Chapter 8
Diabetes Prediction Using Novel Machine Learning Methods

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ABSTRACT

Diabetes is a prevalent and chronic health condition affecting millions globally. Diabetes is caused by a combination of many factors including obesity, excessive blood glucose levels, abnormal cholesterol levels, family history, physical inactivity, bad food habits, and other causes. Frequent urination, increased thirst, increased hunger, and loss of weight are the common symptoms of diabetes. A person having diabetes has heavy risks of heart disease, kidney disease, nerve damage, diabetic retinopathy, brain stroke, foot ulcer, etc. These risks factors can be reduced by early detections of disease. The big challenge for the health care industries nowadays is to give a more precise result which could easily predict whether a patient is having or diagnosed with such disease.

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1. INTRODUCTION

Diabetes is a chronic, metabolic disease characterized by elevated levels of blood glucose (or blood sugar), which leads over time to serious damage to the heart, blood vessels, eyes, kidneys and nerves. The most common is type 2 diabetes, usually in adults, which occurs when the body becomes resistant to insulin or doesn't make enough insulin. In the past 3 decades the prevalence of type 2 diabetes has raised dramatically in countries of all income levels. Type 1 diabetes, once known as juvenile diabetes or insulin-dependent diabetes, is a chronic condition in which the pancreas produces little or no insulin by itself. For people living with diabetes, access to affordable treatment, including insulin, is critical to their survival.

In recent years, the integration of Machine Learning (ML) techniques has shown promising results in various medical applications, including disease prediction. This study aims to explore the application of ML algorithms for diabetes prediction using readily available clinical and demographic data. In existing method, the classification and prediction accuracy is not so high. This research showcases the potential of ML techniques in accurately predicting diabetes using clinical and demographic data. The interpretability of these models contributes to their clinical utility and facilitates their integration into healthcare systems for improved diabetes management.

2. LITERATURE REVIEW

Tasin et al.(2022) proposed automatic diabetes prediction system employing XGBoost machine learning framework with ADASYN. Later deployed the model into a website and Android smartphone application. Data used in this model predicting diabetes based on PIMA Indian Dataset for female.

Bhavya et al. (2020) developed a system using machine learning that predicts diabetes using old patients data. The proposed system used one of the popular machine learning algorithms KNN and obtained higher accuracy. And later an interface was designed for Admin and members.

Tejas N.Joshi and Prof. Pramila M. Chawan (2018) presented a system Diabetes Prediction Using Machine Learning by applying three algorithms including Artificial Neural Network (ANN), Support Vector Machine (SVM), and Logistic Regression. This project proposed earlier detection of diabetes in an effective way.

Priya Gandhi and Dr. Gayatri S Pandi(2022) developed a system Diabetes Prediction using Machine Learning Techniques based on PIMA Indian Diabetes Dataset for female patients. Machine learning algorithm used in this system are Naïve Bayes Classifier, Decision Tree, SVM, and KNN. SVM obtained highest accuracy of 90.23%.