VISUAL ANALYSIS OF CARDIAC ARREST PREDICTION

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ABSTRACT

In recent days most of the young people's lose their lives due to cardiac arrest. This happens due to no prior prediction of Cardiac arrest. A heart attack, also known as cardiac arrest, encompasses colorful heart- related diseases and has been the leading cause of death worldwide in recent decades. Several medical data mining and machine literacy technologies are being applied to gather helpful knowledge regarding heart complaint vaticination. If we could able to predict the cardiac arrest prior we can prevent as much lives prior by preventing from disease. To overcome this problem, we are going to develop a model for prediction cardiac arrest. To develop a model for predicting Cardiac arrest we had chosen Artificial Intelligence Technology. The reason why we choose this technology is that it has both Machine Learning and Deep Learning which can handle large amount of data. Apart from handling large number data it can be able to handle picture data also and gives us the accurate prediction value. A visual analysis may directly prognosticate cardiac arrest, making it a potent educational tool for raising public mindfulness of health issues. By prognosticating cardiac arrest before, precautionary way can be taken to save lives, and the dispersion of similar health knowledge can dramatically lower the world mortality rate. As our technical feasibility is quite good, we would reach out results more successfully. Our critical aspects of project can be determined and probability of completing successfully will be reached by using AI and Machine learning techniques.

Keyword: - *Cardiac arrest, Prior prediction, Preventing, Artificial Intelligence Technology and Machine Learning*

1. INTRODUCTION

In recent years, the integration of data-driven procedures and new medical technologies have extremely changed the healthcare field. And also, in recent days most of the young people lose their lives due to cardiac arrest. This happens due to no prior prediction of Cardiac arrest. If we could able to predict the cardiac arrest prior, we can prevent as much lives prior by preventing from disease. The prediction and prevention of life-threatening occurrences such as cardiac arrest is an important element of healthcare. Cardiac arrest, or the sudden halt of efficient cardiac pumping, is a leading cause of death globally. Timely prediction of cardiac arrest can provide crucial information to healthcare providers, allowing them to respond and potentially avert these life-threatening episodes. This happens due to no prior prediction of Cardiac arrest. If we could able to predict the cardiac arrest prior we can prevent as much lives prior by preventing from disease. To overcome this problem, we are going to develop a model for prediction cardiac arrest. To develop a model for predicting Cardiac arrest we had chosen Artificial Intelligence Technology. The reason why we choose this technology is that it has both Machine Learning and Deep Learning which can handle large amount of data. Apart from handling large number data it can be able to handle picture data also and gives us the accurate prediction value. Visual analysis is critical in improving medical practitioners' understanding and interpretation of complex medical data, allowing them to make educated judgments. This study focuses on using visual analytic approaches to improve cardiac arrest prediction. By integrating visualizations with predictive models and medical data, we aim to provide a comprehensive framework for early

prediction. Society can be educated effectively using visual analysis. Increasing people's knowledge of various health conditions can encourage them to take preventative measures. For instance, through earlier cardiac arrest prediction, preventative steps can be done to save human life. Promoting such health information in society has the potential to significantly reduce global mortality. Cardiovascular diseases (CVDs), which kill an estimated 17.9 million people year, are the leading cause of death worldwide, according to the World Health Organization (2021). 85% of these fatalities are caused by heart attacks and strokes. Coronary heart disease, cerebrovascular disease, rheumatic heart disease, and other illnesses are examples of CVDs. In low- and middle-income countries, about three-quarters of all heart-related fatalities take place.

1.1 Importance of Cardiac Arrest Prediction

Cardiac arrest is characterized by a suddenly and unexpectedly stops moving of heart activity, which causes blood flow to stop suddenly and unexpectedly. Given that cardiac arrest frequently happens with little to no warning, quick response and treatment are essential for survival. Machine learning and predictive modelling innovations made recently have showed promise in locating patterns and risk factors related to cardiac arrest. Healthcare workers may be able to predict cardiac arrest in high-risk patients by using these technologies, enabling prompt intervention and better patient outcomes. Cardiac arrest frequently results in admission to the intensive care unit and has a low rate of post-hospital survival. The ability of the current illness severity scores to predict survival for this particular subset of patients is poor. Machine learning entails the development of algorithms that can improve risk estimation by learning from large datasets, though the data used may be biased. Our goal was to use machine learning to predict death following a cardiac arrest admission to an intensive care unit, and then to use an "explainer" model to make the decision-making process transparent.

