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E-Mail

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editor@ijmece.com

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CHRONIC KIDNEY DISEASE PREDICTION USING PYTHON AND MACHINE LEARNING

Bardipuram Keerthi¹ , Manvita Kuchadi² , Khamandalam Saketh³ ,Dr P Dileep⁴

^{1,2,3}B.Tech Student, Department of CSE (Data Science), Malla Reddy College of Engineering and Technology, Hyderabad, India.

⁴ Professor, Department of CSE (Data Science), Malla Reddy College of Engineering and Technology, Hyderabad, India.

ABSTRACT

One of the most serious diseases of modern times is chronic kidney disease, which must be diagnosed as early as possible. Machine learning techniques are currently used in medicine. Using a machine learning system, the doctor can detect the disease early. This article is about predicting chronic kidney disease . Disease prediction and detection is an important and challenging topic as it contributes to the early detection of diseases, thereby helping pathologists and healthcare providers in decision-making. In recent studies and research, "The Artificial Neural Network" provides a useful method to address a variety of everyday issues in life or in many different fields, such as the medical field, where it can be used to anticipate a specific disease based on some provided data. In this article, we use the ANN approach to describe a system for predicting chronic kidney disease. This neural network output lets us know whether a patient has chronic renal illness or not. Artificial neural networks produce outcomes that are more accurate than those of other machine learning algorithms in the aforementioned topic of kidney disease prediction after extensive investigation.

I.INTRODUCTION

Nowadays, changing eating habits and work culture lead to a number of health problems. Although people are increasingly are no symptoms of this disease clearly visible in the early stages. The kidneys are an important

organ in the human body and play a key role in excretion and osmoregulation. The kidneys are part of the excretory system, which collects and excretes all waste and dangerous substances produces the body. Morbidity, mortality and hospitalization rates in patients

worldwide All people were severely affected by chronic kidney disease (CKD), a non-communicable disease. As it grows, will soon be one of the deadliest assassins in the world. There are 1 million cases of chronic kidney disease in India illnesses (IRC) per year. Due to this dangerous disease, kidney function gradually deteriorates. The MRC is, a disease in which the kidneys gradually lose their ability to function over many years. The person will do it develops irreversible kidney failure. If chronic kidney disease goes undiagnosed, the following symptoms may occur: nerve damage, decreased immune response due to harmful fluid, electrolyte and waste levels. In advanced stages, accumulates in the blood and body. It is therefore extremely important to detect chronic kidney disease early. Various models and algorithms have been developed for prediction. Here we experimented with its use alternative artificial neural network techniques for predicting chronic kidney disease and treated early: high blood pressure, anemia, brittle bones, poor nutrition, poor ,health concerned about their health, they tend to pay more attention to it when they are ill. Symptoms occur. However, since it does not cause any

characteristic symptoms, it suggests chronic kidney disease. Disease is difficult to diagnose. It's really hard to predict that it will be any different. There developed for prediction. Here, I've experimented with using an alternative Artificial Neural Networks technique to try and predict CKD.

II.PROBLEM DEFINITION

Determine a person's prognosis for chronic kidney disease based on their health information, such as: He moglobin, albumin, concentrated cell volume, hypertension, etc. Create a custom Python program using artificial neural networks (ANNs) to predict and c lassify people with chronic kidney disease (CKD) or not.

III.OBJECTIVE

Nowadays everyone is trying to take care of their health but due to work and tight schedules only pay attention to their health when certain symptoms occur. However, since chronic kidney disease is a disease symptoms or in some cases no symptoms, it is difficult to predict, detect and prevent this condition, which can cause long-term health problems. However, machine

learning offers hope in this situation because it excels at predictions and analysis. The goal of this project is to predict CRI using machine learning. Using various classification algorithms, medical examination results from patients with chronic kidney failure can serve as a basis for nutritional plans. We create a model using the Artificial Neural Network, compile it, store it, and then use it to forecast chronic kidney disease. Two machinelearning libraries are using Keras and sklearn Chronic Kidney Disease dataset has been taken from the UCI repository and nerve damage, reduced immune response due to harmful fluid, electrolyte and waste levels. In advanced stages, accumulates in the blood and body. It is therefore extremely important to detect chronic kidney disease early. Various models and algorithms have been performance of the model on the training data set. Get the shape of your training and testing data. Walk along the loop Model registered. Then determine the accuracy, loss, prediction and original values of the model in the testdata.

