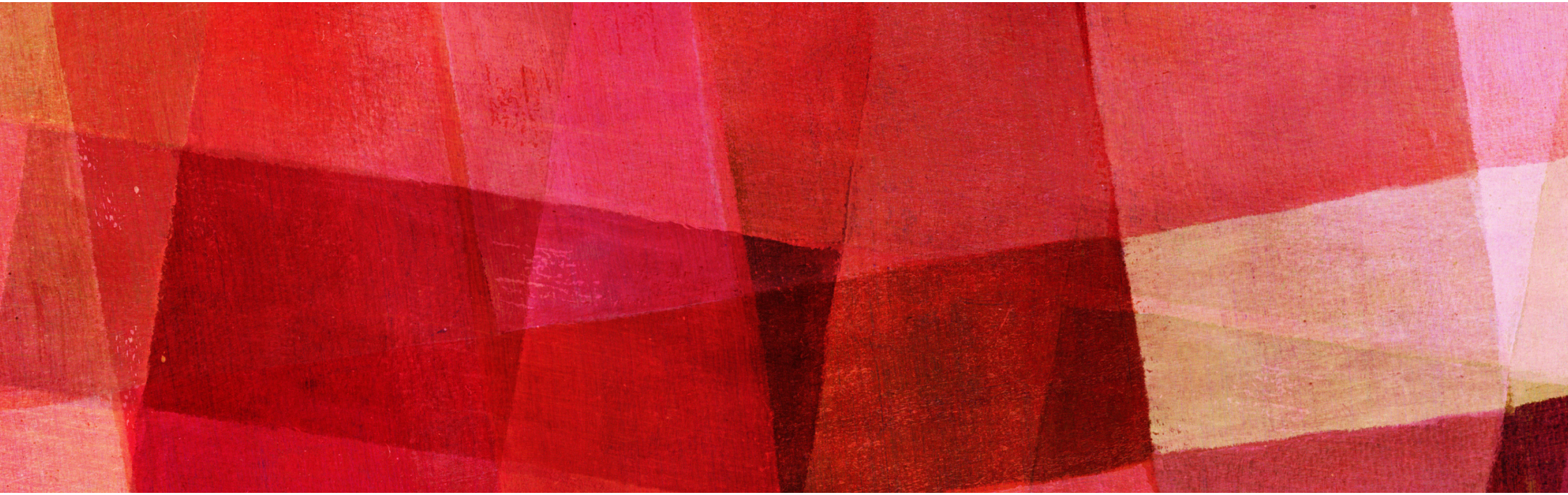
