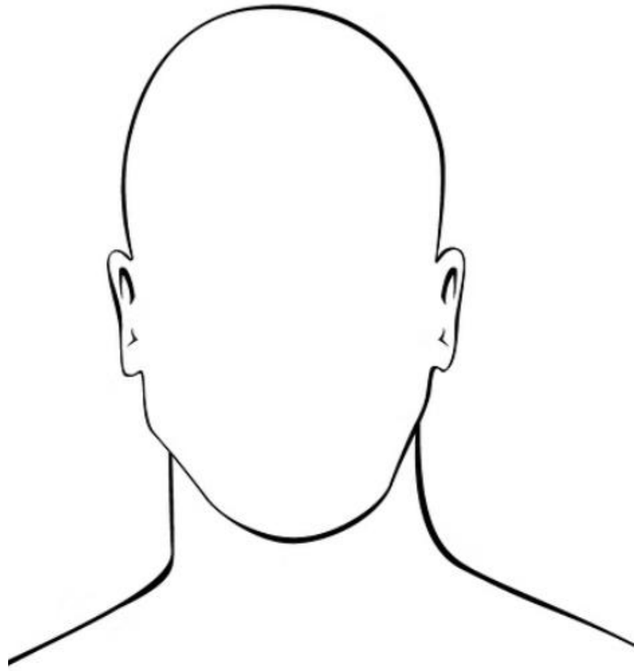
HEART DISEASE PREDICTION
(A MACHINE LEARNING APPROACH)

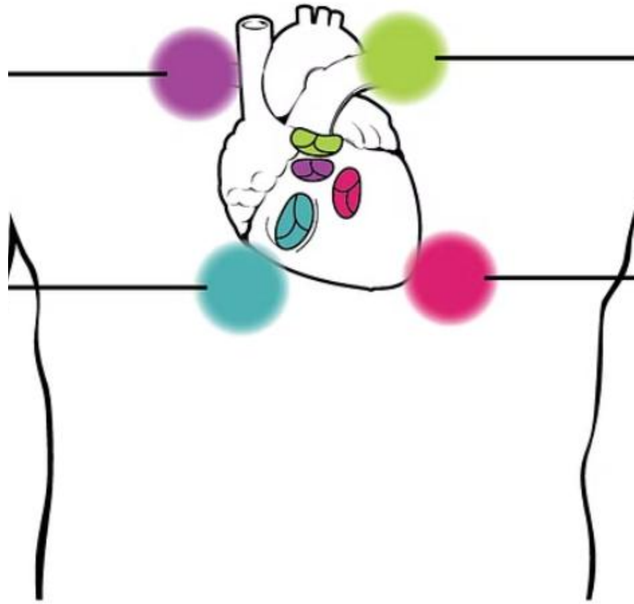
B.TECH 2023-27 4th SEM LEARNING PROJECT

Submitted By:

- NIKHIL KUMAR(23CSEAIML129)
- SEEKHA RANI NAIK (23CSEAIML111)
- PRAYAKTI PANDA (23CSEAIML106)



Under the Guidance of **Asst. Prof. VSK Chaitanya**



BACHELOR'S OF TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
SCHOOL OF ENGINEERING AND TECHNOLOGY
GIETU, GUNUPUR- 765022, ODISHA

08th February,2025

Table of Contents

Introduction

Heart disease is a major global health concern, accounting for a significant portion of deaths worldwide. It encompasses a range of conditions affecting the heart, including coronary artery disease, stroke, and heart failure.

Early detection and prevention are crucial in mitigating the impact of heart disease. This presentation explores how Machine Learning can be leveraged to predict heart disease risk, potentially leading to better patient outcomes.

Problem Statement

Challenges of Traditional Prediction

Traditional methods for predicting heart disease often rely on subjective assessments and limited data, leading to potential inaccuracies and delayed diagnoses.

Potential of Machine Learning

Machine Learning algorithms can analyze vast amounts of patient data to identify patterns and predict heart disease risk with greater accuracy and precision.

Medications	

Dataset & Preprocessing

A comprehensive dataset encompassing patient demographics, medical history, and laboratory test results is collected from multiple sources, including hospitals and research institutions.

