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A Personalized Healthcare Approach for Chronic Kidney Disease using Machine Learning

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Abstract: *Chronic Kidney Disease (CKD) is a growing global health concern requiring early detection for effective treatment. This paper presents the design, development, and implementation of a machine learning-based system to predict CKD using clinical data. A microcontroller-based system is not used here; instead, Python and its libraries handle data preprocessing, missing value imputation, and feature analysis. Various classification algorithms were implemented and compared, with Random Forest achieving the highest accuracy. A heatmap and feature importance graph were generated to identify the most influential attributes for prediction. The user interface provides predictions and insights on patient data such as blood pressure, albumin, serum creatinine, and hemoglobin levels. The model can assist healthcare providers in making data-driven, timely decisions, potentially improving patient outcomes. Simulation and testing were carried out on real-time datasets and validated using performance metrics.*

Keywords: Kidney Disease, Machine Learning, Classification, Medical Diagnosis, Random Forest

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