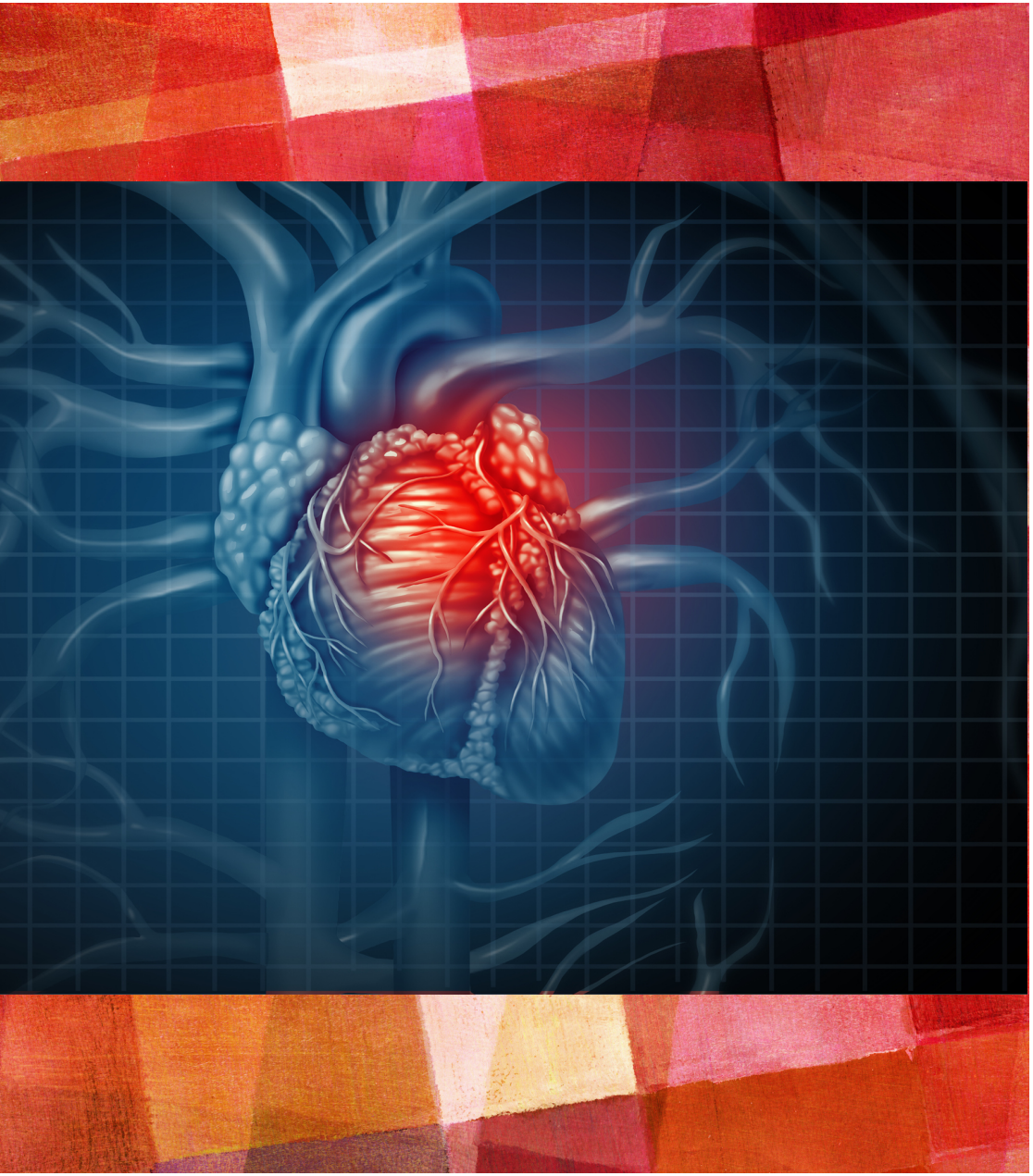