1

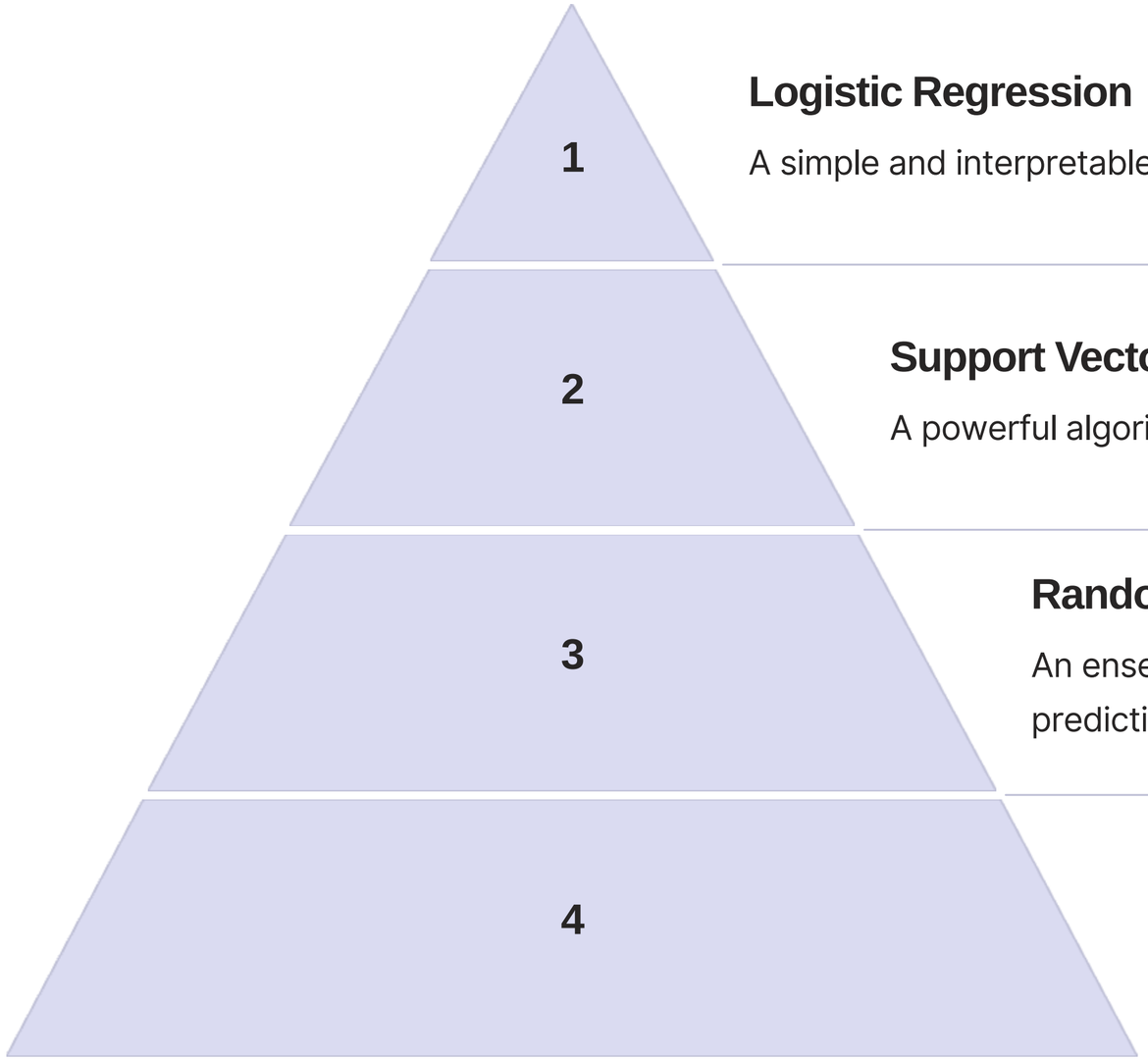
2

The data is carefully cleaned and preprocessed to remove inconsistencies, missing values, and irrelevant information, ensuring the quality and reliability of the analysis.

Features are selected and engineered to represent the most relevant factors contributing to heart disease risk, further enhancing the model's predictive capabilities.

3

Machine Learning Models



Logistic Regression

A simple and interpretable algorithm suitable for binary classification.

Support Vector Machines

A powerful algorithm that excels in finding optimal boundaries between classes.

Random Forest

An ensemble method that combines multiple decision trees to enhance prediction accuracy.

Neural Networks

Complex models capable of learning intricate relationships within the data.

