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**The Silent Killer and Artificial Intelligence : Prediction of Chronic Kidney Disease (CKD) using Machine Learning Basics with the K-Nearest Neighbor (k-NN) Algorithm based on Particle Swarm Optimization (PSO)**

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**Objectives:** Chronic kidney disease is often referred to as the silent killer. Most sufferers do not feel certain symptoms until the disease has entered an advanced stage and kidney function has decreased. Delay in the detection and treatment of these diseases has led to a high prevalence of chronic kidney death in some countries. Data mining classification is needed to facilitate the identification of diseases, one algorithm that is often used is k-NN. The data mining classification and prediction methods tested in this study are K-Nearest Neighbor (k-NN) with novelty that is optimized using the Particle Swarm Optimization (PSO) method to obtain higher accuracy, precision, and sensitivity.

**Methods:** The dataset used in the experiment was obtained from the University of California Irvine (UCI) Machine Learning Repository database with the title Chronic Kidney Disease. The data contains 400 data records consisting of 250 records detected suffering from chronic kidney disease and 150 records not suffering from chronic kidney disease. The experiments conducted in this study used the Rapidminer tool.

**Results:** After testing, the results obtained that by using the PSO optimization applied to the k-NN method, the value of accuracy and precision can increase significantly so that this method can be implemented in classifying and predicting chronic kidney disease. From the results of this study, the best model was obtained on K-Nearest Neighbor (k-NN) on the parameter  $K = 1$ , with the highest accuracy rate of 78.8%, while adding the PSO method obtained results with an accuracy rate of 97.3%.

**Conclusions:** From the level of accuracy obtained, the k-NN + PSO method is proven to be better used to predict chronic kidney disease. This is a very important consideration recommendation because the use of k-NN in general has been widely carried out and the accuracy obtained is far lower than k-NN + PSO.