Comparison of Heart Disease Prediction using LR Along with RNN, GRU and CNN Algorithms

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Abstract: *Coronary heart disease is quite possibly the most offensive infections, particularly the quiet cardiovascular failure, which assaults an individual so suddenly that there's no an ideal opportunity to get it treated and such sickness is extremely hard to be analyzed. The absence of expert specialists and expansion in wrong analyzed cases has required the requirement for building an effective coronary illness discovery framework. Different clinical information mining and AI procedures are being carried out to remove the significant data with respect to the coronary illness forecast. However, the precision of the ideal outcomes are not palatable. This paper proposes a respiratory failure forecast framework utilizing Deep learning strategies, explicitly Recurrent Neural Network to anticipate the reasonable prospects of heart related illnesses of the patient. Convolutional Neural Network is an exceptionally amazing characterization calculation that utilizes Deep Learning approach. The paper talks about in detail the significant modules of the framework alongside the connected hypothesis. The proposed model fuses profound learning and information mining to furnish the exact outcomes with least mistakes.*

Key Words: *Coronary heart disease, Machine Learning, Deep Learning, Logistic Regression, Recurrent Neural Network, Gated Recurrent Unit, Convolutional Neural Network.*

1. INTRODUCTION

In our day to day life, people are undergoing a routine and busy schedule which leads to stress and anxiety. Each person has different values of pulse rate and blood pressure. The number of people affected by heart disease increases irrespective of age in both men and women. But other factors like gender, diabetes, BMI also contribute to this disease. In this paper, we have tried prediction and analysis of heart disease by considering the parameters like age, gender, blood pressure, heart rate, diabetes and so on. Since numerous factors are involved in heart disease, the prediction of this disease is challenging.

Some of major symptoms of heart attack are:

- Chest tightness.

- Shortness of breath.

- Nausea, Indigestion, Heartburn, or stomach pain.

- Sweating and Fatigue.

- Pressure in the upper back Pain that spreads to the arm.

Cardiovascular infections are one of the greatest flying illnesses of the advanced world. As per an overview, about more than 17.7 million passing happen the whole way across the world yearly because of heart illnesses. Of these passing, an expected 7.4 million were because of coronary illness and 6.7 million were because of stroke. Coronary episodes are quite possibly the most destructive illnesses which can wreck one anytime of time with no greeting and quiet cardiovascular failures are something which most specialists can't anticipate. Henceforth after examination we considered utilizing RNN and GRU to make the framework more precise and productive to foresee the quiet respiratory failures and illuminate the client at the soonest conceivable. The absence of trained professionals and expanding incorrectly analyzed cases have required the requirement for building an effective cardiovascular sickness expectation framework. This has prompted innovative work of new clinical information mining procedures and different AI methods. The highlights from the clinical information utilizing the grouping calculations and afterward to choose the most significant credits for quiet cardiovascular failure analysis. The secret state is refreshed on each information step. It is a model which can not just learn nearby and worldly conditions in information yet in addition can oblige variable succession lengths. In RNN the yield of a layer is added to the following information layer and took care of once again into a similar layer. Not at all like feed-forward networks RNN can get grouping of qualities as information sources and it can create arrangement of qualities as yields.

Be that as it may, in RNN issue of disappearing slope is more terrible consequently it prompts dramatically little angles and rot of data through time. The GRU is the more current age of Recurrent Neural organizations and is quite like an LSTM. GRU got free of the cell state and utilized the secret state to move data. It also only has two gates, a reset gate and update gate. CNN is one of the feed foward neural network and gives high feature compatibility when compared to other algorithms.

2. PROJECT DESCRIPTION

EXISTING SYSTEM

The use of Logistic Regression will further enhance the accuracy of the results. While the implementation of such a system is not unprecedented, the existing systems have drawbacks and do not aim at finding out the possibilities of silent heart attacks. This paper aims to address these and propose implementation of innovative features to develop a more comprehensive system. Implementing the after mentioned model meets the goal of developing a system with increased accuracy of estimating the patient getting heart attack percentage while addressing the drawbacks of the existing system. The exactness offered by Logistic Regression is 85.55%.

PROPOSED SYSTEM

The proposed model we use Neural Network and Gated Recurrent Unit for anticipating the stroke of the user in a dataset. The project separates itself by outfitting the forces of both Deep learning and information mining. The paper proposes a framework, with a solid expectation calculation, which carries out incredible grouping ventures with a complete report age module. The project plans to carry out a self-learning convention to such an extent that the previous contributions of the sickness results decide the future prospects of the coronary illness to a specific client. The proposed model utilizes solid preprocessing apparatuses so the order and forecast don't show any mistakes identifying with the dataset. An enormous no. of preparing sets will be utilized to make the expectation increasingly precise. Not exclusively does the datasets yet additionally the ascribes to be utilized are chosen contemplating the different significant boundaries and properties. It expects to remove the appropriate credits from the datasets which will improve the exactness of the expectation. It will likewise furnish the clients with legitimate conclusion so the client comprehends the difficult well absent a lot of trouble. The model which is proposed for Heart Attack Prediction System is made utilizing Deep learning calculations and approach. This paper proposes a respiratory failure forecast framework utilizing Deep learning methods, explicitly Recurrent Neural

Network to foresee the presumable prospects of heart related sicknesses of the patient.

