

Abstract

Controlling the prices of strategic food commodities in traditional markets requires appropriate analytical approaches to understand complex price movement patterns. One such approach is clustering, which aims to group markets based on similar pricing behaviors to support more effective distribution and monitoring policies. This study aims to compare the performance of three clustering methods—K-Means, DBSCAN, and Self-Organizing Map (SOM) segmenting strategic food commodity price data across traditional markets in East Java during 2023.

The data were obtained from daily observations of ten types of food commodities across more than 100 markets. Prior to clustering, the data were standardized, and each method was applied using a uniform cluster count of five. Evaluation of clustering performance was conducted using two internal metrics: Silhouette Score, which measures intra-cluster cohesion and inter-cluster separation, and Davies-Bouldin Index, which assesses cluster compactness and separation. The results show that DBSCAN achieved the most optimal performance with a Silhouette Score of 0.2933 and a Davies-Bouldin Index of 0.4406. K-Means followed with a Silhouette Score of 0.2195 and a Davies-Bouldin Index of 1.2457, while SOM had the lowest performance, with a Silhouette Score of 0.0968 and a Davies-Bouldin Index of 2.0718. PCA scatter plots and boxplots support these findings, showing clearer and more natural cluster separation with DBSCAN. Therefore, DBSCAN is recommended as the primary clustering method for commodity price segmentation, particularly for pattern exploration and data-driven market analysis. The findings are expected to support more adaptive and responsive policy decisions related to price control and food distribution.

Keywords: Clustering, DBSCAN, K-Means, SOM, Commodity Prices, Silhouette Score, Davies-Bouldin Index.