# Advancing early detection of cardiac arrest using Machine Learning Algorithm

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## Abstract

Cardiac attack is a sudden, unexpected loss of heart function. It occurs when the heart's electrical system malfunctions, causing an irregular heartbeat. This leads to the heart's inability to pump the blood effectively. Machine learning is one of the emerging technologies that has a greater impact. There are a variety of machine learning algorithms that can be used for the early prediction of a variety of diseases. Our motive is to provide an early prediction of cardiac arrest by gathering the details of the user's physical aspects, datasets, and applying multiple machine learning algorithms to predict the percentage occurrence of cardiac arrest.

Machine learning is actively being used today, perhaps in many more places than one would expect. A variety of machine learning techniques are employedin the health care industry to aid in diagnosing and early detection of illnesses. Several elements that lead to stroke are considered in the current investigation. First, we're lookinginto the characteristics of those who are more likely to suffer from a stroke than others. The dataset is gathered and multiple classification algorithms are used to predict the occurrence of a cardiac arrest shortly.

The algorithms are namely K-Nearest Neighbors, ExtremeGradient Boosting and Light Gradient Boosting Machine. By applying these three algorithms, accuracy obtained were 70%, 80% and 83%. The best accuracy was shown inExtreme Gradient Boosting which is of 83 percent. Finally, various preventative steps suchas quitting smoking, avoiding alcohol, and other factors are recommended to reduce the risk of having a stroke.

**Key Terms:** BMI - Body Mass Index, KNN – K Nearest Neighbor, LightGBM – Light Gradient Boosting Machine, ML – Machine Learning, SKLearn – Sci-Kit Learn, SMOTE – Synthetic Minority Oversampling Technique.

## Introduction

Machine learning is the modern science of finding patterns and making predictions from data based on work in multivariate statistics, data mining, patternrecognition, and advanced/predictive analytics. Stroke denies an individual's oxygen andsupplements, which results in the death of dead cells when stroke occurs. It's not onlyvery expensive for the medical treatments and a permanent disability but can at lastprompt demise. By and large, Data Mining assumes an imperative part in the forecast ofillnesses in the medical care industry. A significant subject of AI in medication is utilizedin this project.

A machine learning model would take patient's information and propose abunch of suit expectations. The framework can remove concealed information from a chronicled clinical data set and can anticipate patients with infection and utilize theclinical profiles like Age, blood pressure, Glucose, Alcohol consumption and so forth it can foresee theprobability of patients getting an illness. Grouping calculations are utilized with numberof properties for expectation of illness.

The clinical record additionally comprises hisclinical history of illnesses and strokes he has had a stroke before too and we take all thatdata and train the machine dependent on various models, for example, Decision tree,SVM, Logistic regression, and so on. To address the issue of deals expectation of things dependent on client's future requests in various Big Marts across different areas diverse Machine Learning algorithms like XGBoost, LightGBM and K-Nearest Neighbors. Hence, they were the best suited model for stroke prediction and can feasibly be used byphysicians to predict cardiac arrest in real world.

## Literature Survey

"Effective Feature Engineering Technique for Heart Disease Prediction with Machine Learning (2023)"

Abstract:

This model is based predicting the various heart diseases using various machine learning algorithms and displays the performance comparison of various machine learning algorithm in predicting the diseases using PCHF technique. This approach is to enhance the heart failure detection based on patients' health parameters along with machine learning. The main disadvantage is the use of limited prominent features.