IV.LITERATURE SURVEY

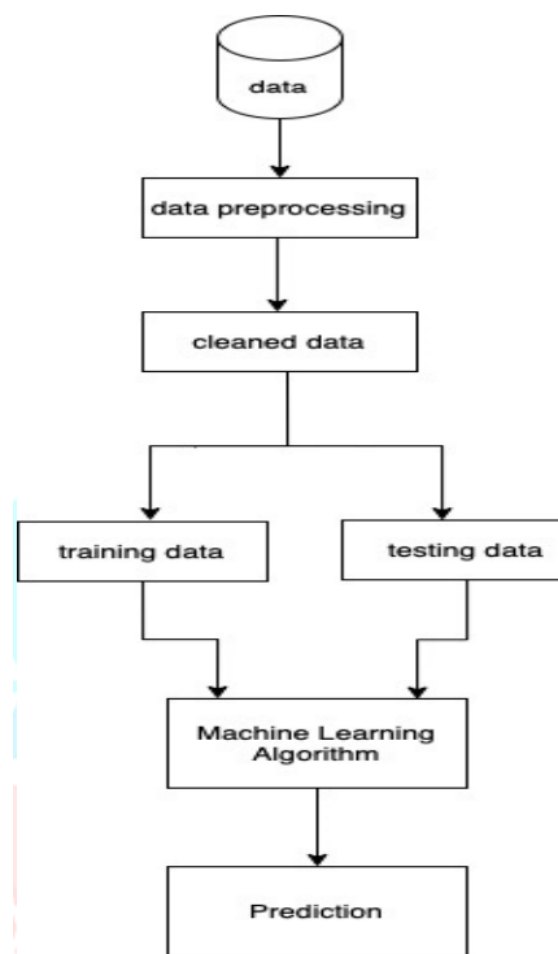
Numerous studies use various categorization methods to predict CKD,

and these researchers receive the predicted results from their model. S. Ramya and Dr. N. Radha [2] used various machine learning classification techniques to increase we keep the columns 'sg', 'al', 'sc', 'hemo', 'pcv', 'wbcc', 'rbcc', 'htn', 'classification'. These are the attributes we'll be using to build the predictive model.

Split and Scale the data : To transform non numeric data into columns we use Label encoder. We split the data into independent(X) dataset that features and dependent(y) dataset the target. Here we diagnosis speed and accuracy. The classification of several stages of CKD according to their severity is the focus of the proposed investigation. by examining various techniques, including RBF, RF, and Basic Propagation Neural Network. The analysis's findings show that the RBF algorithm produces 85.3% accuracy, outperforming the other classifiers. Results from several models have been compared by Gunarathne W.H.S.D et al. Finally, they came to the conclusion that the Multiclass Decision forest algorithm provides greater accuracy than other algorithms, with a 99% accuracy rate for the dataset that has been condensed to just 14 attributes. An innovative method developed by Asif Salekin and John Stankovic [5] makes use of a machine learning algorithm to identify CKD. They receive results based on a dataset with 400 records and 25 attributes that indicate

whether a patient has CKD or not. To obtain results, they employ neural networks, random forests, and k-nearest neighbours. They employ a wrapper approach, which accurately detects CKD, for feature reduction. In the chronic kidney disease dataset , S.Dilli Arasu and Dr. R. Thirumalaiselvi [3] have worked on missing values. Missing values in the dataset will make our model less accurate and provide

V.METHODOLOGY



use the feature scaling. Feature scaling is used to normalize the range of

independent variables or features of data. Min-Max scaler method is used . It scales the dataset so that all input features lie between 0 and 1.

$$x' = \frac{x - \min(x)}{\max(x) - \min(x)}$$

Build the Model (ANN)

