Neural network and support vector machine for the prediction of chronic kidney disease: A comparative study

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Highlights of the research

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ANN and SVM based models are developed for the prediction of kidney disease.

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Comparative analysis was carried out on the two models-ANN and SVM.

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Both ANN and SVM performed excellently but ANN model slightly performed better than SVM.

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The two proposed ANN and SVM models demonstrated promising capabilities of such techniques in the field of medicine.

Abstract

This paper aims to assist in the prevention of [Chronic Kidney Disease](https://www.sciencedirect.com/topics/medicine-and-dentistry/chronic-kidney-disease) (CKD) by utilizing [machine learning](https://www.sciencedirect.com/topics/computer-science/machine-learning) techniques to diagnose CKD at an early stage. Kidney diseases are disorders that disrupt the normal function of the kidney. As the percentage of patients affected by CKD is significantly increasing, effective prediction procedures should be considered. In this paper, we focus on applying different machine learning [classification algorithms](https://www.sciencedirect.com/topics/computer-science/classification-algorithm) to a dataset of 400 patients and 24 attributes related to diagnosis of chronic kidney disease. The [classification techniques](https://www.sciencedirect.com/topics/computer-science/classification-technique) used in this study include [Artificial Neural Network](https://www.sciencedirect.com/topics/computer-science/artificial-neural-network) (ANN) and [Support Vector Machine](https://www.sciencedirect.com/topics/computer-science/support-vector-machine) (SVM). To perform experiments, all missing values in the dataset were replaced by the mean of the corresponding attributes. Then, the optimized parameters for the Artificial Neural Network (ANN) and Support Vector Machine (SVM) techniques were determined by tuning the parameters and performing several experiments. The final models of the two proposed techniques were developed using the best-obtained parameters and features. The empirical results from the experiments indicated that ANN performed better than SVM, with accuracies of 99.75% and 97.75%, respectively, indicating that the outcome of this study is very promising.

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Keywords

Machine learning

Artificial Neural Network (ANN)

Support Vector Machine (SVM)

Chronic Kidney Disease (CKD)