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Prediction of Diabetes through Retinal Images Using Machine Learning

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ABSTRACT: Diabetes is one of the most rapidly growing chronic diseases, which has affected millions of people around the globe. Its diagnosis, prediction, proper cure, and management are crucial. Data mining based forecasting techniques for data analysis of diabetes can help in the early detection and prediction of the disease and the related critical events such as hypo/hyperglycemia. Numerous techniques have been developed in this domain for diabetes detection, prediction, and classification. In this paper, we present a comprehensive review of the state-of-the-art in the area of diabetes diagnosis and prediction using data mining. The aim of this paper is twofold; firstly, we explore and investigate the data mining based diagnosis and prediction solutions in the field of glycemic control for diabetes. Secondly, in the light of this investigation, we provide a comprehensive classification and comparison of the techniques that have been frequently used for diagnosis and prediction of diabetes based on important key metrics. Moreover, we highlight the challenges and future research directions in this area that can be considered in order to develop optimized solutions for diabetes detection and prediction.

KEYWORDS: diabetes, Data Mining, CNN algorithm, diagnosis, Prediction.

I. INTRODUCTION

Manual diagnosis of diabetes heavily relies on the expertise and experience of the ophthalmologist, which can introduce variability and inconsistency in the diagnosis . The process of manually examining and analyzing retinal images can be time-consuming, leading to delays in diagnosis and treatment initiation. Overall, the inventions in retinopathy detection using machine learning CNN aim to address the limitations of the existing procedure, enhance accuracy and efficiency, and improve access to timely and reliable retinopathy diagnosis.

II. LITERATURE SURVEY

In [1]: Implementation of Diabetic Retinopathy Prediction System using Data Mining.We use neural network (NN) and na¨ıve bayes for classification. According to comparison results NN gives better accuracy than na¨ıve bayes and time and memory required for NN is less as compared to na¨ıve bayes.

In [4] In feature extraction phase we have extracted the most appropriate features from digital fundus images by Blood Vessels and Micro aneurysms detection. For this research work we have used Diabetic Retinopathy dataset provided by Kaggle Community. Finally, we have used CNN to predict the Diabetic Retinopathy (DR). In our proposed methodology, we have achieved 95.41

In [5]Deep Neural Network with prediction is the one of the main deep learning technologies which has been used by many researches for early prediction of Type 2 Diabetics (T2D). For the prediction of the T2D, the taxonomy with the components are proposed with Data, Prediction processing and Display (DPD). Those components are evaluated for the better performance of the system and are validated with the different parameters for the early diagnosis of the T2D. The system being proposed has the higher accuracy for the prediction of the T2D and early detection of the diabetics in different age group in comparison to research paper reviewed and with current findings. It also helps to diagnose the diabetics in the patients. The critical analysis of the literature review of the latest published research paper available on the T2D and on deep learning has better accuracy for the prediction of T2D. On basis of the analysis, an effective system for T2D based on Deep Neural Network (DNN) has been developed in the system that can predict the diabetics in the early stage.

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In [8]The experimental results demonstrate that the proposed prediction algorithm can improve the prediction accuracy of glucose. Potential research work and challenges are pointed out for further development of glucose prediction models.

III. METHODOLOGY

• Pre-processing •

In this module,the Pre-processing has The preprocessing usually consists of several steps that depend on a given task and the text, but can be roughly categorized into segmentation, cleaning, normalization, annotation and analysis.Textpreprocessing is a method to clean the text data and make it ready to feed data to the model. Text data contains noise in various forms like emotions, punctuation, text in a different case

• Feature Extraction •

In this module, Text feature extraction is the process of taking out a list of words from the text data and then transforming them into a feature set whichis usable by a classifier.Selection from the document part can reflect the information on the content words, and the calculation of weight is called the text feature extraction . Common methods of text feature extraction include filtration, fusion, mapping, and clustering met .

- Split the data into attributes and labels.
- Divide the data into training and testing sets.
- Train the algorithm.
- Make some predictions.

