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Support Vector Machine (SVM) Optimization based on Particle Swarm Optimization (PSO) and K-Means Algorithm to Increasing Accuracy of Chronic Kidney Disease (CKD) Diagnosis

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Objectives: Data mining is a method used to provide solutions in solving problems in extracting information from big data including classification. In the classification process, the accuracy and time efficiency results obtained are very important. So optimization is needed in order to improve accuracy and time efficiency during the classification process. This study aims to determine how the optimization of accuracy and time efficiency in the SVM algorithm and the accuracy and time efficiency results obtained in the diagnosis of CKD.

Methods: Optimization of the SVM algorithm using the K-Means algorithm for the continuous data clustering process on the dataset and the feature selection process using Particle Swarm Optimization. This study uses the CKD Dataset from the UCI Machine Learning Repository. In data processing, starting from the stages of converting data from .arff extensions to .csv, stages of data transformation from nominal to numeric, data cleaning, K-Means stages, PSO stages, and classification stages using SVM.

Results: From the research results, the SVM method using K-Means and PSO provides an average accuracy of 98.80% higher than the SVM algorithm of 55.00% but 0.12% lower than the SVM only with the PSO method only. The SVM method using K-Means and PSO has an average processing time of about 20 seconds faster than the SVM method with the PSO method which requires an average time of 33.87 seconds. Experiments based on the method used are proven to increase the classification accuracy by 43.80% of the accuracy produced by the SVM algorithm and save processing time of about 20 seconds from the SVM algorithm with PSO.

Conclusions: The method used to optimize the SVM algorithm using the K-Means algorithm and feature selection PSO can optimize and improve accuracy and processing time in the SVM algorithm classification process for the diagnosis of chronic kidney disease.