

ABSTRACT

Livestock products are essential commodities in meeting food needs in Indonesia, particularly livestock meat. On the other hand, meat production across provinces remains uneven due to various factors such as labor availability, feed supply, environmental conditions, livestock infrastructure, and government support. This study aims to classify provinces in Indonesia based on livestock meat production characteristics using the Self-Organizing Map (SOM) method, optimized with Particle Swarm Optimization (PSO). SOM was chosen because it can cluster data without requiring predefined class labels and can map high-dimensional data into a two-dimensional representation, facilitating the analysis and interpretation of production patterns. However, SOM has limitations in finding optimal solutions due to the random initialization of weights. Therefore, PSO optimization is used to improve clustering accuracy and stability by updating weights more effectively in handling nonlinear data patterns. The data used in this study includes the production volume of livestock meat, the number of livestock businesses, and the workforce in the livestock sector for six types of livestock across 38 provinces in Indonesia in 2023. Clustering was performed using SOM, and the generated weights were then optimized with PSO. The clustering process was conducted with 2, 3, 4, and 5 clusters, and the results were evaluated using the Davies-Bouldin Index (DBI) to determine the optimal number of clusters. The study results show that clustering into three clusters produced the most optimal outcome, with a DBI value of 1,626 compared to the other cluster configurations.

Keywords: Livestock Meat, Self-Organizing Map (SOM), Optimization, Particle Swarm Optimization (PSO), Artificial Neural Network (ANN), Clustering, Davies-Bouldin Index (DBI).