

Diabetes Prediction System with Different ML Approaches

Abstract:

The remarkable advancements in biotechnology and public healthcare infrastructures have led to a momentous production of critical and sensitive healthcare data. By applying intelligent data analysis techniques, many interesting patterns are identified for the early and onset detection and prevention of several fatal diseases.

Diabetes mellitus is an extremely life-threatening disease because it contributes to other lethal diseases, i.e., heart, kidney, and nerve damage. In this paper, a machine learning based approach has been proposed for the classification, early-stage identification, and prediction of diabetes. Furthermore, it also presents an IoT-based hypothetical diabetes monitoring system for a healthy and affected person to monitor his blood glucose (BG) level. For diabetes classification, three different classifiers have been employed, i.e., random forest (RF), multilayer perceptron (MLP), and logistic regression (LR).

For predictive analysis, we have employed long short-term memory (LSTM), moving averages (MA), and linear regression (LR).

Existing System:

The COVID-19 global pandemic is a threat not only to the health of millions of individuals, but also to the stability of infrastructure and economies around the world. The disease will inevitably place an overwhelming burden on healthcare systems that cannot be effectively dealt with by existing facilities or responses based on conventional approaches.

We believe that a rigorous clinical and societal response can only be mounted by using intelligence derived from a variety of data sources to better utilize scarce healthcare resources, provide personalized patient management plans, inform policy, and expedite clinical trials. In this paper, we introduce five of the most important challenges in responding to COVID-19 and show how each of them can be addressed by recent developments in machine learning (ML) and artificial intelligence (AI).

We argue that the integration of these techniques into local, national, and international healthcare systems will save lives, and propose specific methods by which implementation can happen swiftly and efficiently. We offer to extend these resources and knowledge to assist policy-makers seeking to implement these techniques.

Proposed System:

Diabetes is a metabolic disorder that impairs an individual's body to process blood glucose, known as blood sugar. This disease is characterized by hyperglycaemia resulting from defects in insulin secretion, insulin action, or both. An absolute deficiency of insulin secretion causes type 1 diabetes (T1D). Diabetes drastically spreads due to the patient's inability to use the produced insulin. It is called type 2 diabetes (T2D). Both types are increasing rapidly, but the ratio of increase in T2D is higher than T1D. 90 to 95% of cases of diabetes are of T2D.

By exploiting the advantages of the advancement in modern sensor technology, IoT, and machine learning techniques, we have proposed an approach for the classification, early-stage identification, and prediction of diabetes in this paper. The primary objective of this study is twofold. First, to classify diabetes into predefined categories, we have employed three widely used classifiers, i.e., random forest, multilayer perceptron, and logistic regression. Moreover, we have also performed a comparative analysis of the proposed approach with existing state-of-the-art approaches. The accuracy results of our proposed approach demonstrate its adaptability in many healthcare applications.

Software Tools:

1. VS Code
2. Jupyter Notebook
3. Anaconda
4. Scikit-Learn
5. Matplotlib
6. Pandas
7. NumPy

Hardware Tools:

1. Laptop
2. Operating System: Windows 11
3. RAM: 8GB RAM
4. ROM: 2GB
5. Fast Internet Connectivity

Applications:

1. The same architecture will be applied to other health care diseases.
2. ML in Healthcare.