3. RESULTS AND DISCUSSION

3.1 Data source

As we probably are aware dataset is an assortment of information objects which are having different quantities of qualities that manage the essential attributes of an item. 303 records obtained with 75 clinical attributes from the UCI Machine Learning Data Repository. In the wake of preprocessing utilization of 270 records with 13 clinical attributes. Out of these 13 attributes, 7 have discrete values while 6 have consistent values.

3.2 Logistic Regression

Logistic Regression is a statistical model that in its basic form uses a logistic function to model a binary dependent variable, although many more complex extensions exist. In regression analysis process logistic regression is estimating the parameters of a logistic model. A binary logistic model has a dependent variable with two possible values, such as pass/fail which is represented by an indicator variable, where the two values are labeled "0" and "1".

3.3 Recurrent Neural Network

Recurrent Neural Network(RNN) are a type of Neural Network where the output from previous step are fed as input to the current step. RNN works on the principle of saving the output of a particular layer and feeding this back to the input in order to predict the output of the layer. RNN came into existence, which solve issues with the help of a Hidden Layer. The main and most important feature of RNN is Hidden state, which remembers some information about a sequence. It uses the same parameters for each input as it performs the same task on all the inputs.

3.4 Gated Recurrent Unit

Designed to save the output of a layer, Recurrent Neural Network is fed back to the input to help in predicting the outcome of the layer. The first layer is typically a feed forward neural network followed by recurrent neural network layer where some information it had in the previous time-step is remembered by a memory function. Forward propagation is implemented in this case. It stores information required for it's future use. If the prediction is wrong, the learning rate is employed to make small changes.

3.5 Convolutional Neural Network

Convolutional Neural Network (CNN) also called as ConvNet; it is a Deep Learning algorithm which can take in an input image, assign importance (learnable weights and biases) to various aspects/objects in the image and be able to differentiate one from the other. The pre-processing required in a CNN is much lower as compared to other classification algorithms. CNN have the ability to learn these filters/characteristics.

3.6 RNN, GRU And CNN

Recurrent Neural Networks suffer from short-term memory. If a sequence is long enough, they'll have a hard time carrying information from earlier time steps to later ones. Gated Recurrent Unit suffer from Long Short-Term Memory(LSTM). They have internal mechanisms called gates that can regulate the flow of information. GRU is good at processing long sequences. A convolutional neural network is a feed-forward neural network that is generally used to analyze visual images by processing data with grid-like topology.
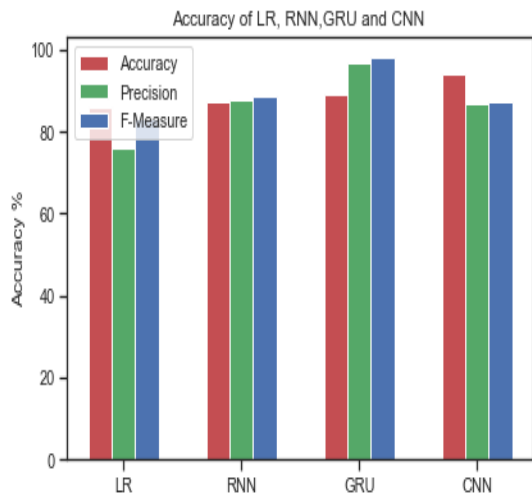
4. EXPERIMENTAL RESULT

FIGURE 4.1 Accuracy of LR, RNN, GRU and CNN

The accuracy of the algorithms is calculated. The accuracy results are tabulated as follows:

Method	Accuracy
LR	85.55%
RNN	87.91%
GRU	87.91%
CNN	89.56%

The accuracy of Recurrent Neural Network, Gated Recurrent Unit algorithm and Convolutional Neural Network is good when compared to Logistic Regression algorithms.

5. CONCLUSION

As gone through number of projects and their papers and discovered various algorithms had accuracy precision beginning from ML calculations to profound learning calculations exactness continued expanding however could not acquire great outcomes for quiet cardiovascular failure forecast. Consequently after analyse considered utilizing RNN and GRU to make the framework more precise and proficient to foresee the quiet respiratory failures and illuminate the client at the soonest conceivable. The preprocessed information is given as contribution at the information layer. The word installing layer changes over the info information into thick vector portrayal. With the assistance of learning CNN layer the vector esteems are handled.

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