ABSTRAK

Peningkatan penggunaan *smartphone* di Indonesia mendorong perlunya strategi segmentasi pasar yang tepat berdasarkan spesifikasi dan harga. Penelitian ini mengkaji pemanfaatan gabungan metode Principal Component Analysis (PCA) dan Fuzzy C-Means (FCM) dalam proses pengelompokan data smartphone dari dataset Mobile Phones Data di Kaggle. PCA diterapkan untuk mereduksi dimensi data dengan tetap mempertahankan sekitar 94% variansi utama menggunakan empat komponen. Proses ini meningkatkan efisiensi pemrosesan serta memperjelas pola distribusi data. Kemudian, FCM digunakan untuk membentuk klaster berdasarkan derajat keanggotaan fuzzy, memungkinkan identifikasi kelompok dengan batasan yang tidak tegas. Berdasarkan evaluasi *Silhouette Score*, hasil pengelompokan menunjukkan peningkatan kualitas klaster dari 0,54 menjadi 0,72 setelah PCA diterapkan. Sebanyak sembilan klaster berhasil diidentifikasi, mencerminkan segmentasi produk smartphone mulai dari kelas entry-level hingga flagship.

Kata Kunci: Fuzzy C-Means, Klasterisasi, PCA, Smartphone, Reduksi Dimensi

ABSTRACT

The increasing number of smartphone users in Indonesia drives the need for accurate market segmentation based on specifications and pricing. This study proposes the combination of Principal Component Analysis (PCA) and Fuzzy C-Means (FCM) to cluster smartphones in the Mobile Phones Data dataset from Kaggle. PCA is used for dimensionality reduction, retaining 94% of variance with four principal components, thereby enhancing computational efficiency and visualization. Subsequently, the FCM algorithm is applied to form clusters based on fuzzy membership degrees, allowing for flexible grouping of data with indistinct boundaries between clusters. Evaluation results using the Silhouette Score show an improvement from 0.54 (without PCA) to 0.72 (with PCA), indicating that the clusters formed are more distinct and compact. The clustering results in nine groups with varying price and specification characteristics, which can be interpreted as entry-level, mid-range, and flagship segments. These findings demonstrate that the combination of PCA and FCM is effective in supporting consumer technology product segmentation analysis.

Keywords: Fuzzy C-Means, Clustering, PCA, Smartphone, Dimensionality Reduction