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Heart Disease Prognosis Using Artificial Intelligence

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ABSTRACT

Machine learning tools are providing successful results in disease diagnosis. In the diagnosis of heart disease, the Machine Learning Techniques has been used to show the acceptable levels of accuracy. Human heartbeat has been asserted to provide promising markers of CHF. For diagnosing heart disease, it can provide solution to complex queries and thus assist healthcare practitioners to make intelligent clinical decisions which traditional decision support systems cannot. By providing this treatment, it also helps to reduce the treatment costs. To predict the heart disease of a person, the CNN is used, which is one of the classification technique of deep learning. In the existing system, they have used random forest algorithm which is one the technique of machine learning. It could provide the accuracy up-to 80%. But by using this conventional neural network, the accuracy level could be more than 90% (i.e.) the efficiency level is increased. Each person has different level of Cholesterol, Blood pressure, FBS, Resting Electrocardiogram, Pulse rate in their body. we can predict the heart disease, by using the medical terms such as blood pressure, type of chest pain, blood sugar, cholesterol. Rather than using machine learning, Deep learning algorithm will provide the result accurately.

Keywords : Artificial Intelligence, Machine Learning, Neural Network, Random Forest, Convolutional Neural Network.

I. INTRODUCTION

The artificial intelligence techniques are useful for predicting various diseases [1] in medical field. Cardiovascular diseases are one of the highest- flying disease. According to world health organization about more than 12 million deaths occurs worldwide, every year due to heart problems. It is also one of the fatal diseases in India, it causes maximum casualties. The diagnosis of this disease is intricate process. It should be diagnosed accurately. Due to limitation in potential of the medical experts and their unavailability at certain places, put their patients at high risk. Normally, it is diagnosed using intuition by the medical specialist. It would be highly advantageous if the techniques are integrated with the medical information system.

Disease diagnosis plays an important role in deep learning. Healthcare organizations [2] can reduce costs by accomplishment of computer based data and decision support systems. Healthcare service data are very huge as it incorporates patient records, resource management information and updated information. Human services associations must have capacity to break down information. Treatment records of many patients can be stored up in computerized. There are various reasons for the occurrence of Heart Diseases, it can be frequently investigated through the Attribute Set related to different test results of Patients. The different sources of medical.

Data are Medical Analysis, Diagnostic Centers, Past Case Sheets, Doctor Prescriptions. Heart diseases can be predicted through the analysis made on fasting blood sugar, Maximum heart rate achieved. Based on the values of the attributes, it makes indexes for all associated frequent item sets. The presence of these item sets depends on the threshold value specified. Deep learning techniques like convolutional neural network algorithm is used for validating the accuracy of medicinal data. These algorithms can be used to optimize the data storage for practical and legal purposes.

Heart Disease Prediction helps in preventing patient's life from risks. To make this possible there will be different modules handled by the application and it will be collecting all the data required to predict the Heart Disease of a respective Patient. The main objective is to develop a system that will help to contribute our Society. This become easy for us to compute our health status and make the people healthier. All the collected data from the patient's report will be presented in the Graph format. It will be helpful in analyzing.

To predict the disease, it uses the Naive Bayes, K-nearest neighbor, Random forest and Decision tree. These algorithms have been used for analyzing the heart disease [3-6]. Convolutional neural network is the deep learning algorithm used for classifying these medical data and these data are calculated using delta rule. Convolutional Neural Network algorithm performs well than other algorithms. It is used in the application to make it more effective.

II. RELATED WORK

The current review contributes with an extensive overview of decision support systems [1] in diagnosing heart diseases in clinical settings. The investigators independently screened and abstracted studies related to heart diseases-based clinical decision support system (DSS) published until 8-June-2015 in PubMed, CINAHL and Cochrane Library. The data extracted from the twenty full-text articles that met the inclusion criteria was classified under the following fields; heart diseases, methods for data sets formation, machine learning algorithms, machine learning- based DSS, comparator types, outcome evaluation and clinical implications of the reported DSS. Out of total of 331 studies 20 met the inclusion criteria. Most of the studies relate to ischemic heart diseases with neural network being the most common machine learning (ML) technique. The study categorizes the ML techniques according to their performance in diagnosing various heart diseases. It categorizes, compares and evaluates the comparator based on physician's performance, gold standards, other ML techniques, different models of same ML technique and studies with no comparison. It also investigates the current, future and no clinical implications.