PREDICTION OF HEART DISEASE

Literature Review -K.Saketh Sai Nigam & Diwakar Mohan



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BACKGROUND

- A major source of death and morbidity, heart disease is a serious worldwide health concern. According to the WHO (Rath et al., 2021) 17.8 million people die from heart disease globally per decade.The evaluation of the patient's medical history, physical examinations, laboratory testing, stress tests, and cardiac catheterisation are frequently combined in the identification and diagnosis of heart disease. These diagnostic techniques, however, could not always give a complete picture or might need for intrusive treatments.

- Furthermore, heart disease sometimes manifests without symptoms or with mild signs, making it challenging to recognise those who are at risk or who are in the early stages of the disease.

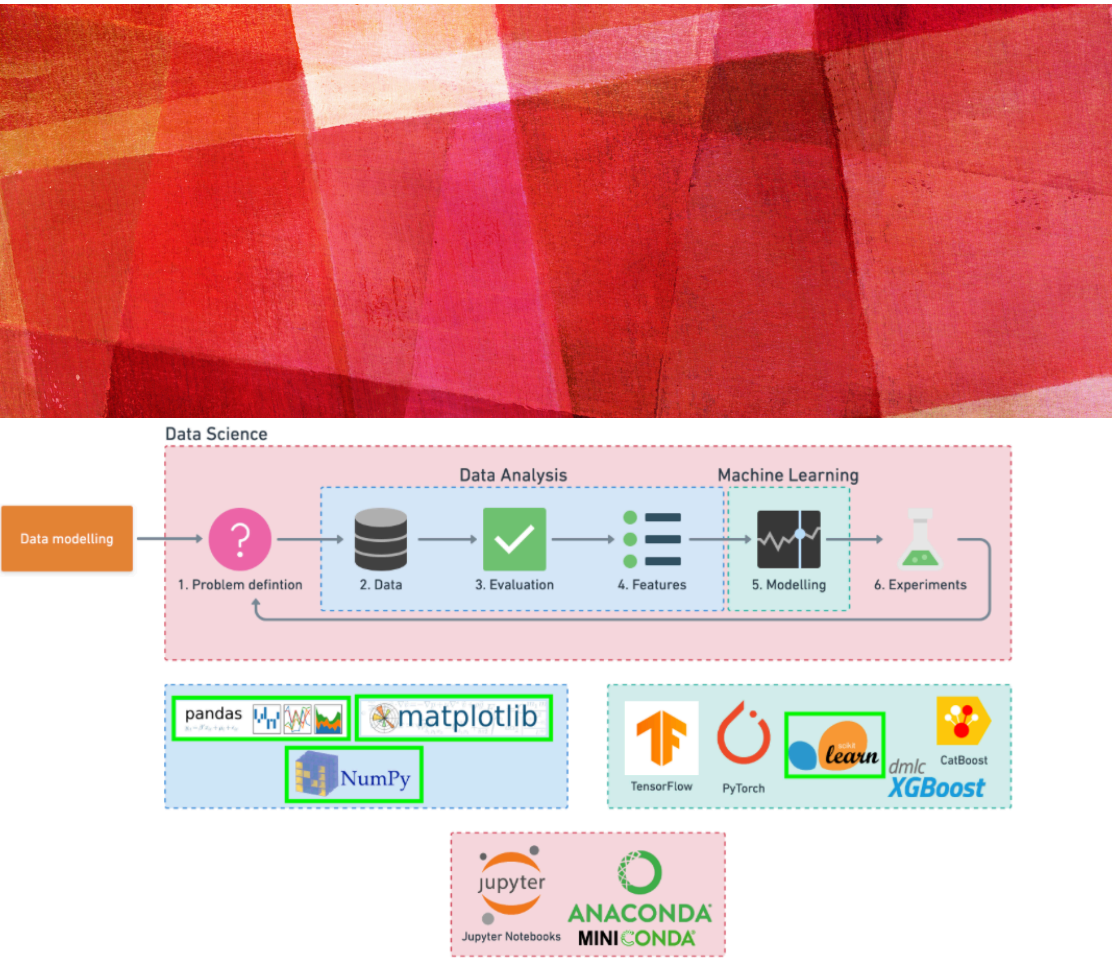
OBJECTIVE

- Given the challenges in diagnosing cardiac illness, there is a growing need for innovative, trustworthy techniques to improve early detection and risk stratification. The goal is to develop prediction models that, uses a variety of clinical data and risk variables to accurately detect cardiac illness at an early stage.

STRATEGY

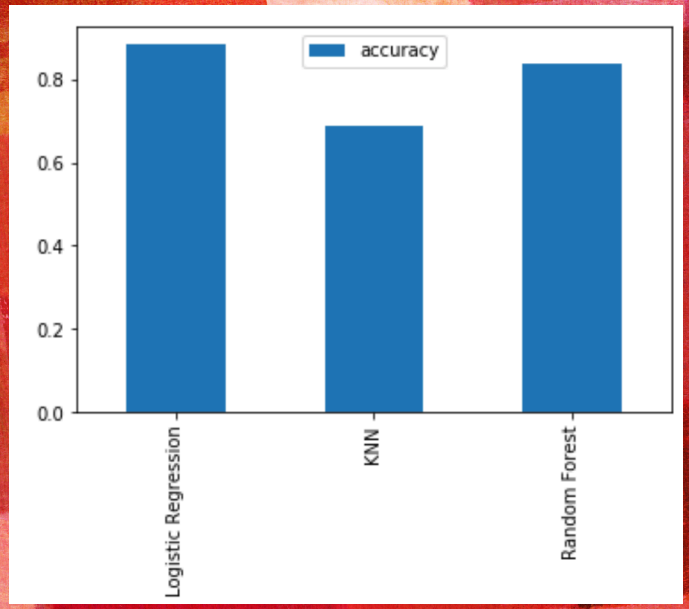
- The current approach we recommend is to identify heart disease by assessing individual risk factors and symptom evaluation. The former entails assessing elements including age, gender, family history, lifestyle decisions (such as smoking, nutrition, and physical activity), and pre-existing medical diseases (such as hypertension, diabetes).

