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Diabetes Disease Prediction using Retina Scan

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***Abstract* – One of the foremost causes for the increase in mortality among children and adults in recent years is diabetes. Doctors are using classification systems to analyse and diagnose the medical data. In order to classify diseases, Radial basis function neural networks are more dependable. It is especially helpful in diabetes classification, because of it's non iterative nature. In Radial basis function neural networks, there are four layers. The four layers are input layer, pattern layer, summation layer and the decision layer. They are feed forward neural networks. Along with the training data set size, the size of the pattern layer increases simultaneously. Although various attempts have made to solve this issue by clustering input data using different clustering algorithms like k-means and k- medoids, the main difficulty in determining the optimal number of neurons in the pattern layer remains unsolved. A new model is applied here in order to classify the data gathered from diabetic patients. This model is made mainly on the basis of cluster validity index and radial basis neural network. In order to determine the optimal number of neurons in pattern layer, cluster validity index is used in class by class fashion. It is important to identify the weights between summation layer and pattern layer for processing. Thus, in order to identify the weights between summation layer and pattern layer, a new convex fitness function has been designed for bat inspired optimization algorithm. For testing the model, Pima Indians Diabetes data set and synthetic data sets are being used. Experimental results proved that our approach performs better in terms of accuracy, sensitivity, specificity, classification time, training time, network complexity and computational time compared to conventional radial basis function neural network. On comparing with familiar classifiers namely probabilistic neural network, feed forward neural network, artificial immune system, GINI classifier, etc, our proposed model has proven to perform better.**

***Keywords*– Retina, Diabetes, Prediction.**

I. INTRODUCTION

Lining the inner surface of the eye, there is a light-sensitive tissue called Retina. An image of the visual world is created on retina by the optics of the eye, which is similar to the working of the film in a camera. As light strikes the retina, a cascade of chemical and electrical events is initiated that ultimately triggers nerve impulses. These signals pass through the fibers of the optic nerve and are sent to various visual centers of the brain. Being a membrane in the eye, Retina is responsible for controlling the amount of light reaching it.

The retina consists of pigmented fibro vascular tissue known as stoma. The most forward portion of the eye is Retina. It is the only one seen on superficial inspection. The pupil is contracted by retina and opened by a set of dilator muscles. A heavily pigmented epithelial layer covers the back surface and the front surface lacks epithelium. Light is blocked by the high pigment content from passing through the iris restricting it to the pupil. Root is the outer edge of iris which is attached to sclera and the anterior ciliary body. The combination of retina And ciliary body is called as the anterior uvea. In front of the root of the retina, there is the region through which the aqueous humour constantly drains out of the eye. As a result, diseases of the iris often have important effects on intraocular pressure leading iris to make the pupil larger or smaller. Similar to thumb impression, Retinal images are very important biometric information. Due to its uniqueness in nature, it can further be used for all kinds of authentications and security applications from home to office. In order to recognize the retinal information and develop a retinal image recognition system, there is a need for faster algorithms to be run for simple webcams.

Retinal recognition is a method of biometric authentication that uses pattern-recognition techniques based on high resolution images of the iris of an individual's eyes. Digital templates are extracted from iris images to get its mathematical representation. Digital templates make the processing simple to yield unambiguous positive identification of an individual. Recognition efficacy of iris rarely impedes by glasses or contact lenses. The smallest outlier is provided by the iris

technology for those who cannot use or enroll in the groups of all biometric technologies.

1. Radial Basis Function

For solving current pattern recognition problems, RBF model is currently very popular. Nonlinear and linear components can be used separately in RBF. RBF possesses important and universal mathematical properties and best approximation. RBF models are attractive for many applications because of these features. RBF model is used in a wide range of fields like geophysics, signal processing, meteorology, orthopedics, computational fluid dynamics and cancer classification.

2. Convolutional Neural Network (CNN)

CNN is a type of artificial neural network. The main purpose of a convolutional neural network is analysis of data and extraction of information from the provided data. It uses a machine learning unit algorithm called perceptrons for supervised learning. Image processing, natural language processing and other types of cognitive tasks are easier to be implemented with the help of CNN. Convolutional neural network is an important neural network used for image recognition and classification. Object detection, faces recognition etc., are some of the areas where CNNs are widely used. For classifying images, CNN takes an input image, processes it and then classifies under certain categories (Eg., Dog, Table, Tiger, Man). An input image occurs as an array of pixels to the computer which is dependent on the resolution of image. Based on the image resolution, it will see h x w x d. Eg. An image of 6 x 6 x 3 array of matrix of RGB and 4 x 4 x 1 array of matrix of grayscale image.

II. LITERATURE REVIEW

The existing system of disease prediction process is manual. Existing system is a large man power process and is difficult to implement it at different platforms. It has too many problems. So we introduce diabetes disease prediction, which is a fully mobile application.

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