Sugar Level Detection using Thermal Image of the Palm

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Abstract: Diabetes is an infection that happens when your blood glucose, likewise called glucose, is excessively high. Blood glucose is your primary wellspring of vitality and originates from the sustenance we eat. Insulin a hormone created by the pancreas causes us to get glucose from sustenance that we expend day by day. Now and again your body doesn't mke enough or any insulin or doesn't utilize insulin well. Glucose at that point remains in your blood and doesn't achieve your cells. In spite of the fact that diabetes has no perpetual fix ,yet you can find a way to deal with your diabetes and remain solid. Once in a while people call diabetes "a bit of sugar" or "marginal diabetes". These terms recommend that somebody doesn't generally have diabetes or has a less genuine case, yet every instance of diabetes is not kidding. All articles transmit infrared energy(heat) as a component of their temperature. The infrared vitality discharged by an article is known as its warmth signature. When all is said in done, an item can emanate more radiations. Thermal picture is basically a warmth sensor that is fit for distinguishing small contrasts in temperature. The gadget gathers the infrared radiation from items are once in a while definitely a similar temperature as different articles around them, a thermal camera can recognize them and they will show up as unmistakable in a thermal picture.

Index Terms: sugar ,thermal ,image processing, diabetes, classifiers.

I. INTRODUCTION

In vitality digestion, glucose is the most imperative wellspring of vitality in all living beings. Glucose for digestion is in part put away as a polymer, on plants predominantly as starch and amylopectin and in creatures as glycogen. Glucose flows in the blood of creatures as glucose. The typical blood glucose level for non-diabetics ought to be somewhere in the range of 3.9 and 7.1 mmol/L(70 to 130 mg/dL).The worldwide mean fasting plasma blood glucose level in people is about 5.5 mmol/L(100 mg/dL),however this dimension changes all through the day.Blood sugar level for those without diabetes and who are not fasting ought to be underneath 6.9 mmol/L(125 mg/dL).The blood glucose target run for diabetics, as indicated by the American Diabetes Association, it ought to be 5.0-7.2 mmol/L(90-30 mg/dL)before dinners, and under 10 mmol/L(180 mg/dL)after suppers.

Type 1 diabetes once known as adolescent diabetes or insulin-subordinate diabetes is an endless condition in which the pancreas produce practically no insulin. Insulin is a hormone expected to enable sugar to enter cells to create vitality. Distinctive factors,including hereditary qualities and some infections, may add to type 1 diabetes. In spite of the fact that type 1 diabetes generally shows up amid youth or adolescence it can create in grown-ups.

On the off chance that you have type 2 diabetes your body does not utilize insulin legitimately. This is called insulin opposition. At first, your pancreas makes additional insulin to compensate for it.But after some time it can't keep up and can't make enough insulin to keep your blood glucose at ordinary dimensions.

Gestational diabetes happens just amid pregnancy. It implies you have high glucose level, however those dimensions were ordinary before you were pregnant. On the off chance that you have it, you can at present have a solid infant with assistance from your specialist and by doing basic things to deal with your glucose likewise called blood glucose. After your infant is conceived, gestational diabetes more often than not leaves..

II. RELATED WORK

An automation method is used for implementing the food images which are detected. For the further analysis the features are extracted in the textural format from the segmented region. For the verification of the accuracy of the detection SVM,PNN and KNN classifiers are used. Based on the comparison result KNN classifier is concluded as the best and most efficient among others.[5]To determine the hyperglycaemia presence an artificial neural network which uses a classification unit is developed. T1DM patient's ECG parameters id used for this testing. By using LM algorithm it gives result of 70.59% sensitivity and specification of 65.58%. Other than this algorithm various types of training algorithms have also developed and compared.[8]The calibration of the photoacoustic measurement mobile computing is used. To estimate the glucose amount which is specified by photoacoustic apparatus is determined along with the FPGA-based embedded system for noise removing for data acquisition and finally for displaying it. Using vitro by the photoacoustic measurements this technique is verified. [3]The main concept of UWB is based on the non-invasive glucose monitoring system. This works with 82%accuracy and showing its accuracy in practice. This method is non-invasive, user friendly and end users for checking it regularly.

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III. EXISTING SYSTEM

In type II diabetes the temperature of the planar foot is very important as the abnormal variations of the temperature can be easily signed in foot ulcer. This main propose of this paper is to automatic analyse of the temperature variations by using infrared camera. A protocol of robust acquisition is needed to be proposed and a development of image software is needed. Three major analysis are needed to be performed.Firstbased on the Chan and Vese active contour method a mean foot temperature is needed to be measured.Second,foot is assessed by a rigid region registration method which difference between the 2 feet. Third, significant regions difference by greater than 2.2 C are highlighted. All these are completely automatic and need no manual intervention. Based on the medical exam,these persons are divided into 2 groups

i) a medium risk group

ii) a high risk groups.