Training & Evaluation

1

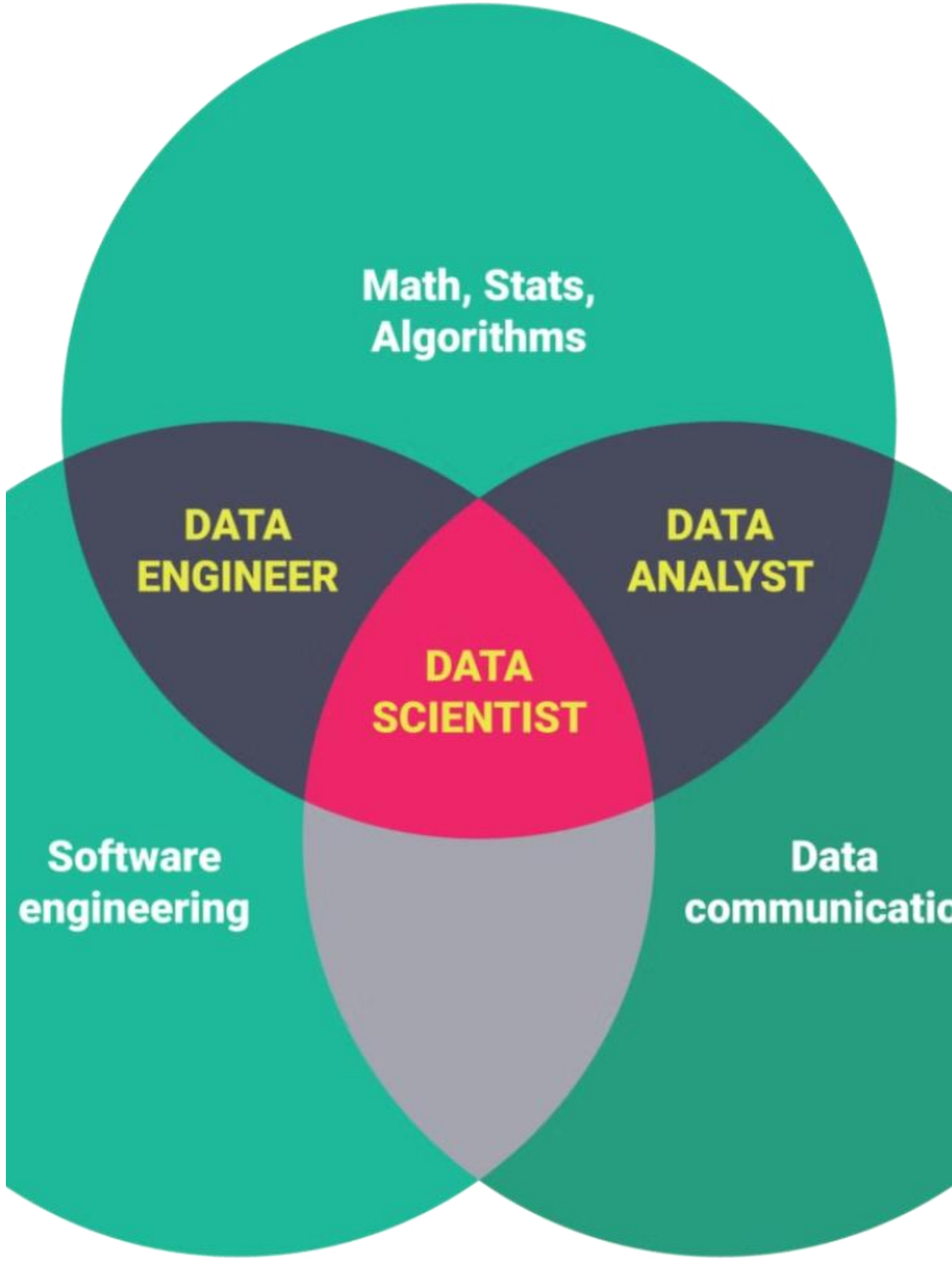
The collected dataset is divided into training and testing sets, enabling the model to learn patterns from the training data and evaluate its performance on unseen data.

