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# Efficient Heart Attack Risk Prediction using Deep Learning

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**ABSTRACT:** Heart Disease forecast is treated as most confounded task in the field of medical sciences. Along these lines there emerges a need to build up a choice emotionally supportive network for identifying heart problems of a patient. In this paper, we propose effective hereditary calculation half breed with deep learning approach for heart disease expectation. Today clinical field have made considerable progress to treat patients with different sort of infections. To accomplish a right and practical treatment and emotionally supportive networks can be created to settle on great choice. Numerous emergency clinics use clinic data frameworks to deal with their medical services or patient information. These frameworks produce gigantic measures of information as pictures, text, outlines and numbers. Tragically, this information is seldom used to help the medical growth. There is a greater part of concealed data in this information that isn't yet investigated which offer ascent to a significant inquiry of how to make valuable data out of the information. So there is need of making an incredible venture which will assist experts with anticipating the heart issues before it happens. The principle objective of this paper is to build up a model which can decide and extricate obscure information related with heart problems from a past heart information base record. It can tackle muddled questions for recognizing heart disease and subsequently help clinical experts to settle on savvy clinical decision.

**KEYWORDS:** Heart Attack, deep Learning, convolution neural network (CNN), ECG,

## I. INTRODUCTION

The primary purpose behind death around the world, including South Africa is respiratory failure sicknesses and conceivable location at a prior stage will forestall these assaults. Clinical specialists produce information with an abundance of covered data present, and it's not utilized viably for forecasts. Therefore, the examination changes over the unused information into a dataset for forming utilizing diverse information mining strategies. Individuals kick the bucket having experienced indications that were not taken into contemplations. There is a prerequisite for clinical experts to characterized coronary illness before they happen in their patients.

The highlights that expansion the odds of respiratory failures are smoking, absence of actual activities, hypertension, elevated cholesterol, unfortunate eating routine, unfavorable utilization of liquor, and high sugar levels . Cardio Vascular Disease (CVD) comprises coronary heart, Cardiovascular or Stroke, hypertensive coronary illness, innate heart, fringe supply route, rheumatic coronary illness, and incendiary coronary illness.

AI is an information disclosure procedure to inspect information and exemplify it into helpful data. The flow research means to gauge the likelihood of getting coronary illness given patient informational index. Predictions' and depictions are head objectives of information mining; by and by Prediction in information mining includes properties or factors in the informational collection to find obscure or future state estimations of different ascribes. Portrayal stress on finding designs that depicts the information to be deciphered by people.

## II. LITERATURE SURVEY

This project uses a neural network to estimate the level of risk of heart disease to create an accurate heart disease prediction method (EHDPS). The device uses 15 medical criteria for estimation, including age, sex, blood pressure,

cholesterol and obesity. The EHDPS anticipates the probability of heart attack in patients. It permits the establishment of important information, e.g. links between cardiovascular variables and patterns[1].

The medical world remains rich in facts but poor in expertise. The medical services have a wealth of data available. However, effective computational methods are not available to help spot secret data connections and patterns. Disease is a term for a wide variety of body-related curing disorders. This health conditions define the unexpected conditions of health that control all aspects of the body directly. The study of the various forms of general corporal problems is carried out by medical data mining techniques including association rule mining, grouping and clustering [2].

This thesis encourages a consultation with end users and online. Here the author suggests a platform that helps clients to take advantage of the clever social intelligent system in their medical issues online. The frame is supported by various symptoms and underlying disorder or illness. The framework also helps people to share symptoms and concerns. In order to obtain new and insightful insights into these important biomedical datasets, data mining as a research area already has proven capable of finding secret trends, analyses and information used in various fields of research and has now gained attention every day among researchers and scientists. Another aspect of data mining is the detection of new information relating to biomedicine and wellbeing to improve clinical decision-making[3].

Authors compared the various methods of data classification and their estimation of chronic kidney disease thoroughly in this report. Authors equate success indicators such as RCO, Kappa statistics, RMSE and MAE to J48, Naïve Bayes, and Random Forest, SVM and k-NN classifiers with the use of the WEKA tool. Authors have contrasted these classifiers with different accuracy measurements such as TP rate, FP rate, precision, recall and WEKA f-measure. Results of the experiment suggest that random forest classification has greater accuracy of classification than other classification data for chronic kidney disease [4].

The author suggests a scheme which is based on a mixture of various methods of data mining, such as clustering, classification etc. The patient's conditions will be determined by the theory formalised based on test findings and patient's symptoms before the medication for the dominant illnesses is prescribed. Our system's key purpose is to help physicians in diagnosing the patient by evaluating the evidence and information available [5].

For a multitude of uses, data mining methods are used. Data mining plays a vital part in disease prediction in the healthcare sector. The patient should be expected to diagnose a disease number of checks. However, the number of experiments can be minimised using data mining technology. In time and efficiency this shortened measure plays a significant role. These paper analyses methods for data mining that can be used in various forms of disease prediction. This study examined scientific papers focusing primarily on the prediction of heart and diabetes, breast cancer and so on [6].

The analysis of various types of heart-driven problems is focused on medical data mining methods such as association rule-mining, grouping, clustering. A central challenge in data mining is grouping. This work includes a database of records, each with a single class name, and a classifier provides a short and unambiguous description for each class which can be used to identify successive records. Several common classifiers create decision-making bodies for model groups. The data classification is based on the MAFIA algorithm that results in precise analysis, estimation and comparison of the data using entropy-based cross-validation and partitioning technique [7].

