Task 1: Research Review

Introduction:

Heart disease remains one of the leading causes of mortality worldwide, making its prediction a critical area of research. Machine learning techniques offer promising avenues for early detection and risk assessment, aiding in timely intervention and prevention strategies. This report aims to explore the analysis of heart disease prediction using machine learning, encompassing various models and techniques employed in research studies.

Literature Review:

Numerous research studies have delved into heart disease prediction using machine learning algorithms, employing diverse datasets and methodologies. One common approach involves utilizing clinical parameters such as age, gender, blood pressure, cholesterol levels, and various biomarkers to build predictive models.

1. Models and Techniques:

- **Logistic Regression:** Often employed as a baseline model due to its simplicity and interpretability.
- Decision Trees: Provide insight into feature importance and offer a transparent decision-making process.
- **Random Forests:** Ensemble methods like Random Forests enhance predictive performance by aggregating multiple decision trees.
- **Support Vector Machines (SVM):** Effective in handling high-dimensional data and nonlinear relationships.
- **Neural Networks:** Deep learning techniques, including feed forward neural networks and convolutional neural networks, offer high predictive accuracy but require substantial computational resources and data.

2. Common Factors Influencing Heart Disease:

- **Age:** Advanced age is a significant risk factor for heart disease, with the incidence increasing with age.
- **Gender:** Men tend to have a higher risk of heart disease compared to pre-menopausal women, although the risk equalizes post-menopause.
- **Hypertension:** High blood pressure is a leading cause of heart disease and stroke.

- **Cholesterol Levels:** Elevated levels of LDL cholesterol ("bad" cholesterol) and reduced levels of HDL cholesterol ("good" cholesterol) increase the risk of heart disease.
- **Diabetes:** Individuals with diabetes are at a higher risk of developing heart disease due to factors such as insulin resistance and dyslipidaemia.