2

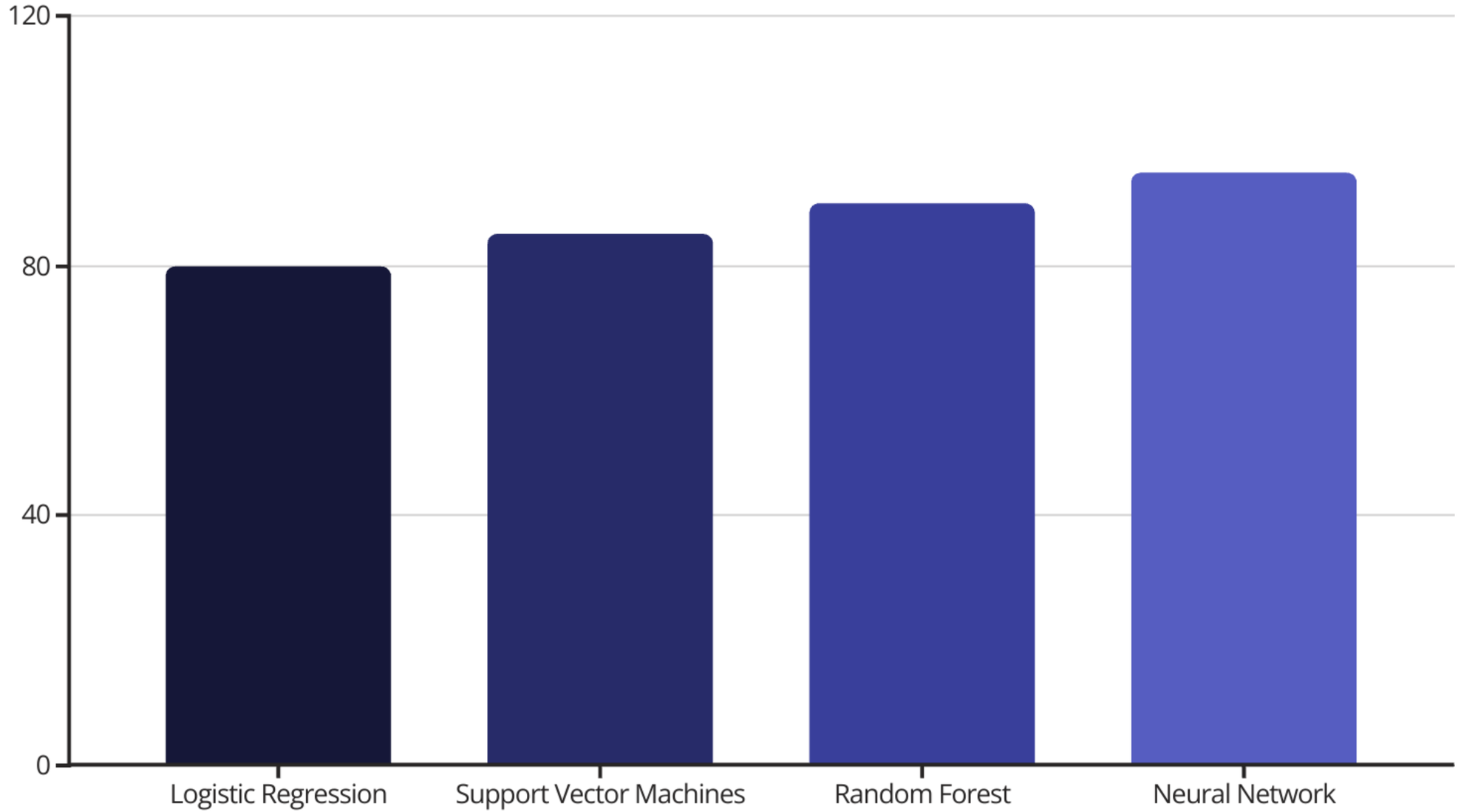
The model is trained using various parameters and hyperparameters, optimizing its ability to predict heart disease risk accurately.

3

Evaluation metrics such as accuracy, precision, recall, and F1-score are used to assess the model's performance, ensuring its reliability and effectiveness.



Results


120
80
40
0
Logistic Regression
Support Vector Machines
Random Forest
Neural Network

Future Scope

- Integrating the model with existing healthcare systems for seamless prediction and early intervention.
- Expanding the dataset to include diverse populations and patient subgroups for improved generalization.
- Developing personalized risk assessment strategies tailored to individual patient characteristics.

Conclusion:

- **Summary of Findings:**

Machine learning enhances early heart disease detection by analyzing key health parameters. Logistic Regression, Random Forest, and SVM were tested, with data preprocessing significantly improving model accuracy.

- **Key Takeaways:**

  - ML models assist in heart disease risk prediction.
  - Feature importance analysis helps in better diagnosis.
  - Accuracy depends on data quality and preprocessing.

- **Final Thoughts:**

Future improvements include real-time monitoring, mobile integration, and deep learning enhancements. AI-driven healthcare solutions can revolutionize early detection and save lives.