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Heart Disease Prediction and Prevention System

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Abstract: *The healthcare domain is one of the prominent research fields in the current scenario with the rapid improvement of technology and data. It is difficult to handle the huge amount of data of the patients. It is easier to handle this data through Big Data Analytics. There are a lot of procedures for the treatment of multiple diseases across the world. Machine Learning is an emerging approach that helps in prediction, diagnos of a disease. This paper depicts the prediction of disease based on symptoms using machine learning. Machine Learning algorithms such as Naive Bayes, Decision Tree and Random Forest are employed on the provided dataset and predict the disease. Its implementation is done through the Python programming language. The research demonstrates the best algorithm based on their accuracy. The performance of the given dataset determines the accuracy of an algorithm.*

Keywords: ECG Classification, Convolutional neural network(CNN), heart diseases.

I. INTRODUCTION

Overview:

At present, when one suffers from a particular disease, then the person has to visit the doctor which is time-consuming and costly too. Also if the user is out of reach of doctors and hospitals it may be difficult for the user as the disease can not be identified-fied. So, if the above process can be completed using an automated program which can save time as well as money, it could be easier for the patient which can make the
process easier. There are other Heart-related Disease Prediction Systems using data mining techniques that analyze the risk level of the patient. heart Disease Predictor is a web-based application that predicts the heart disease of the user concerning the symptoms given by the user. heart Disease Prediction system has data sets collected from different health-related sites. With the help of a heart Disease Predictor, the
user will be able to know the probability of the disease with the given symptoms. As the use of the internet is growing every day, people are always curious to know different new things. People always try to refer to the internet if any problem arises. People have access to the internet than hospitals and doctors. People do not have immediate options when they suffer from a particular disease. So, this system can be helpful to people as they have access to the internet 24 hours.

II. RELATED WORK

Various methods are there for ECG classification based on ECG signals processing techniques such as wavelet transform [4], statistical [5], and hidden Markov models [7],and recent techniques like artificial neural networks (ANNs)[8], support vector machines (SVM) [9]. To achieve high accuracy and a compression ratio of an ECG signal DCT algorithm is used so that DCT coefficients are obtained [10].
Normally speaking, inter-patient disparities of the ECG signals as they don't practice well and thus they typically show a common issue of having an irregular presentation. Due to this, the system becomes untrustworthy and hence can't be used globally it also has high differences in accuracy for the bigger database. To address such insufficiencies and disadvantages, in this paper, the proposed system gives an
ECG classification approach based on 1D Convolutional Neural Networks (CNNs), [11],[12]. In this paper, the proposed system classifies the heartbeat differently, so there is no need for feature extraction and processing manually. The final output is divided into 4 classes named class 1(Normal),class 2 Left bundle branch block (LB), class 3 Right bundle branch block (RBBB) and class 4 (Premature ventricular contraction).

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III. PROPOSED SYSTEM

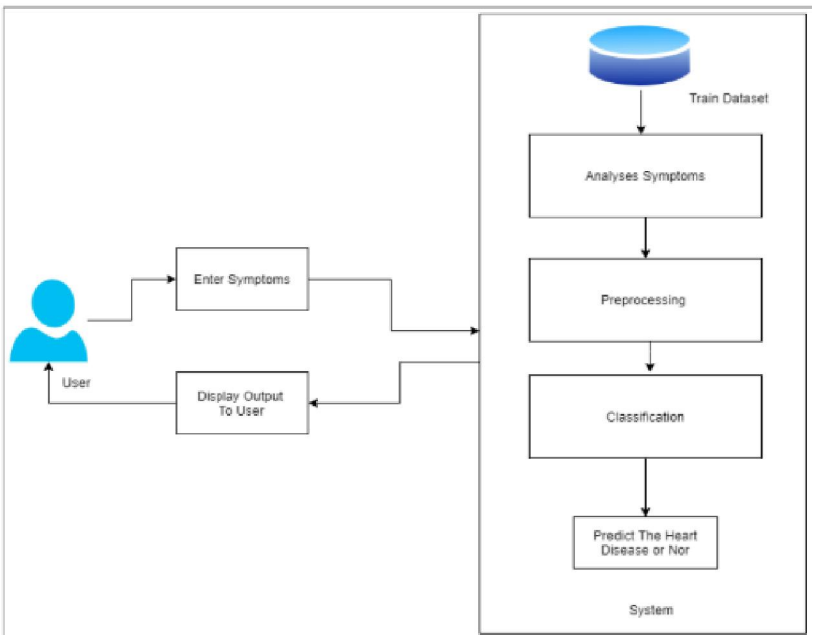

Fig: Proposed System

CNN stands for Convolutional Neural Network. It is a deep learning algorithm specifically designed for analyzing visual data such as images and videos. CNNs have revolutionized computer vision tasks and achieved remarkable performance in tasks like image classification, object detection, and image recognition. The main component of a CNN is the convolutional layer, which applies a set of learnable filters (also called kernels) to the input image. Each filter convolves across the input image, computing dot products and producing a feature map. These feature maps capture different aspects, such as edges, textures, or patterns, from the input image.

There are Four types of layers in Convolutional Neural Networks:

1. Convolutional Layer: In a typical neural network each input neuron is connected to the next hidden layer. In CNN, only a small region of the input layer neurons connect to the neuron hidden layer.
2. Pooling Layer: The pooling layer is used to reduce the dimensionality of the feature map. There will be multiple activation pooling layers inside the hidden layer of the CNN.
3. Flatten: Flattening is converting the data into a 1-dimensional array for inputting it to the next layer. We flatten the output of the convolutional layers to create a single long feature vector.
4. Fully-Connected layer: Connected Layers form the last few layers in the network. The input to the fully connected layer is the output from the final Pooling or Convolutional Layer, which is flattened and then fed into the fully connected layer.

IV. CONCLUSION

In conclusion, heart disease prediction using machine learning techniques has shown tremendous potential and promise in improving preventive care and early detection. Machine learning algorithms can analyze large amounts of patient data and identify patterns, risk factors, and predictive features that can aid in accurate heart disease prognosis. The future scope of heart disease prediction using machine learning is vast. As technology continues to advance, more sophisticated models can be developed, incorporated-

rating more extensive and diverse datasets. Integration with wearable devices and continuous monitoring can provide real-time data, further enhancing the accuracy of predictions.

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