For the model's architecture we'll add 2 layers. We have the first layer with 256 and the 'ReLu' activation function with a normal distribution initializer for the weights. We must also specify the number of features/columns in the data set Then the dataset is cleaned and manipulated. All the null or empty values are replaced with mean. Then we use Split and Scale. The data is then divided into training data and test data. Then there is the model Built in. Once the model is built, it is compiled and then saved. Graph model loss and accuracy to show the

Dataset is taken from the UCI repository. It is the dataset for prediction of chronic kidney disease using machine learning algorithm . It has 25 attributes age , bp , sg , al , su , rbc , pc , pcc , ba , bgr , bu , sc , sod , pot , hemo , pcv , wc , rc , htn , dm , cad , appet , pe , ane , classification . We only take important attributes required to build the model.

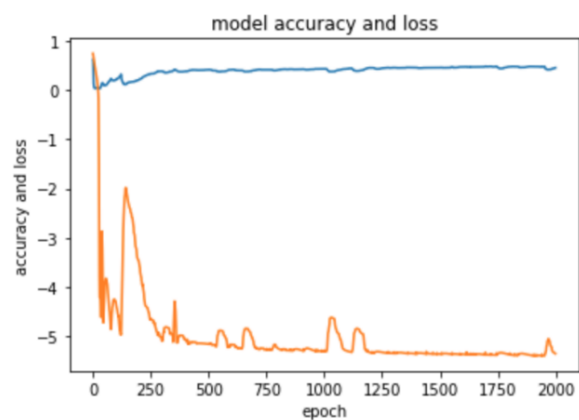
Here , bp stands for blood pressure , sg stands for specific gravity , al stands for albumin , su is the glucose level , rbc stands for red blood cell , pc stands for pus cells , psc stands for pus cell clumps , bu stands for blood urea , sc stands for serum creatinine , sod stands for sodium , pot stands for potassium , hemo stands for haemoglobin , pcv stands for packed cell volume , wc stands for white blood cells , rc stands for red blood cells , htn stands for hypertension , ane stands for anaemia , appet stands for appetite . After loading the “kidney_disease.csv” dataset , it is time for data preprocessing.

Data preprocessing :

Data cleaning : When we gather open source raw data of CKD patients it does not contain the name of all attributes or has missing values or blank spaces in the dataset. So first we need to handle such values. Here we will replace the missing values with the mean of the other values. We could also use the approach where we remove the missing values , but it might lead to losing important information.

Data Reduction : The dataset we have loaded has 25 attributes . All the attributes in the dataset are not needed. We only need some attributes out of all these to successfully carry out the

prediction. Here ,len(X.columns). In the second layer we will have one neuron which uses ‘hard_sigmoid’ activation function. The second layer is also the last layer here. Now , compile the model and give “Binary_crossentropy” which is the loss function used for binary classification. It helps us evaluate how well the model did on the training and then using an optimizer it tries to improve on it. We have used the ‘adam’ optimizer . To see how well the model does we will use some metrics on the model's accuracy. Using the training datasets (X_train and y_train) we train the model . 200 epochs are given and a batch size equal to number of patients in the dataset. Next step is to save the model . Now, we’ll visualise how well the model did on the training dataset . Plot accuracy and loss versus epoch for the same .



VI.CONCLUSION :

We have built a program that predicts the presence of Chronic Kidney Disease . It is a good model as our experimental results show the loss and accuracy versus epochs have a good graph. This can basically act as the foundation of CKD prediction. It is a model made using the concept of artificial neural network.

VII.FUTURE SCOPE

This can be viewed as the foundation of the CKD patient healthcare system. It will aid in CKD prediction so that the appropriate precautions can be taken to help stop it from getting worse. It will benefit our quality of life and help us avoid serious health hazards. Artificial neural network (ANN) is created to function similarly to how the human brain operates. In fact, the core of deep learning is an ANN. Deep learning can therefore be added to this in the future to improve the outcomes of this research. This could be used in the future in conjunction with deep learning.

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