CIS 550-7102: Advanced Machine Learning - On-Line (2024 Spring CE1)

Final Project Proposal: Predictive Modelling for Heart Disease Diagnosis

Group No: 10

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Introduction:

In the realm of healthcare, predictive modelling plays a crucial role in diagnosing diseases and aiding clinical decision-making. Heart disease, being one of the leading causes of mortality worldwide, necessitates accurate risk assessment and early detection. This project proposes the development of predictive models using machine learning algorithms to predict the likelihood of heart disease based on patient characteristics and diagnostic test results.

Objectives:

- Design and implement supervised learning algorithms such as Linear Regression, Decision Trees, and Ensemble Methods to predict the presence or absence of heart disease.
- Build and compare multiple predictive models using various evaluation metrics to identify the most effective algorithm.
- Evaluate model performance using techniques like cross-validation and hyperparameter tuning to ensure robustness and accuracy.
- Interpret the models to understand the factors influencing heart disease risk, providing actionable insights for healthcare professionals.

Dataset Description:

- The dataset consists of patient characteristics and diagnostic test results related to heart disease.
- Features include age, sex, chest pain type, resting blood pressure, cholesterol levels, fasting blood sugar, electrocardiographic results, maximum heart rate achieved during exercise, exercise-induced angina, ST depression induced by exercise, slope of peak exercise ST segment, number of major vessels colored by fluoroscopy, thalassemia type, and the presence or absence of heart disease.
- The target variable (AHD) indicates whether a patient has heart disease or not.

Approach:

- Utilize supervised learning algorithms such as Linear Regression, Decision Trees, and Ensemble Methods to predict heart disease.
- Build and compare predictive models using evaluation metrics like accuracy, precision, recall, and F1-score.
- Evaluate model performance using techniques like cross-validation and hyperparameter tuning.
- Interpret the models to understand the impact of different features on heart disease risk.

Deliverables:

- Developed predictive models for heart disease diagnosis using machine learning algorithms.
- Comparative analysis of model performance using evaluation metrics.
- Insights into factors influencing heart disease risk based on model interpretation.
- Documentation detailing the methodology, results, and recommendations.

Conclusion:

By leveraging machine learning techniques, this project aims to develop accurate predictive models for heart disease diagnosis. The insights gained from this endeavour can assist healthcare professionals in identifying individuals at high risk of heart disease, enabling timely intervention and improved patient outcomes.