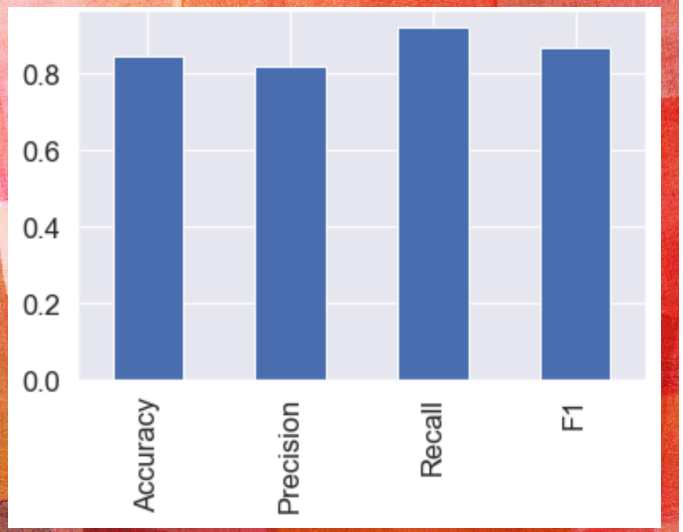
- The later involves analysing Individuals experiencing symptoms such as chest pain, shortness of breath, fatigue, or palpitations should undergo a thorough evaluation to determine if heart disease is the underlying cause. This includes a detailed medical history, physical examination, and specific tests like electrocardiography (ECG) to assess heart function.



METHODOLOGY

- We looked at three models to predict cardiac disease using machine learning. To determine whether or not a person has cardiac disease, algorithms like K means, Random Forrest, and logistic regression have been used. All the three models are most effective at forecasting binary outcomes.
- The odds of the result are determined through logistic regression, which transfers them to a probability ranging from 0 to 1. Random Forest is an effective method for predicting binary outcomes due to the fact that, it can handle intricate correlations and interactions between features. Although K-means is more frequently used for clustering than for binary classification, it can still help forecast binary results subtly.The dataset we received needs to go through preparation, including data standardisation, null value removal or replacement utilising data completeness approaches.
- An essential factor that has to be considered is tuning the hyperparameters in all three models. The logistic regression probability value, the number of decision trees in the random forest, and the number of clusters in the k-means algorithm are some examples of hyperparameters that are tuned using cross validation methods.
- The best model is chosen and applied to predict the presence or absence of heart disease, and its performance is evaluated, based on how well the three models performed in the detection of heart illness.





KEY AREAS OF DISCUSSION

➤The significance of collecting trustworthy datasets with significant properties for heart disease identification.

➤Identifying the most useful characteristics or risk factors related to heart disease.

➤Comparing several machine learning methods for detecting cardiac illness, such as logistic regression, random forest, support vector machines, and neural networks.

➤Assessing the performance parameters (accuracy, precision, recall, F1-score, ROC curve, etc.) to determine how well the selected method performs.

➤Increasing the model's generalisability.

➤Examining the difficulties and factors to be taken into account when implementing machine learning models in clinical practise.

CURRENT TRENDS EXISTING

- Techniques for ensemble learning including stacking, boosting, and bagging are becoming more and more common.To find the most important features for heart disease identification, feature importance analysis is frequently used.

- Heart disease diagnosis uses deep learning methods, notably neural networks. To examine intricate patterns and temporal correlations in medical data, hybrid architectures, Long Short-Term Memory (LSTM) networks, and convolutional neural networks are employed.

CONCLUSION

- Machine learning algorithms have showed considerable potential in the identification of cardiac disease based on the proposed literature. It will shed light on the ongoing research efforts to address challenging cases in heart disease prediction and provide insights into the broader implications of AI models in identifying heart disease with less attributes and at early stages. Continued research, collaboration between researchers and clinicians, and loads of data are crucial for harnessing the full potential of machine learning in improving patient outcomes, reducing healthcare costs, and advancing cardiovascular medicine.

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