SENSING AND PREDICTION OF INCURABLE KIDNEY DISEASE USING ANN AND MACHINE LEARNING MODELS

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ABSTRACT

Now-a-days peoples are suffering from IKD (Incurable Kidney Disease) due to kidney failure which can be detected by some of the symptoms or else by the lab tests. In world probably 20 million peoples are suffered and die due to this disease without the improper detection of advanced stages. There are lot of techniques to detect and prevent the Incurable Kidney Disease. This paper aims to use Machine Learning and data mining technique for decrease the amount of patient and death rate by predicting their stages. The doctors can detect and prevent the disease by machine learning classifier algorithm on time to cure it. Dataset of the patient has been collected and then classified by the classifier algorithm of c5.0 decision tree. In Existing it uses CNN method for predicting it gives 93.28% accuracy. This paper promotes ANN method for predicting with accuracy 98.93%.

Keywords – Artificial Neural Network, C5.0 Decision tree, Machine Learning

I. INTRODUCTION

In early stages kidney diagnose treatment are used but which is not work in all the time. So that the avoiding the risky situation, find the good way of cure the kidney disease. The proposing the technologies of predict rental stages from the dataset. In existing there any missing of values which leads to drop of prediction. But in the advances machine learning algorithm proposed the correct prediction of there is missing of values in a patient's data

In today's world probably all disease is detected and predicted in an efficient manner with more accuracy by using many technologies in internet. These can be analysis by using the patient's dataset. Every dataset contains the collection of data which gives more amount of information about the disease. These collected datasets can be trained and classified by some algorithms.

incurable kidney disease which is abbreviated as Chronic Kidney Disease is one of the major disease in the world. The Global Burden Of Disease Study (GBDS) announces in 2010 that incurable kidney disease is one of the top 20th disease in the world. Probably 500 million people are suffered from the mostly from Africa and south Asia. In an research they find 33% people who affected by Incurable Kidney Disease are 30 years old in urban countries

Incurable Kidney Disease can be from improper consumption of water, irregular-sleepiness, smoking, alcohol and improper diet. It can affect females, males and children. Probably males are suffered from this disease due to the consumption of alcohol. This can affect the parts of the body, urine and at last kidney failure

The previous method of diagnosed the Incurable Kidney Disease based on the report of patients which contain urine examination, history of checkups and also screened the relatives who had this disease.

The patient who suffer from Incurable Kidney Disease can follow some of the tips like regular exercise, following diet, avoid smoking and alcohol, be active and so all physical works and so on

By this summary we proposed to calculate GFR and ACR of first level using artificial neural networks. This paper aims to get efficient prediction of disease using machine learning techniques

II LITERATURE SURVEY

H. Han and A. K. Jain gives the diet plan to control incurable kidney disease. It uses Multilevel DescionForest, Multilevel Neural network algorithm to predict the disease using blood potassium and classifier algorithm gives the diet plan to the users
G. Vishali et al can evaluated and proposed kernel extreme learning machine to predict incurable kidney disease by using four kernel levels such as RBF-ELM, Linear-ELM, Polynomial-ELM and Wavelet – ELM are compared the methodologies to predict the disease
R. S. Vidhya et al that they used prediction algorithm for chronic verbal infraction disease from the data. They used Convolution neural networks to predict and KNN classifier to disease
M.J.Lysaght states the patient in incurable kidney disease to develop End Stage Rental disease which is expensive way of dialysis and kidney transplantation and to predict with incomplete data with an accuracy of 0.975 and 0.960 using neural networks. By this research they find Hypertension can also cause incurable kidney disease. By eliminating some of characteristics which lead to decrease the accuracy
G Susrutha et al uses MCAR method to do prediction in the missing data, thirreserch shows the cereum value is normal but others are to be changed.