One of the most important applications of machine learning systems [2,8,10] is the diagnosis of heart disease which affect the lives of millions of people. Patients suffering from heart disease have lot of independent factors such as age, sex, serum cholesterol, blood sugar, etc. in common which can be used very effectively for diagnosis. In this paper an

Extreme Learning Machine (ELM) algorithm is used to model these factors. The proposed system can replace a costly medical checkups with a warning system for patients of the probable presence of heart disease. The system is implemented on real data collected by the Cleveland Clinic Foundation where around 300 patients information has been collected. Simulation results show this architecture has about 80% accuracy in determining heart disease.

Recent advances in wearable and/or biomedical sensing technologies [4,9] have made it possible to record very long-term, continuous biomedical signals, referred to as biomedical intensive longitudinal data (ILD). To link ILD to clinical applications, such as personalized healthcare and disease prevention, the development of robust and reliable data analysis techniques is considered important. In this review, we introduce multiscale analysis methods for and the applications to two types of intensive longitudinal biomedical signals, heart rate variability (HRV) and spontaneous physical activity (SPA) time series. It has been shown that these ILD have robust characteristics unique to various multiscale complex systems, and some parameters characterizing the multiscale complexity are in fact altered in pathological states, showing potential usability as a new type of ambient diagnostic and/or prognostic tools. For example, parameters characterizing increased intermittency of HRV are found to be potentially useful in detecting abnormality in the state of the autonomic nervous system, in particular the sympathetic hyperactivity, and intermittency parameters of SPA might also be useful in evaluating symptoms of psychiatric patients with depressive as well as manic episodes, all in the daily settings.

III. SYSTEM MODEL

In the system, first it process the data from the data set for good predicting capability. It handles all missing values and investigates each possibility. If an attribute has more than 5% of missing values, then the records should be deleted. While Random Forest is a good option (fast, robust and easier to understand) for local search ability but it didn't work well with global clusters. Even its performance is un-consistent at different initial partitions, it produces different results at different initial partitions.

Initially, it will collect all the required data from the patient to make the analyze using the relevant algorithms of the application. Once, all the data has been gathered the report will be generated. The drawbacks of the existing system have been overcome by implementing CNN to make the analysis. Existing systems had used only one algorithm each. In this system CNN algorithm has been used and that makes the system more effective than the previous one. The system is less cost product with highest accurate output results. It can predict and give accurate results it helps in saving the life of the patient.

By using Machine learning techniques, we propose a system for heart disease prediction. To generate strong association rules, we have applied frequent pattern growth association mining on patient's dataset. The method will help doctor to explore their data and predict heart disease. There is no previous research that identify heart disease, which Machine learning technique can provide more reliable accuracy in identifying suitable treatment for heart disease patients. Practical use of healthcare database systems and knowledge discovery is difficult in heart disease diagnosis. The heart beat parameter in ECG signal is noticed and mean heart rate, standard deviation and frequency domains (e.g., LF and HF powers) are derived. Finally, these and further features are fed into a standard Support Vector Machines (SVM) to predict mortality in CHF patients at a single-subject level. But it has some accuracy reduction because of some arrhythmia signals are come to interrupted the ECG.

In Proposed System, we are applying machine learning techniques in identifying suitable treatments for heart disease patients. Apply single techniques to heart disease diagnosis Daggle dataset to apply convolution neural network establish baseline accuracy in the diagnosis of heart disease patients.
The convolution neural network is mainly applicable when the dimensionality of the inputs is high. Convolution neural network model recognizes the characteristics of patients with heart disease. It shows the probability of each input attribute for the predictable state.

Neural network has the most recent technology taken to evaluate the training data. It is the one of supervised neural network multi- layer perceptron for prediction. Multi-layer perceptron contains three part input, hidden layer and output layer. The trained data taken as input data, this input each is multiplied with each weight and go to hidden layer and then output. Output layer is depending on the weight's and previous data.

