6COSC006W – Final Year Project Report

ELIXIR: Diabetes Diagnosis and Treatment Prediction system for personalized Ayurveda medicine

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Abstract

The significance of detecting diabetes and pre-diabetes is related to the risk of developing complications from high blood glucose levels. Studies have found that early signs of diabetic complications such as retinopathy and cardiovascular disease were found relatively early in the diabetes diagnosis, implying that these disease states were already present or developing well before an official diagnosis of diabetes was made. Because diabetes complications can develop before a patient is diagnosed, early detection and intervention can be extremely beneficial in the long run. The risk of developing type 2 diabetes from pre-diabetes is quite high, especially if untreated. When diabetes is detected early, the patient may not only delay, but also avoid, the development of diabetes. The prevention of disease is far less expensive than the treatment of hyperglycaemia and diabetic complications. The disease "Diabetes Mellitus" is one of the world's most common critical illnesses. Diabetes affects 8.5 percent of persons over the age of 18 and is responsible for 1.6 million deaths annually, according to the World Health Organization. As a result of the research, it was discovered many studies have been conducted for diabetes prediction, but no specific mechanism has been implemented to pre-determine the best treatment to be prescribed for that. As a result, I chose Ayurveda as my treatment option in efforts to add value to both diabetes prevention and the Sri Lankan Ayurveda industry.

This project aims to dissect the factors that influence the diagnosis process of diabetes patients. To Design, Implement, Test, and Evaluate a Machine learning model that inputs the diagnosis of the patient and utilizes artificial intelligence, optimization algorithms in a probabilistic context to provide time-dependent optimal decisions on the prediction of diabetes and the treatment to be prescribed according to the Ayurveda clinical data of the patient. This supports the decisions of the specialists to produce this medicine to deliver the best-customized treatment for the analysed disease. Meanwhile, providing the required data for the sources to be used, edit and remove these sources, and storing and retrieving the data which is prescribed to patient and their information through efficient database management systems. Also, this project aims to collect more data on treatment customization for patients for algorithm training purposes for more accurate customization of treatments in the future.

Author has incorporated strategies to optimally predict diabetes diagnosis and the most suitable Ayurveda treatment for it using a real-life data set of diabetes clinical data and the outcome manually matched with the best Ayurveda herbal treatment with the help of Ayurveda Physicians. Pre-processing tasks like scaling, testing, training, and managing would be included, as well as best parameter selection for increased accuracy. Diabetes diagnosis and treatment prediction were predicted using classification algorithms described in the literature, with an accuracy of 88 percent for diabetes prediction and 55 percent for treatment prediction. This project also funds a treatment prescribing system that allows physicians to amend and personalize treatments for patients, as well as manage patient records to store and retrieve data.

Keywords- Diabetes prediction, Machine learning, Accuracy, Random Forest (RF), Ayurveda herbal treatments