

Predictive Analysis of Customer Loyalty Using the KNN Method Based on RFM-Based Customer Segmentation

(Case Study: Elhurriyah Yogyakarta)

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ABSTRACT

Customer loyalty is a critical factor in ensuring long-term business sustainability, as retaining existing customers is significantly more cost-effective than acquiring new ones. This study aims to develop a predictive model for customer loyalty using the K-Nearest Neighbour (KNN) algorithm integrated with Recency, Frequency, and Monetary (RFM) analysis to segment customers of Elhurriyah Yogyakarta, a Muslim fashion brand based in Yogyakarta. The dataset consists of Elhurriyah's 2024 transaction records, which were analyzed to generate RFM scores and form the basis for labeling customers as loyal or non-loyal. These labels served as input for the KNN classification model. The research adopts a quantitative and machine learning approach to classify customer loyalty. The results demonstrate that the KNN algorithm effectively distinguishes between loyal and non-loyal customers, achieving an accuracy, precision, recall, and F1-score of 90%. Furthermore, the findings highlight that combining RFM analysis with machine learning algorithms offers an effective predictive tool in the implementation of supervised learning techniques for customer loyalty modeling.

Keywords: RFM Analysis, Classification, KNN, Customer Loyalty, Machine Learning.