

# Chronic Kidney Disease Prognosis using Machine Learning

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**Abstract:** Goal three of the UN's Sustainable Development Goal is focused on promoting good health and well-being, with a specific emphasis on addressing the challenges posed by non-communicable diseases. One of the objectives for this goal is to reduce premature mortality from non-communicable diseases by a third by the year 2030. Chronic kidney disease (CKD) is a major contributor to morbidity and mortality from non-communicable diseases, affecting between 10 and 15% of the global population. Early and accurate detection of the stages of CKD is considered vital in order to minimize the impact of the associated health complications, such as hypertension, anemia, mineral bone disorder, poor nutritional health, acid base abnormalities, and neurological complications. To this end, machine learning techniques have been used in various research studies to detect CKD at an early stage. However, previous research has not focused on specific stage prediction. In this study, both binary and multi-classification for stage prediction were carried out using Random Forest (RF), Support Vector Machine (SVM), and Decision Tree (DT) prediction models. Analysis of variance and recursive feature elimination were applied for feature selection, and tenfold cross-validation was used to evaluate the models. The results showed that RF based on recursive feature elimination with cross-validation had better performance than SVM and DT for stage prediction of CKD. This research has the potential to lead to earlier detection and intervention, ultimately reducing premature mortality from non-communicable diseases as outlined in the UN's Sustainable Development Goal of good health and well-being.

**Keywords:** Support Vector Machine, K-nearest Neighbor, Decision tree classifier, Random Forest classifier, Naive Bayes Classifier, Machine Learning

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