AI-Powered Heart Disease Detection System

1. Introduction

Heart disease is a leading cause of death globally, responsible for about one-third of all deaths worldwide. Timely detection and intervention can significantly reduce the risk of fatal outcomes, yet access to effective diagnostic tools remains limited, particularly in remote and underserved areas. Traditional heart disease detection methods, such as stress tests and angiography, are not only costly but often inaccessible to people in low-resource settings. Recent advancements in artificial intelligence (AI) and machine learning provide an opportunity to create a highly accurate, accessible, and cost-effective heart disease detection tool. By utilizing patient data and AI-driven predictive analytics, this project aims to develop a system that can detect potential heart disease risks early on, empowering both healthcare professionals and individuals with critical information that can aid in timely medical intervention.

2. Problem Statement

Despite progress in medical technology, there remains a significant gap in early detection and diagnosis of heart disease, particularly in low-resource and remote areas where access to advanced diagnostic tools is limited. This gap can result in undiagnosed conditions, delayed treatments, and preventable complications or fatalities. While some predictive models for heart disease exist, many lack the accuracy, accessibility, or affordability needed for widespread adoption. Furthermore, medical professionals often lack a straightforward tool for preliminary screening, which could be used alongside clinical diagnostics to improve the speed and accuracy of heart disease detection. This project addresses the need for an AI-powered heart disease detection system that leverages accessible health data and predictive models to identify potential heart disease cases accurately and efficiently.

3. Goals

- **Develop an AI-Powered Predictive Model**: Build a machine learning model capable of accurately predicting heart disease risk using patient data.

- **Create an Accessible Platform**: Design a user-friendly interface that allows healthcare providers and patients to input relevant data and receive instant risk assessments.

- **Enhance Early Detection and Intervention**: Provide a tool that aids in early detection, potentially leading to timely medical intervention and improved patient outcomes.

- **Promote Preventative Health**: Educate users on risk factors for heart disease and encourage proactive measures based on personalized assessments.

4. Related Work

- **"Machine Learning Technology-Based Heart Disease Detection Models"** by Umarani Nagavelli , Debabrata Samanta , Partha Chakraborty
  https://pmc.ncbi.nlm.nih.gov/articles/PMC8898839/
- **"Heart disease detection using machine learning methods: a comprehensive narrative review"** by Mohammadreza Hajiarbabi
  https://jmai.amegroups.org/article/view/9054/html
- **"Heart Disease Detection by Using Machine Learning Algorithms and a Real-Time Cardiovascular Health Monitoring System"** by Shadman Nashif, Md. Rakib Raihan, Md. Rasedul Islam, Mohammad Hasan Imam
  https://www.scirp.org/journal/paperinformation?paperid=88650