Chronic kidney diseases (CKD) are a steady decline over several months or years of renal function. The most prominent causes of chronic renal disease are diabetes and high blood pressure. The main purpose of this study is to assess the impairment of the renal function by using the classification algorithm on the test results obtained from the medical patient's study. The aim of the work is to reduce the diagnostic time by using classification algorithms and to increase diagnostic accuracy. The proposed work discusses the grouping of multiple phases according to their magnitude into chronic kidney disease. The experiment is carried out with various algorithms such as the Network for Back-Propagation, Radial Bases and Random Forest [8].

### III. PROPOSED METHODOLOGY

We are going to recommend a novel The prediction mechanism for a cardiovascular disease high risk prediction is proposed that learns first deep characteristics and trains those learned characteristics. If trained with all attributes and the same training samples, the classifier outperforms all other classifiers. The statistically important increase in results has also been seen. Due to inadequate samples for accurate mapping between features and class labels, it is difficult to predict cardiovascular disease using a poor population. Current literature generally manages this role by creating and selecting handcrafted features.

#### A. Architecture

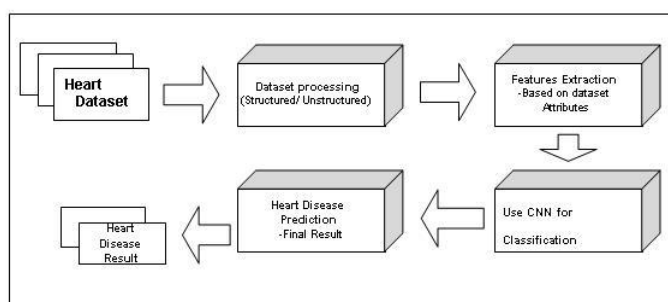


Fig. 1. Proposed System Architecture

Heart data collection: in this system use Kaggle heart disease dataset.

1. age - age in years
2. sex - (1 = male; 0 = female)
3. cp - chest pain type
4. trestbps - resting blood pressure (in mm Hg on admission to the hospital)
5. chol - serum cholestoral in mg/dl
6. fbs - (fasting blood sugar) (1 = true; 0 = false)
7. restecg - resting electrocardiographic results
8. thalach - maximum heart rate achieved
9. exang - exercise induced angina (1 = yes; 0 = no)
10. oldpeak - ST depression induced by exercise relative to rest
11. slope - the slope of the peak exercise ST segment
12. ca - number of major vessels (0-3) colored by flourosopy
13. thal - 3 = normal; 6 = fixed defect; 7 = reversable defect
14. target - have disease or not (1=yes, 0=no)

Data processing: To work with categorical variables, we should break each categorical column into dummy columns with 1s and 0s.

Let’s say we have a column Gender, with values 1 for Male and 0 for Female. It needs to be converted into two columns with the value 1 where the column would be true and 0 where it will be false. Take a look at the Gist below.

To get this done, we use the get dummies() method from pandas. Next, we need to scale the dataset for which we will use the standard Scaler. The fit transform() method of the scaler scales the data and we update the columns.

Feature Extraction: Extract features using convolution layer.Convolution is the first layer to extract features from an input attributes. Convolution preserves the relationship between pixels by learning features using small squares of input data. Convolution of an image with different filters can perform operations such as edge detection, blur and sharpen by applying filters.



Classification: we classify data using softmax classifier. B. Proposed Algorithm

1. CNN(Convolution neural network) Convolution Layer

Convolution is the first layer to extract features from an input attributes. Convolution preserves the relationship between pixels by learning features using small squares of input data. Convolution of an image with different filters can perform operations such as edge detection, blur and sharpen by applying filters.

Pooling Layer

Pooling layers would reduce the number of parameters when the data are too large. Spatial pooling also called subsampling or down sampling which reduces the dimensionality of each map but retains important information.

IV. RESULTS AND ANALYSIS

The suggested cardiac disease prediction. precision was compared and seen graphically on the number of samples. See the following graph and table showing the outcome of CNN classification methodology for the prediction of cardiovascular disease.

Compared to the current strategies the average accuracy of CNN classified technology is above 90%. Therefore the performance of our planned method is higher than the current one. This work also provides a greater estimate of heart disease than the current system.

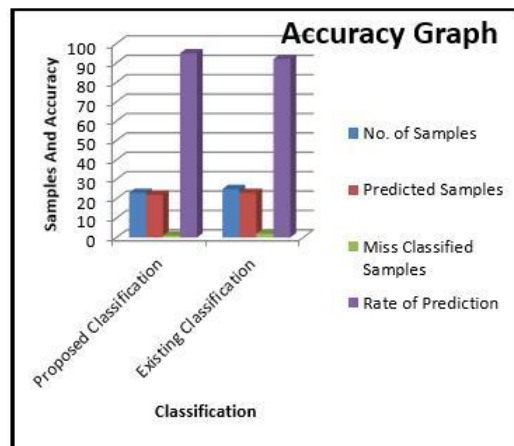


Fig. 2. Classification Result

Algo	NOS	PS	MCS	A
CNN	28	22	2	92%
Naive Bayes	25	19	3	88%

where,

Algo - Algorithm

NOS - No of samples

MCS - Miss Classified samples

A – accuracy



## V. CONCLUSION

### Fully Connected Layer

In this layer Feature map matrix will be converted as vector (x1, x2, x3, . . . ). With the fully connected layers, we combined these features together to create a model.

### Softmax Classifier

Finally, we have an activation function such as softmax or sigmoid to classify the outputs.

The experiment is organized with the dataset of Heart attack by deep learning algorithms. Heart Disease dataset is taken and analysed to predict the asperity of the disease. A deep Learning approach is used to predict the heart attack risk. The data in the dataset is pre-processed to make it suitable for classification. The deep Learning approach to generate efficient classification rules is proposed. To perform classification task of medical data, the network is trained using Convolutions technique. deep learning technique is a multilayer perceptron that is the special design for identification of heart attack information.

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