

Machine Learning based Exploratory Data Analysis (EDA) and Diagnosis of Chronic Kidney Disease (CKD)

Vaishali Mehta¹, Neera Batra², Poonam³, Sonali Goyal⁴, Amandeep Kaur⁵, Khasim Vali Dudekula^{6*} and Ganta Jacob Victor⁷

^{1,2,4,5}Department of Computer Science and Engineering, Maharishi Markandeshwar Deemed to be University, Mullana, Ambala, Haryana, India

³LNTE, Panipat, Haryana, India

⁶School of Computer Science and Engineering, VIT-AP University, Amaravati, AP, India

⁷Department of Computer Science and Engineering, Koneru Lakshmaiah Education Foundation, Green fields, Vaddeswaram, Guntur - 522302, Andhra Pradesh, India

Abstract

INTRODUCTION: This research paper presents an exploratory data analysis (EDA) approach to diagnose Chronic Kidney Disease (CKD) using machine learning algorithms.

OBJECTIVES: This paper focuses on early and accurate detection of CKD using a comprehensive dataset of clinical and laboratory parameters to minimize the risk of patients' health complications with timely intervention through appropriate medications.

METHODS: Machine Learning based prediction models including Naive Bayes, KNN, Logistic regression, decision tree, ensemble modelling, Random Forest and Ada Boost.

RESULTS: The results indicate that the Naive Bayes algorithm achieved highest accuracy and sensitivity in detecting CKD.

CONCLUSION: For reduced features and for binary class classification, Naive Bayes classifier gives best performance in terms of accuracy and computational cost. Other algorithms are good for multi-class classification but for binary class, they are little expensive than Naive Bayes.

Keywords: Chronic Kidney Disease, Machine Learning, Classification, Feature selection, Regression

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1. Introduction

In the peritoneal cavity in the back of the human body are two kidneys. Salt, water, and other ions are all balanced by the kidneys' basic function. Additionally, it tracks substances like uric acid, blood urea, magnesium, potassium, calcium, and phosphorus. Kidneys secrete erythropoietin, vitamin D, and renin, three hormones that promote RBC synthesis and maturation, regulate calcium and phosphorus, control blood pressure, and get rid of all metabolic waste products. Chronic renal disease is primarily brought on by high blood pressure and sugar levels. A prevalent issue with kidney function called chronic kidney disease (CKD) results in deteriorating

kidney function and kidney failure. In many circumstances, an early diagnostic approach is crucial and critically *significant to determining kidney functionality. Fatigue, swelling around the eyes, ankles, and legs Muscle cramps at night, difficulties falling asleep, and nightly urination are the primary symptoms CKD.

The current diagnostic method relies on the analysis of urine with the aid of serum creatinine levels. This is accomplished using a variety of medical techniques, including ultrasonography and screening. Patients who have hypertension, a history of cardiovascular disease, a current illness, or who have had kidney disease in a family member are all screened during the screening process. This method involves measuring the GFR (Glomerular filtration rate) in a first-morning urine sample as well as estimating from the serum creatinine level.

* Corresponding author. Email: khasim.vali@gmail.com