Figure 1: Cardiac Arrest

1.2 Role of Visual Analysis

A visual analysis may directly prognosticate cardiac arrest, making it a potent educational tool for raising public mindfulness of health issues. The interpretability of the predictions made by predictive models can be improved by integrating visualizations. Medical personnel may be able to spot trends, abnormalities, and potential warning signs that could go unnoticed through conventional tabular data analysis alone with the aid of visual representations of data like time-series plots, heat maps, and interactive dashboards. Healthcare experts can analyze intricate medical data pertaining to cardiac health through visualizations. They can use graphical representations to assess patient vital signs, historical data, and risk factors, making it simpler to spot trends and anomalies. Medical professionals, students, and patients can all benefit from visualizations that explain the importance of cardiac health. Healthcare professionals can better comprehend the dynamics of cardiac arrest prediction with the aid of interactive visual tools that simulate various scenarios. This Visual Analysis Cardiac Arrest Prediction can be used in medical Industries for predicting the Cardiac arrest. While analyzing Visualization of cardiac arrest prediction we can be able to Predict and prevent the cardiac arrest. Medical people like doctors could able to deliver the effects of cardiac arrest through Visualization. On comparing with number prediction of data's, Visualization of predicted data will be very

comfortable for the ordinary people to understand the effects. The cost for consultation will also be reduced and they can predict their probability change within in a short period of time, in order to book an appointment with doctor and waiting for a while in hospital to get consultation. After predicting their prediction probability, they can consult doctor for their perception in order to prevent heart disease.