III PROPOSED SYSTEM

The framework utilizes the incurable kidney disease prediction dataset. After preprocessing and feature selection, ANN and c5.0 decision tree algorithms have been used.
The early stages of prediction uses CNN based model with K-nearest neighbors algorithm. In proposed the prediction can be done by ANN based model with c5.0 decision tree classifier
Using structured and unstructured data of patients can be classified by Machine Learning algorithm.
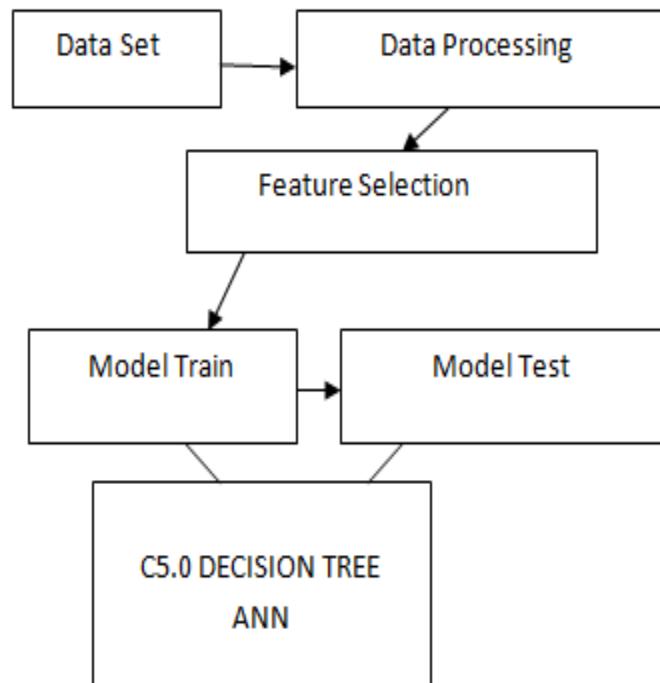
Fig 1: Block Chain Mechanism

The figure 1 represent the block diagram of predicting Chronic Kidney Disease. First the dataset of the patients to be collected, the process the structure and unstructured data in the dataset in data Preprocessing. After Preprocessing the feature of data that is BP, WBC count level are to be checked finally using classifier algorithm the data of the patients to be trained and tested.

IV DATASET

The data of patients can be collected from hospital. Here we can take 500 dataset of the patients '0' represent the patient not suffer from incurable kidney disease and '1' represent the patient suffer from incurable kidney disease.
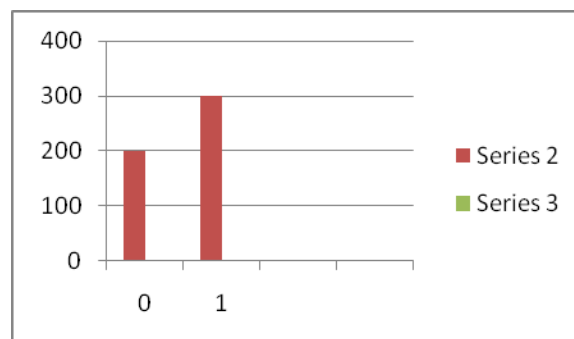

Fig 2 Dataset of Patient

Figure 2 describes the overall incurable kidney disease patients and Non-incurable kidney disease patients. from the collected dataset there are 300 incurable kidney disease patients and 200 non incurable kidney disease patients which represents as 1 and 0 respectively.

V DATA PROCESSING

This stage the data in the dataset can be preprocessed which means it could remove unwanted data i.e., noisy data during processing the dataset for help to predict the stages

Data Preprocessing has the strategy of change raw information into clean dataset. Every machine learning classifier algorithm used this as first step

It can also process both structured and unstructured data in an dataset and also predict the accuracy of there is also from the incomplete data

VI FEATURE SELECTION

The dataset contains blood pressure, albumin, sugar, blood urea, serum creatinine, potassium, white blood cell count, and hypertension of the patient.

In the urine protein test albumin is accessed if the level is high in urine test there possible of failures in filtration. The WBC count should be 4.5 to 11 mgl if it is exceed or in low due to kidney failure, heart disease

The serum creatinine count contains both creatinine and creatinines are in same level in the body for metabolic cycle of muscle contraction.

Hypertension can result of heart attack, tension and headache.

VII ALGORITHMS:

- C5.0 decision tree
- ANN

i. C5.0 DECISION TREE

The c5.0 is a one of the decision tree algorithm used to build. Decision tree or rule set. It can split the maximum field and convert it into sub fields. Then again spilt the sub sample into another sub it will repeat until the sub cannot be able to split. It need not require large estimate dataset. This algorithm can predict also from the missing values

C5.0 DT can predict continuous and discrete values in the dataset. This Machine Learning uses supervised learning approach by that it can give priority to the important data. This algorithm can find which input column is used to predict the disease.

C5.0 is a type of decision tree because it creates the decision tree from the input. The tree has the number of branches. It utilizes the tree structure to model the relationship between features and potential outcomes. At each node of the tree, the attribute of the dataset is chosen. It can handle nominal and numeric features both.

C5.0 is the extended version of theC4.5 classification algorithm and uses information entropy concept. Entropy is used for finding the impurity of features. Information entropy is produced based on the calculation of parent and child entropy values. This process is iterative and works until there is no the further split. CHAID Chi-square automatic interaction detection (CHAID) is a type of decision tree technique. It is used to determine the relationship between variables. Nominal, ordinal and continuous data can be used in CHAID for finding the outcome. For each categorical predictor, all possible cross-tabulation is created in the CHAID model and it process works until the best outcome is attained. The target or dependent variable becomes a root node in the tree, the target variable.

