means performed best in 2 of the 3 evaluation metrics used.



PROBLEM STATEMENT

Fawry needs to effectively apply the loyalty program to merchants in various activities with various business sizes, based on their behavior, as loyalty requires various attributes to be measured, and loyalty involves various aspects. In addition, discovering other characteristics of the rest of the merchants based on their behavior too, to target them separately.



DISCUSSION

After the clustering is finished, all merchants are labeled into seven groups: Loyal, Potential Loyalist, Average, Needs Motivation, Low Risk, High Risk, and Churned.

In the following table, the business recommendations for the most important groups of merchants (in the project's scope) will be discussed based on their behavior.

Loyal	<ul style="list-style-type: none"> Early Adopter: access to new POS machines and services. Bonuses and money prizes. Promote positive Word-of-Mouth. Up-sell higher value services. Understand his behavior to give promotions on their most used services.
Potential Loyalist	<ul style="list-style-type: none"> Appreciating his sales numbers with bounces and prices. Set a frequency-based target. Encouraging converging. Promote positive Word-of-Mouth.
Needs Motivation	<ul style="list-style-type: none"> Reconnect to check if there are any technical or hardware-related issues. Set goals based on the average of her group. Make limited-time offers and create a sense of urgency.



CONCLUSION

The transactional data provided was very imbalanced and skewed, but after feature engineering and normalization, work continued smoothly. Resulting in 7 groups of merchants based on their transaction behavior, the most important groups were provided with business recommendations to be tackled.

Afterward, an interactive operational dashboard was designed and implemented for further analysis and answering questions raised by managers and analysts.

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