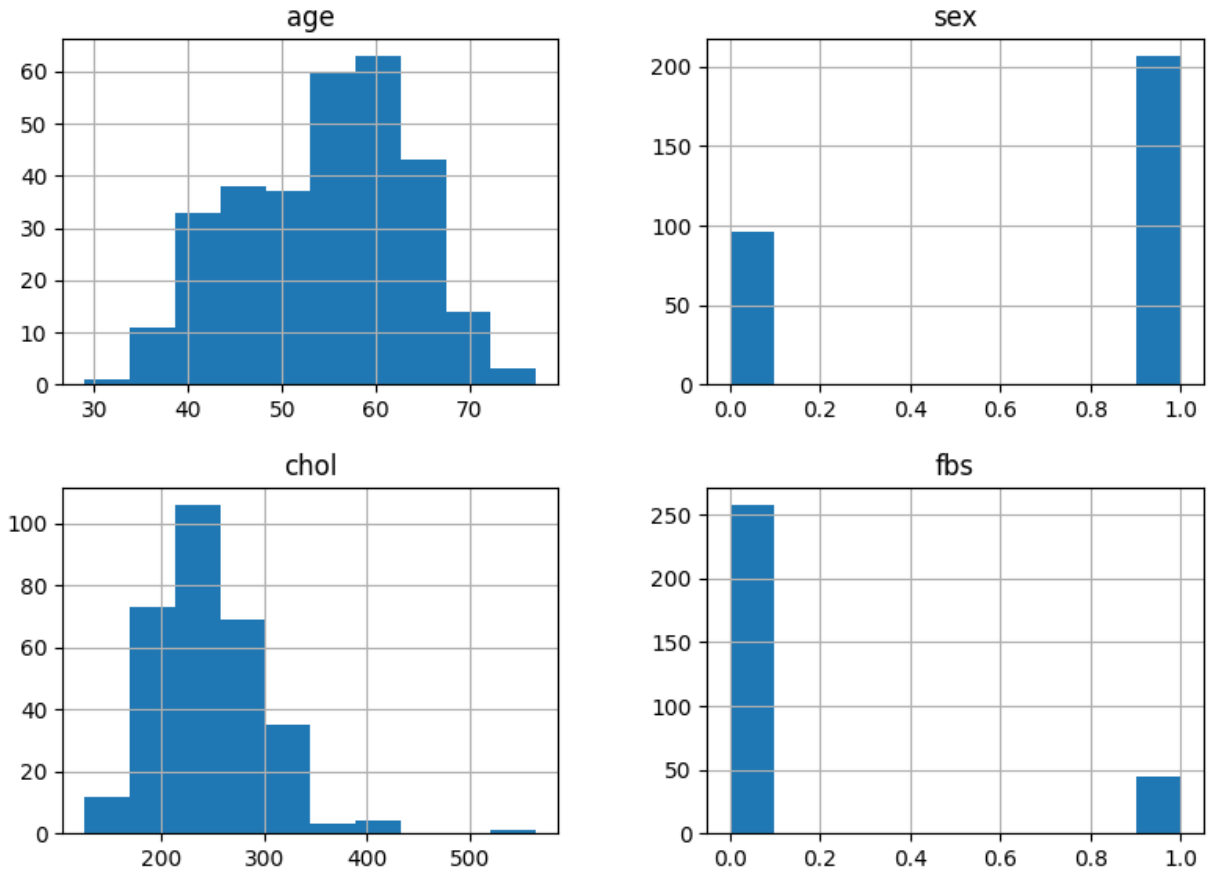

Figure 2: Visual Analysis

2. RELATED WORK

Patients who had visited the ED now tend to be more complex, carry a heavier burden of critical illness, and deal with overcrowded departments and resource constraints. As a result, patients in the ED are susceptible to unnoticed clinical decline, which may result in cardiac arrest in the ED. [1] The identification of critically ill patients at triage and the identification of patients who suddenly deteriorate during their stay in the ED have traditionally been used to identify patients who may advance to ED-based cardiac arrest. Many early warning ratings, however, werecreated and validated for hospitalized patients, a group that is fundamentally different from the triage population at ED's. The effectiveness of triage early warning scores in identifying or avoiding ED-based cardiac arrest has only been examined in a smallnumber of trials.[5] Millions of men suffer from cardiac arrest and other cardiovascular issues, and there are many factors that contribute to this crisis, including people's wellbeing, particularly because of job stress, exhaustion, poor food quality, and an elevated cholesterol level as a result of cardiac disease due to a lack of technology. Every day, several scientific and medical assistance programs are implemented, but each one has unique characteristics, benefits, and drawbacks. This article's objective is to investigate the likelihood of cardiac arrest using different regulated or unregulated variables in particular data sets machine learning algorithms. Various machine learning algorithms were employed in the study, including traditional methods such as logistic regression, support vector machines,decision trees, and random forests, as well as more advanced techniques like neural networks.[6] This study explores various machine learning techniques to predict cardiac arrest in high-risk patients with a history of cardiovascular diseases, aiming to prevent sudden cardiac arrests through early identification and personalized intervention strategies.

2.1 Need for the Study

- Cardiac arrest frequently results in admission to the intensive care unit and has a low rate of post-hospital survival.
- The ability of the current illness severity scores to predict survival for this particular subset of patients is poor.
- Machine learning entails the development of algorithms that can improve risk estimation by learning from large datasets, though the data used may be biased.
- Our goal was to use machine learning to predict death following a cardiac arrest admission to an intensive care unit, and then to use an "explainer" model to make the decision-making process transparent.

2.2 What did the scientists do and discover?

- We examined 1.5 million patients from one of the largest international datasets of patients admitted to intensive care units.
- We analyzed the data of patients who had been admitted after suffering a cardiac arrest and created a number of machine learning algorithms to predict death, which we then compared to preexisting scores.
- We discovered that machine learning models were better at estimating the risk of death, and we were able to use another algorithm to explain the justification for the risk estimate provided for a specific patient.

2.3 What do these results imply?

• The accuracy of estimating survival for intensive care patients after a cardiac arrest can be improved by using machine learning.
• These findings have only been evaluated in a single large group of patients, and should be validated in another separate group, with other predictors added.
• These raw estimates can then be further resolved on a per-patient basis to provide a breakdown to understand the reasoning behind the algorithm's decision, which could help clinicians decide whether to trust the algorithm on a per-patient basis.

3. METHODOLOGY PROPOSED

1. K Neighbor's Classifier
2. Support Vector Classifier
3. Decision Tree Classifier
4. Random Forest Classifier

Figure 3: Comparative Analysis of Four Algorithms

- The project involved analysis of the heart disease patient dataset with proper data processing.
- Our visual model is been trained and tested using the above 4 Algorithms.

- The algorithm which gives the best score for Prediction is used for our project.
- As our technical feasibility is quite good we would reach out results more successfully.
- Our critical aspects of project can be determined and probability of completing successfully will be reached by using AI and Machine learning techniques.

