1. **Title of the project:** Heart Failure Prediction
2. **Project Brief**

Introduction: Cardiovascular diseases (CVDs) remain a leading cause of global mortality, responsible for approximately 31% of all deaths worldwide. Among CVDs, heart failure is a prevalent condition, contributing significantly to premature deaths. Early detection and management of cardiovascular diseases are crucial for individuals at risk. This project aims to leverage machine learning models to predict heart failure based on relevant patient features.

Problem Statement: Develop a classification filter using various machine learning models to predict heart failure. The dataset comprises 12 features, including patient demographics, medical history, and diagnostic indicators. The goal is to build a robust model capable of accurately classifying individuals into two categories: those with heart disease (output class 1) and those without (output class 0). Additionally, the project aims to compare the performances of different classification models to identify the most effective approach.

1. **Objective:**

The primary objective of the project is to create a classification filter for heart failure prediction. This involves implementing and evaluating various classification models on the provided dataset. The comparison of model performances will help identify the most effective model for accurate and reliable predictions.

1. **Deliverables:**
2. Project Documentation:

* Detailed project overview, objectives, and significance.
* Description of dataset attributes and their relevance to heart failure prediction.
* Explanation of the chosen machine learning models and their rationale.
* Overview of the evaluation metrics used to assess model performance.

1. Data Preprocessing:

* Cleaning and handling missing data.
* Encoding categorical variables.
* Normalizing or scaling numerical features.

1. Exploratory Data Analysis (EDA):

* Visualization of data distribution and correlations.
* Identification of patterns or trends within the dataset.

1. Model Development:

* Implementation of classification models (e.g., Logistic Regression, Decision Trees, Random Forest, Support Vector Machines, etc.).
* Hyperparameter tuning for optimal model performance.

1. Model Evaluation:

* Comparison of model performances using metrics such as accuracy, precision, recall, F1 score.
* Visual representation of model evaluation results.

1. Conclusion and Recommendations:

* Summary of findings.
* Identification of the most effective model for heart failure prediction.
* Recommendations for further improvement or refinement.

By delivering these components, the project aims to provide a comprehensive understanding of heart failure prediction using machine learning, along with actionable insights for healthcare practitioners and researchers.

1. **Resources**

**Data set source:** Data is provided in .csv format for this project.

Also, similar data can be found in: https://www.kaggle.com/datasets/fedesoriano/heart-failure-prediction

**Software**: Anacoda, Jupyter notebook

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