The mean temperature of the planar foot surface is more prominent than 1 C contrasted with the medium hazard gathering. The mean point to point contrast demonstrates indistinguishable qualities in the 2 gatherings. While looking at 9 subjects out of 82 one's shoe noteworthy hyperthermia of foot. The new chance to dissect foot temperature consequently in emergency clinics will help in lessening foot ulcer is normal.

IV. PROPOSED SYSTEM

In this project our aim is to detect the glucose level of an individual using the thermal image of the palm. Here we use mid-infrared rays to detect the glucose level instead of near infra-red rays because near infra-red light interacts with a number of acids and chemicals in the skin which makes it toxic. All objects will emit a few kinds of infrared radiation. Thermal cameras can detect this radiation and convert it to an image that we can interpret and see with our eyes. Thermal cameras capture the total amount of heat radiating by the particular object. All objects will emit a few kinds of infrared radiation. Also, it was one of the ways that heat is transferred. The hotter an object will be more infrared radiation produced. Thermal cameras can detect this radiation and convert it to an image that we can interpret and see with our eyes. Inside the thermal camera. There are a group of small measuring devices that will capture infrared radiation, called micro bolometer which accounts the temperature and then consigns that pixel to an appropriate colour. Most thermal cameras capture longer wavelength of infrared and the general typical night vision security camera witness shorter wavelength of infrared. Thermal compression has the capability to capture longer wavelengths of infrared and also allowing detecting heat. Insulin will seem to work as an internal thermostat and facilitate to raise core body temperature by trigger the burning of "brownfats "cells.Many type1 diabetes have a low core body temperature that is below 97 degree whereas the type II diabetes warm a body rather than cooling it.Sincebody temperature depends on the level of glucose in the body it is possible for us to detect the sugar level using thermal camera which produce images depending on the temperature. Thecolour of the object in the picture depends on the amount heat radiated around that particular object. Many type I diabetes have a low core body temperature that is below 97 degree whereas the type II diabetes warm a body rather than cooling it.Since, body temperature depends on the level of glucose in the body it is possible for us to detect the sugar level using thermal cameras which produce images depending on the temperature. In this paper we have used image acquisition for acquiring the thermal image of the palm using near infra res rays. Reprocessing is used for converting the acquired thermal image into gray scale image. By using gray level co-occurrence matrix feature extraction is done. In classification the image obtained after feature extraction is compared with database and the result is produced accordingly. For feature extraction many data analysis software packages are available like NumPy, MATLABetc which are the easy and simple techniques for feature extraction with built-in functions.in our project we are using principal component analysis using NumPy.After extracting the feature, the gray scale image is classified using classifiers. The like Support VectorMachine (SVM), Probabilistic Neural Network (PNN), K-Nearest Neighbour Network (KNN)are used to diagnose the thermal image of the palm. In this project we are using support vector machine (SVM)as the classifier. Because support vectormachine (SVM) is suitable for supervised learning than other available classifiers. Finally, the result is produced whether the patient is diabetic.

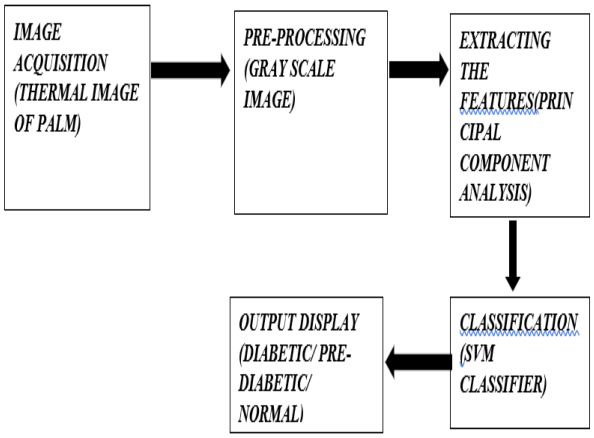

Fig.1 System architecture

V. CONCLUSION

In this method we have approached non-invasive technique for detecting the sugar glucose level in the blood. For detecting the level of glucose in this project we have used many modules for the accuracy detection. We initially acquire the thermal image which is later converted into the gray scale image for the system detection using pre-processingthem the feature extraction is done using the principal component analysis and the classification is done using the SVM which is gives accurate result compared to other methods. Then finally the result is produced related to the test.

Table 1. Classifier results

CLASSIFIER TYPE	ERROR	RELATIVE ACCURACY
Support vector machine	14.6%	85.4%
Probabilistic neural network	25.4%	74.6%
K-nearest neighbour network	18.8%	81.2%

VI. FUTURE ENHANCEMENTS

In future the project can be extended by the additional use of Thermal cameras available.Also the images obtained by the normal cameras can be converted into a thermal image and it can be processed to get the result of the bood glucose level.So that the patient or the individual can check the diabetic level on daily basis.

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