# Cardiovascular Diseases Prediction Using Machine Learning: Advancing Early Diagnosis and Prevention

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Cardiovascular diseases are among the most common illnesses globally, causing approximately 32% of deaths annually, according to the World Health Organization. In Palestine, the mortality rate reached 29.9% in 2020, according to the Ministry of Health. These diseases pose a serious health challenge, necessitating the urgent development of a system capable of predicting them early and saving lives. In our Palestinian community, the diagnosis of cardiovascular diseases often relies on expensive tests, leading to delays and worsening health conditions. Diagnostic errors may occur due to symptom similarity, misinterpretation of data, and lack of awareness about the importance of regular check-ups. Additionally, insufficient equipment and limited availability in medical centers contribute to rising mortality rates and negatively affect patients' lives. Our project aims to predict a person’s risk of cardiovascular diseases based on medical and demographic data previously entered into the system. The system was trained on 70% of a Kaggle dataset, while the remaining 30% was allocated for accuracy testing. The system relies on supervised machine learning, specifically the Random Forest algorithm, to analyze new user data. The model was tested on approximately 300 patients from a Kaggle dataset, in addition to 10 patients from our community — both with and without heart disease. The system proved effective, accurately predicting 90% of cases, demonstrating both its precision and value. In light of the growing global and local burden of cardiovascular diseases, this project represents a vital step toward harnessing artificial intelligence to support early detection, reduce the high costs of medical examinations, enhance healthcare efficiency, and ultimately save lives.

**Awards Won:**