EARLY DETECTION OF CHRONIC KIDNEY DISEASE

INTRODUCTION

Chronic Kidney Disease (CKD) is a major medical problem and can be cured if treated in the early stages. Usually, people are not aware that medical tests we take for different purposes could contain valuable information concerning kidney diseases. Consequently, attributes of various medical tests are investigated to distinguish which attributes may contain helpful information about the disease. The information says that it helps us to measure the severity of the problem and we make use of such information to build a machine learning model that predicts Chronic Kidney Disease

LITERATURE REVIEW

Year Of Publication	Paper Name	Author's Name	Link
2019	Detection of Chronic Kidney Disease using Machine Learning Algorithms with Least Number of Predictors	Marwa Almasoud , Tomas E Ward	https://thesai.org/Downloads/Volume10No8/Paper_13-Detection_of_Chronic_Kidney_Disease.pdf

In this paper, they aim to test the ability of machine learning algorithms for the prediction of chronic kidney disease using the smallest subset of features. Several statistical tests have been done to remove redundant features such as the ANOVA test, the Pearson's correlation, and the Cramer's V test. Logistic regression, support vector machines, random forest, and gradient boosting algorithms have been trained and tested using 10-fold cross-validation. We achieve an accuracy of 99.1 according to F1-measure from Gradient Boosting classifier. Also, we found that hemoglobin has higher importance for both random forest and Gradient boosting in detecting CKD. Finally, our

results are among the highest compared to previous studies but with less number of features reached so far. Hence, we can detect CKD at only $26.65 by performing three simple tests.

[2]

Year Of Publication	Paper Name	Author's Name	Link
2019	Chronic Kidney Disease Diagnosis and Management	Teresa K. Chen, MD, MHS, Daphne H. Knicely, MD, and Morgan E Grams, MD, PhD	Chronic Kidney Disease Diagnosis and Management - PMC (nih.gov)

The proposed system uses CKD method for diagnosis. In this method once a diagnosis of CKD has been made, the next step is to determine staging, which is based on GFR, albuminuria, and cause of CKD . Staging of GFR is classified as G1 (GFR ≥90 ml/min/1.73 m2), G2 (GFR 60–89 ml/min/1.73 m2), G3a (45–59 ml/min/1.73 m2), G3b (30–44 ml/min/1.73 m2), G4 (15–29 ml/min/1.73 m2), and G5 (<15 ml/min/1.73 m2).

[3]

Year Of Publication	Paper's Name	Author's Name	Link
2014	Systems biology towards novel chronic kidney disease diagnosis and treatment	Dr. Bernd Mayer	https://cordis.europa.eu/docs/results/241/241544/final1-syskid-final-report-2015-03-13.pdf

This system explains about the hemodynamic in our glomerulor. Alterations in glomerular hemodynamic were considered of upmost importance. Both afferent arteriolar glomerular vasodilatation and efferent vasoconstriction increase intra-glomerular filtration pressure thus leading to hyper filtration, which on the short term stabilizes GFR but on the long term leads to progressing glomerular sclerosis thereby initiating a vicious cycle.
[4]

Year Of Publication	Paper's Name	Author's Name	Link
2020	Machine learning algorithm for early detection of end-stage renal disease	Zvi Segal, Kira Radinsky, Bar Ehrenberg,	https://bmcnephrol.biomedcentral.com/articles/10.1186/s12882-020-02093-0

End stage renal disease (ESRD) describes the most severe stage of chronic kidney disease (CKD), when patients need dialysis or renal transplant. There is often a delay in recognizing, diagnosing, and treating the various etiologies of CKD. The objective of the present study was to employ machine learning algorithms to develop a prediction model for progression to ESRD based on a large-scale multidimensional database.

[5]

Year Of Publication	Paper's Name	Author's Name	Link
2021	Diagnosis of Chronic Kidney Disease Using Effective Classification Algorithms and Recursive Feature Elimination Techniques	Ebrahime Mohammed Senan,Mosleh Hmoud Al-Adhaileh	https://www.hindawi.com/journals/jhe/2021/1004767/

This study focused on evaluating a dataset collected from 400 patients containing 24 features. The mean and mode statistical analysis methods were used to replace the missing numerical and the nominal values. To choose the most important features, Recursive Feature Elimination (RFE) was applied. Four classification algorithms applied in this study were support vector machine (SVM), k-nearest neighbors (KNN), decision tree, and random forest. All the classification algorithms achieved promising performance. The random forest algorithm outperformed all other applied algorithms, reaching an accuracy, precision, recall, and F1-score of 100% for all measures. CKD is a serious life-threatening disease, with high rates of morbidity and mortality. Therefore, artificial intelligence techniques are of great importance in the early

detection of CKD. These techniques are supportive of experts and doctors in early diagnosis to avoid developing kidney failure.

[6]

Year Of Publication	Paper Name	Author's Name	Link
2022	A Deep Neural Network for Early Detection and Prediction of Chronic Kidney Disease	Vijendhra Singh,Vijayan K Asari	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8774382/

This research objectives to create a deep neural network and compare its performance to that of other contemporary machine learning techniques. In tests, the average of the associated features was used to replace all missing values in the database. After that, the neural network's optimum parameters were fixed by establishing the parameters and running multiple trials.

[7]

Year Of Publication	Paper Name	Author's Name	Link
2021	Prediction of Chronic Kidney Disease - A Machine Learning Perspective	Pankaj Chittora,Sandeep Chaurasia	https://ieeexplore.ieee.org/document/9333572

Chronic Kidney Disease dataset has been taken from the UCI repository. Seven classifier algorithms have been applied in this research such as artificial neural network, C5.0, Chi-square Automatic interaction detector, logistic regression, linear support vector machine with penalty L1 & with penalty L2 and random tree. The important feature selection technique was also applied to the dataset

[8]

Year Of Publication	Paper Name	Author's Name	Link
2022	Design System For Early Detection And Prediction Of Chronic Kidney Disease Using Machine Learning Techniques	Sreeji S, Balamurugan Balusamy	https://www.webology.org/data-cms/articles/20220713111947amwebology%2018%20(6)%20-%20500%20pdf.pdf

This study provides a unique Machine learning model for detecting and predicting CKD in its early stages. The goal of this study is to build a deep neural network and compare it to the performance of other modern machine learning approaches. In testing, the database's missing values were replaced with the average of the corresponding characteristics. After that, the ideal parameters of the neural network were determined by setting the parameters and executing several trials. Recursive Feature Elimination was used to pick out the most significant features (RFE). The RFE revealed critical characteristics such as haemoglobin, specific gravity, serum creatinine, red blood cell count, albumin, packed cell volume, and hypertension.

[9]

Year Of Publication	Paper Name	Author's Name	Link
2022	Predicting Chronic Kidney Disease using Machine Learning	Aman Preet Gulati	https://www.analyticsvidhya.com/blog/2022/01/predicting-chronic-kidney-disease-using-machine-learning/

In this article, we will be going through the Chronic kidney disease dataset and doing the complete analysis on the same our main goal will be to predict whether an individual will have chronic kidney disease or not based on the data provided.

[10]

Year Of Publication	Paper Name	Author's Name	Link
2019	Early detection of chronic kidney disease using machine learning	Abrar, Tahmid Tasnim, Samiha Hossain, Md. Mehrab	http://hdl.handle.net/10361/12817

In this article they discussed the current methods and suggested improved technology based on the XGBoost (Extreme Gradient Boost), which combined significant characteristics of the F scores and evaluated four pre-processing scenarios. In addition, we provided machine training methods for anticipating chronic renal disease with clinical information.

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