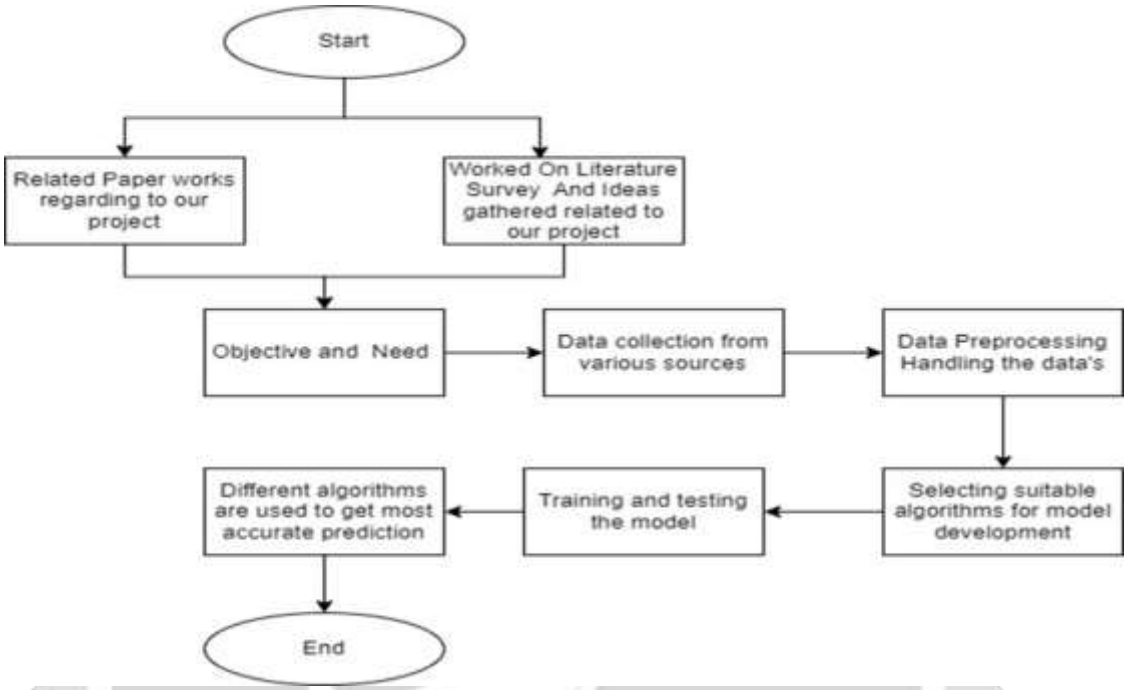

Figure 4: Proposed Work

3.1 Modules

- Preprocessing - Data Preprocessing is of Processing the data which is already been gathered, this process involves processing data values.
- Algorithm Selection- In this process the algorithm selection will be performed based on the accuracy in prediction value such as KNN, SVM, Decision Tree and Random Forest Classifier.
- Model Training- This module involves training the selected object detection algorithm on the pre-processed data. The training process involves optimizing the algorithm's parameters to make it more accurate.
- Model Testing and Evaluation- This Module involves testing the trained object detection model on new set of data or values to evaluate its accuracy and performance.
- Model Integration - This module involves integrating the Prediction model with other applications or systems such as Photo scanning of medical reports.
- Visualization- This Module involves the visualization of cardiac arrest prediction using visualization tool like Power BI.

	age	sex	cp	trestbps	chol	fbs
count	303.000000	303.000000	303.000000	303.000000	303.000000	303.000000
mean	54.366337	0.683168	0.966997	131.623762	246.264026	0.148515
std	9.082101	0.466011	1.032052	17.538143	51.830751	0.356198
min	29.000000	0.000000	0.000000	94.000000	126.000000	0.000000
25%	47.500000	0.000000	0.000000	120.000000	211.000000	0.000000
50%	55.000000	1.000000	1.000000	130.000000	240.000000	0.000000
75%	61.000000	1.000000	2.000000	140.000000	274.500000	0.000000
max	77.000000	1.000000	3.000000	200.000000	564.000000	1.000000

Figure 5: Data Collection

3.2 Tech Equipment's used

Technology:

- Artificial Intelligence
- Machine Learning Algorithms

Languages:

- Python (Pandas and NumPy Library)
- Html & CSS

Tools:

- Google Colab
- Visual Studio Code
- Power BI

4. SOFTWARE ARCHITECTURE

Normalize or standardize the data to ensure consistent scales and improve model performance. Feature engineering: Extract relevant features from the raw data or generate new features to improve prediction accuracy. Prediction Model and Model Training: Implement a machine learning model that predicts the likelihood of cardiac arrest based on the pre-processed data. The model can be based on traditional machine learning algorithms or more advanced deep learning models, depending on the complexity of the data and prediction requirements. The model has been trained and tested by using different machine learning algorithms to predict most accurate prediction level for the dataset. From those prediction value the model which gives more accurate value will be taken for the visualization process.

5. CONCLUSIONS

This Visual Analysis Cardiac Arrest Prediction can be used in medical Industries for predicting the Cardiac arrest. While analyzing Visualization of cardiac arrest prediction we can be able to Predict and prevent the cardiac arrest. Medical people like doctors could able to deliver the effects of cardiac arrest through Visualization. On comparing with number prediction of data's, Visualization of predicted data will be very comfortable for the ordinary people to understand the effects.

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