

Cardiac Disease Detection using Machine Learning

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Abstract: *This project Cardiac Disease Detection Using Machine Learning undertakes a comprehensive study of machine learning algorithms for heart disease prediction, aiming to enhance early detection and preventive healthcare. It systematically compares five traditional algorithms—KNN, LDA, Decision Tree, Logistic Regression, and Naive Bayes—against a Convolutional Neural Network (CNN), seeking to identify the most effective approach. Utilizing a rich dataset of cardiovascular risk factors and clinical measurements, the project trains and evaluates predictive models, ensuring a foundation in real-world patient data. The dataset's diverse features enable the models to capture complex, non-linear relationships inherent in medical data. The inclusion of a CNN is a key innovation. CNNs, typically used in image analysis, are adapted to process structured medical data, potentially surpassing traditional algorithms by learning hierarchical feature representations. This approach aims to uncover subtle indicators of heart disease, demonstrating the potential of advanced techniques in medical diagnostics. Evaluation emphasizes clinical relevance, focusing on accuracy, sensitivity, and specificity. Sensitivity, identifying those with heart disease, and specificity, identifying those without, are crucial for minimizing errors. The CNN's superior performance across these metrics highlights its potential for clinical decision support. This research aims to provide healthcare professionals with a reliable risk assessment tool, facilitating earlier interventions and personalized prevention. By demonstrating the CNN's capabilities and conducting a thorough comparative analysis, the project contributes to the understanding of machine learning's role in medical diagnostics. It paves the way for proactive healthcare strategies, leveraging advanced techniques to combat heart disease.*

Keywords: K-Nearest Neighbors (KNN), Linear Discriminant Analysis (LDA), Decision Tree, Logistic Regression, Naive Bayes