Multi-layer Perception is just that, a network that is comprised of many neurons, divided in layers. These layers are divided as follows:

The input layer, where the input of the network goes. The number of neurons here depends on the number of inputs we want our network to get. One or more hidden layers. These layers come between the input and the output and their number can vary. The function that the hidden layer serves is to encode the input and map it to the output. It has been proven that a multi-layer perceptron with only one hidden layer can approximate any function that connects its input with its outputs if such a function exists.
The output layer, where the outcome of the network can be seen. The number of neurons here depends on the problem we want the neural net to learn. The Multi-layer perceptron differs from the simple perceptron in many ways. The same part is that of weight randomization. All weights are given random values between a certain range, usually [- 0.5,0.5]. Having that aside though, for each pattern that is fed to the network three passes over the net are made.

IV. PROPOED SYSTEM IMPLEMENTATION

Implementation is the stage in the project and the theoretical design is turned the program into a working system. The most crucial stage is achieving a successful new system and giving a user confidence in that the new system will work efficiently and effectively in the implementation stage. The program will be tested by giving the sample data set of the user to ensure that it predicts correctly. The data will be collected from the patient first and it will be entered in the system for the Medical Analysis. The medical records of the patient can be viewed and it will be used to predict the heart disease.

The analysis report should get generated by taking the right values and the result should be generated based on the algorithm it is used in the system. During the testing, the errors will be found initially and it should get corrected to bring the right prediction. In the system, false prediction of a heart disease is an issue and it shouldn't happen in the system. The data has to be reviewed and the errors should get corrected to bring the right prediction of the heart disease. The produced report has to be tested with the algorithm and it has to detect the errors if it has any in the produced result. Errors in the report have to be corrected, once if it is verified with the algorithm manually.

a. Creating a user requirement system

The developed system should meet the requirement of the patients that is it has to predict the heart disease based on their recorded health information.

b. Training Data Set

The system can be used efficiently only if the data set is trained. A system with dummy records and value, the analysis has to be done based on that. Doctor's has to be trained to use the system in an efficient manner.

c. Tested data and preprocessing

The system uses 15 medical parameters such as age, sex, blood pressure, cholesterol, and obesity for prediction. The EHDPS predicts the likelihood of patients getting heart disease.The obtained results have illustrated that the designed diagnostic system can effectively predict the risk level of heart diseases.

It is the alignment of the data.Data Preprocessing plays a significant role in Data Mining.The training phase in the Data Mining during Knowledge Discovery will be very difficult if the data contains irrelevant or redundant information or more noisy and unreliable data.The medical data contain many missing values. So preprocess is an obligatory step before training the medical data. A total of 303 instances are trained before preprocessing.

d. Feature Extraction

It is worth noticing that most of the real-life data contains more information than it is needed to build a model, or the wrong kind of information.Noisy or redundant information makes it more challenging to extract the most meaningful information.Feature selection which refers to the process of reducing the inputs for processing and analysis, or finding the most meaningful subset of information, is eff ective for the prediction performance. Feature selection does not only improve the quality of the model but also makes the process.

e. Multilayer Perceptron

With one or more layers between input and output layer, MLP is a feed forward neural network. It is called as feed forward because the data flows in one direction from input to output layer (forward). Nodes that are no target of any connection is called input neurons, while nodes that are no source of any connection is called output neurons. A MLP can have more than one output neuron. The way the target values (desired values) of the training patterns are described will determine the number of output.

f. CNN

Finally we predict that the person have an heart disease or not using Conventional neural network by using the features of cholesterol, resting blood pressure, fasting blood sugar, thalassemia, chest pain type etc., This model could answer complex queries, each with its own strength with ease of model interpretation and an easy access to detailed information and accuracy

V. CONCLUSION

Decision Support in Heart Disease Prediction System is developed using multi-layer perceptron Classification. The system extracts hidden knowledge from a historical heart disease database. This model could answer complex queries, each with its own strength with ease of model interpretation and an easy access to detailed information and accuracy. The system is expandable in the sense that more number of records or attributes can be incorporated and new significant rules can be generated using underlying Deep learning technique. In Proposed System, we are applying deep learning techniques in identifying suitable treatments for heart disease patients. Apply the techniques like conventional neural networks to establish the heart disease diagnosis kaggle dataset to achieve baseline accuracy in the diagnosis of heart disease patients. The conventional neural network is mainly applicable when the dimensionality of the inputs is high. Conventional neural network model recognizes the characteristics of patients with heart disease. It shows the probability of each input attribute for the predictable state.Here the datasets

are trained manually through code,but in future there is a possibility to train the datasets automatically with the new features.

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