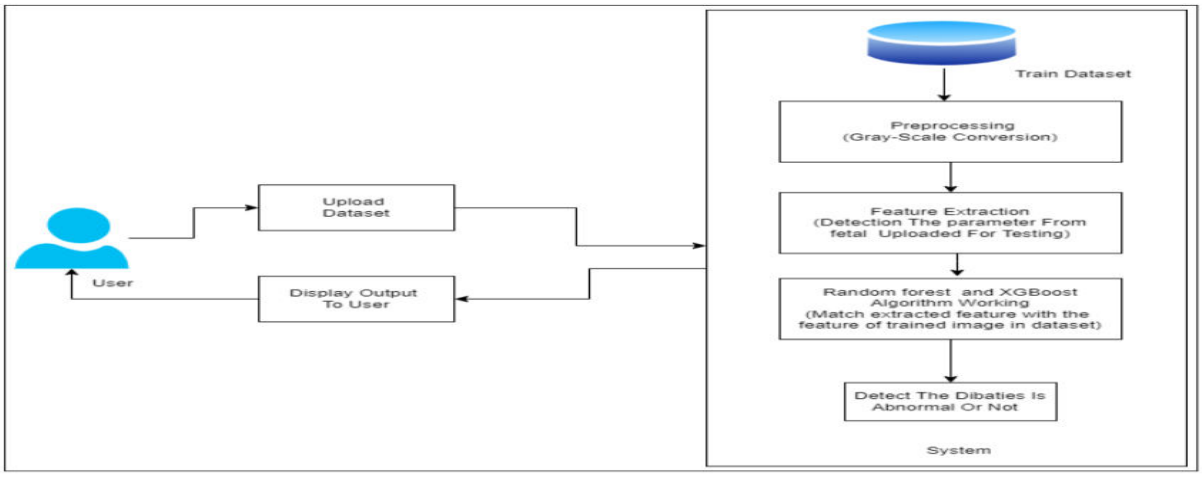

Figure 5.1: system Architecturel

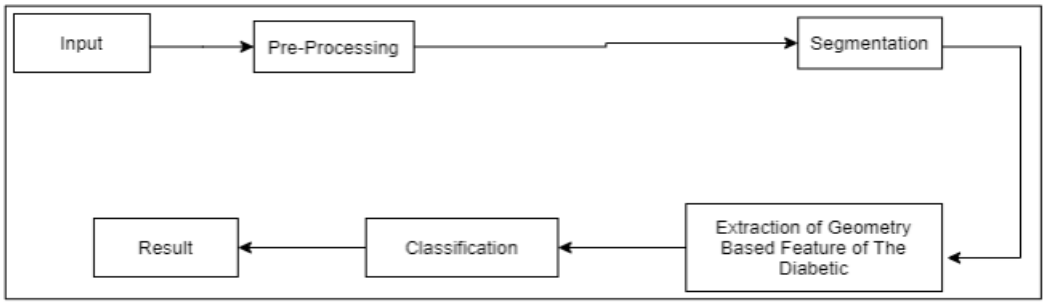

Figure 5.4: Data Flow(2) diagram

IV. RESULTS

User first have to register to use the prediction model . after registration is complete, login is done .

After logging in new window opens ,this window contains multiple options like select image, image preprocerssing, CNN prediction ,and exit

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Using select image option user can select the retinal image .Next step is image preprocessing. In this step selected image is converted in black and white image and then the gray scale image is shown.

The final step is to select cnnprediction.Using the trained model the selected image is predicted for diabetes on different stages like moderate and severe

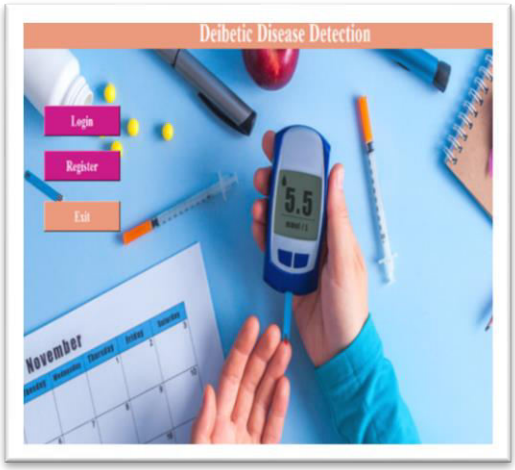

Fig. 1 main interface

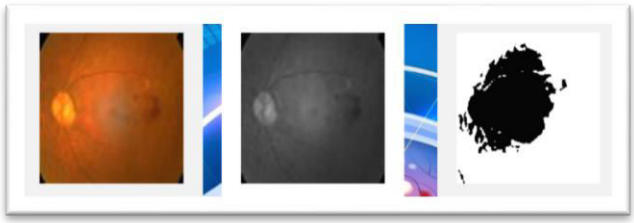

Fig. 2 image preprocessing.

Fig. 3 Prediction.

V. CONCLUSION

diabetes prediction has been accomplished using the proposed ensemble model from the dataset, where the preprocessing plays a crucial role in robust and precise prediction. The quality of the dataset was improved by the proposed preprocessing scheme, where outlier rejection and filling missing values was a core concern.

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