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Coronary Heart Disease Prediction using Shap

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Abstract: *Heart disease remains one of the leading causes of mortality worldwide, making early and accurate prediction crucial for timely diagnosis and treatment. With advancements in artificial intelligence, machine learning models have shown promising results in predicting heart disease using clinical data. However, most of these models function as black boxes, providing little to no insight into how predictions are made. This lack of transparency poses challenges in critical fields such as healthcare, where interpretability and trust are essential.*

This project addresses the issue by developing a heart disease prediction system using Logistic Regression, combined with SHAP (SHapley Additive exPlanations) to enhance explainability. The system is trained on the UCI Heart Disease dataset and involves stages such as data preprocessing, model training, evaluation, and explainability analysis. SHAP values are used to interpret the influence of individual features on the model's predictions, providing both global and local explanations.

The results show that features such as chest pain type, maximum heart rate, and ST depression are significant contributors to heart disease predictions. SHAP visualizations offer clear, intuitive insights into feature importance, thereby improving user trust and aiding medical professionals in decision-making.

By integrating explainable AI into the heart disease prediction pipeline, this project not only improves prediction accuracy but also ensures that the outcomes are interpretable and actionable. This makes the system a valuable decision-support tool in clinical environments, promoting the responsible use of AI in healthcare.

Keywords: Heart Disease, Machine Learning, SHAP, Explainable AI, Logistic Regression, Feature Importance

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