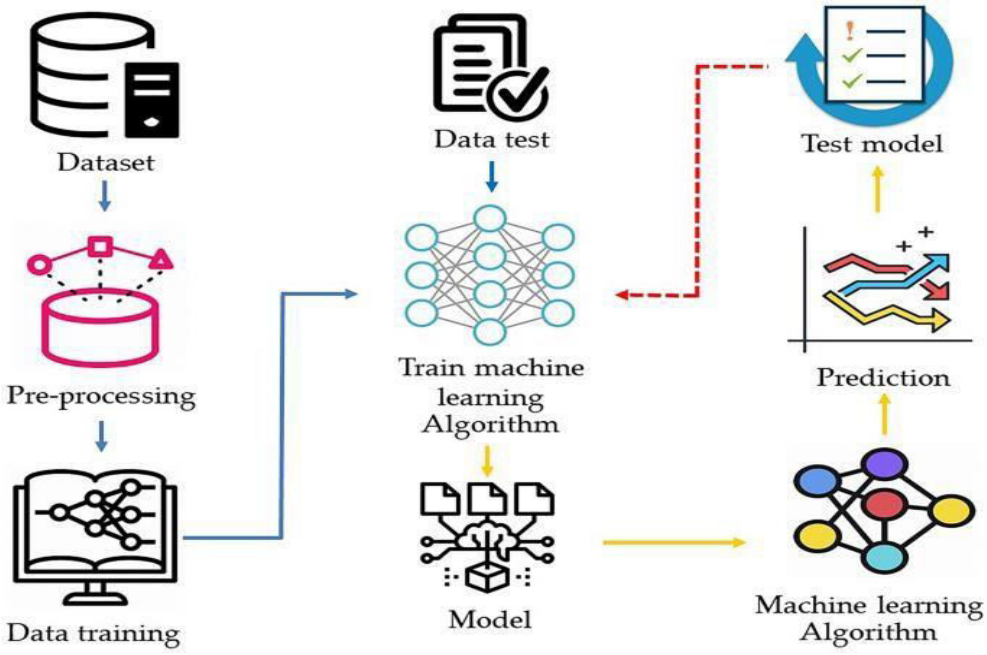
## System Design

The dataset is the collection of data that is used to train and evaluate the machine learning model. It typically includes features such as age, gender, medical history, lifestyle factors, and other relevant information that may contribute to the risk of cardiac arrest

Data preprocessing involves preparing the dataset for use in the machine learning model. This may include cleaning the data, removing outliers and errors, filling in missing values, and scaling or normalizing the data.

The training dataset is a subset of the overall dataset that is used to train the machine learning model. The model learns from the patterns in the training dataset to make accurate predictions.

The test dataset is a separate subset of the overall dataset that is used to evaluate the performance of the machine learning model. It is used to measure the accuracy of the model's predictions on new data that it has not seen before.




Model selection involves choosing the appropriate machine learning algorithm for the task. Commonly used algorithms for cardiac arrest prediction include logistic regression, decision trees, random forests, and support vector machines.

Model evaluation involves testing the performance of the machine learning model using the test dataset. Common metrics used to evaluate the model include accuracy, precision, recall, and the area under the receiver operating characteristic curve.

Once the machine learning model has been trained and evaluated, it can be used to make predictions on new data. In the case of cardiac arrest prediction, the model can be used to predict the risk of cardiac for a given patient based on their demographic and medical information.

The result of the machine learning model is the prediction of cardiac arrest risk for a given patient. This information can be used by clinicians to make more informed decisions about patient care, such as recommending lifestyle changes or prescribing medication to reduce the risk of cardiac arrest.

## CONCLUSION

Upon the observation from the data processing, the glucose level acts as an major factorfor the future stroke risk. Glucose level is directly proportional to the cardiac arrest risk. Therefore maintaining average range of glucose level is much more important. Nowadays, every human needs to know how to handle the work and life pressure, since work pressure also leads to increase the risk of cardiac arrest in a peak. To lead a peaceful life, every person should need to manage a good and even a better health condition in both physical and mental way.

## FUTURE ENHANCEMENTS

This project helps to predict the cardiac arrest risk using prediction model in older people and forpeople who are addicted to the risk factors are mentioned in the project. In future the sameproject can be extended to give the update in stroke risk percentage using the output of current project. This project can also be used to find the stroke probabilities in young people and underage by collecting respective risk factor information’s and doctor consulting.

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