Two or more parts as per the categories in target variable and child of the root node are created using the statistical method and variable relationship. Such a process will be till leaf nodes of the tree. F-test is used for the continuous dependent variable and the Chi-square test is used for the categorical dependent variable.

ii. ANN

ANN is Artificial Neural Network, It used to preprocessed the dataset of patient which helps in complex data to predict the problem, classifies the stages of incurable kidney disease and make the decision. it can connect large amount of data to process it. Previously CNN can be used.

The ANN approach enables automatic diagnosis of Chronic Kidney Disease. This approach can help the classifier algorithm to the evaluation of treatment for Kidney. Artificial Neural Network can train the data by selecting the feature values and is a type of artificial intelligence and also supervised machine learning type. It work same as the human brain like every neuron connected here also connected to every network like neuron which are the node. Ann can solve the complex problem which the human does not solve. It consist of input, hidden and output layers. The input layer can take the input of the function and the operation of function are performed in hidden layer and then output produce by output layer which gives the predicted result. Ann work based on back-propagation.

ANN used the logistic regression supervised learning techniques for predict the disease which is an statistical model. It divided the result as "True" or "False", 0 or 1, success or not success It return 1, if it is success else return 0 if it is not success.

$$P = 1/1 + e^{\wedge}(-(b_0 + b_1 x + b_2 x^{\wedge} 2))$$

Where, P is the predicted value, b0, b1, b2are biases and x is an attribute. It is used in various field of machine learning application in social sciences and medical arena, for example, for spam detection, diabetes detection, cancer detection etc. Logistic regression is the advanced version of linear regression.

VIII EXPERIMENTAL RESULT

The prediction of health sickness and advances stages can be done by utilizing c5.0 and ANN. The result is high accurate when compared with existing result.

Performance factor
i. Memory allocation depend upon the size of dataset
ii. Number of scan depends upon the disease
iii. Execution time based on the number of patients

Table 1 gives the number of positive and negative result of incurable kidney disease patient and non-incurable kidney disease patient from the dataset using the classifier algorithm from neural networks.

Figure 3 represent the result of different algorithm which varies depend upon the accuracy level of test results. By this result the finding the highest accuracy test result classifiers among the others.

Table 1 Result Sample

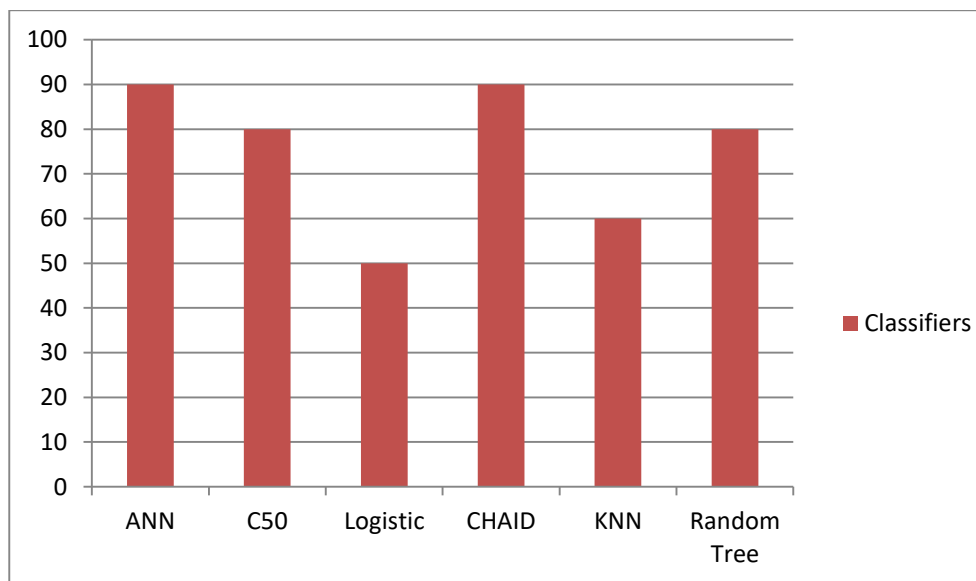|	Positive (1)	Negative (0)
Positive (1)	TP	FN
Negative (0)	FP	TN

Fig 3 Comparisons with different Techniques

IX CONCLUSION

The aim of the research is to detect and predict incurable kidney disease in early stages predictions can also be done for which types by their symptoms. By the medical database it can classify the types and disease in an automation way. C5.0 decision tree can classify the types of stages and predict its level and an economical faster manner. By conclude that decision tree classifier c5.0 can predict accurately incurable kidney disease. The existing methods are 95 percent and it can give 98 percent accuracy. There is large amount of dataset can be used to predict. The use of this technology to make the patient to become aware and take prior treatment to prevent the disease or death, which reduces the death rate of people and also suffer of people.

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