ABSTRAK

Ketidakcukupan konsumsi pangan atau *Prevalence of Undernourishment* (PoU) merupakan salah satu permasalahan di Indonesia yang menggambarkan proporsi penduduk yang tidak mampu memenuhi kebutuhan energi minimum hariannya. Oleh karena itu, diperlukan metode clustering untuk mengelompokkan wilayah berdasarkan tingkat ketidakcukupan pangan guna mendukung penyusunan kebijakan yang lebih tepat sasaran. Penelitian ini bertujuan membandingkan performa algoritma *Agglomerative Hierarchical Clustering* dan *Gaussian Mixture Model* (GMM) dalam mengelompokkan wilayah di Indonesia berdasarkan karakteristik ketidakcukupan konsumsi pangan. Dataset yang digunakan diperoleh dari Badan Pangan Nasional dan terdiri atas data PoU, Indeks Ketahanan Pangan (IKP), Jumlah Penduduk, Penduduk *Undernourish*, dan Kode Kabupaten/Kota. Tahapan penelitian meliputi preprocessing data, standarisasi, *feature selection*, dan proses clustering. Evaluasi model dilakukan menggunakan *Silhouette Score*, *Davies-Bouldin Index*, *Calinski-Harabasz Index*, dan akurasi. Hasil penelitian menunjukkan bahwa *Agglomerative Hierarchical Clustering* dengan *average* linkage dan 3 cluster menghasilkan *Silhouette Score* sebesar 0,519 dan *Davies-Bouldin Index* sebesar 0,611 yang menunjukkan kualitas pemisahan cluster yang lebih baik. Sementara itu, *Gaussian Mixture Model* dengan parameter diag dan 3 cluster menghasilkan *Calinski-Harabasz Index* sebesar 1596,525 yang menunjukkan performa klasifikasi dan stabilitas cluster yang lebih tinggi. Dengan demikian, *Agglomerative Hierarchical Clustering* lebih unggul dalam kualitas pemisahan cluster, sedangkan *Gaussian Mixture Model* lebih unggul dalam akurasi dan kemampuan memodelkan distribusi data yang kompleks.

Kata Kunci: Ketidakcukupan Konsumsi Pangan, *Prevalence of Undernourishment* (PoU), Clustering, *Agglomerative Hierarchical Clustering*, *Gaussian Mixture Model* (GMM).

ABSTRACK

Food insufficiency, or Prevalence of Undernourishment (PoU), is one of the challenges faced by Indonesia, reflecting the proportion of the population that is unable to meet its minimum daily energy requirements. Therefore, a clustering approach is needed to group regions based on their level of food insufficiency in order to support more targeted policy making. This study aims to compare the performance of Agglomerative Hierarchical Clustering and Gaussian Mixture Model (GMM) algorithms in clustering regions in Indonesia based on food insufficiency characteristics. The dataset was obtained from the National Food Agency and consists of PoU, Food Security Index (IKP), Total Population, Undernourished Population, and Regency/Municipality Code data. The research stages include data preprocessing, standardization, feature selection, and clustering. Model evaluation was conducted using Silhouette Score, Davies-Bouldin Index, Calinski-Harabasz Index, and accuracy. The results show that Agglomerative Hierarchical Clustering with average linkage and three clusters achieved a Silhouette Score of 0.519 and a Davies-Bouldin Index of 0.611, indicating better cluster separation quality. Meanwhile, the Gaussian Mixture Model with the diag parameter and three clusters achieved a Calinski-Harabasz Index of 1596.525, indicating higher classification performance and cluster stability. Therefore, Agglomerative Hierarchical Clustering outperformed in terms of cluster separation quality, while Gaussian Mixture Model demonstrated superior accuracy and a better ability to model complex data distributions.

Keywords**:** Food Insufficiency, Prevalence of Undernourishment (PoU), Clustering, Agglomerative Hierarchical Clustering, Gaussian Mixture Model (GMM).