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## PREDIAGNOSIS OF DIABETES THROUGH IRIS SCAN

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### ABSTRACT:

The initial symptoms of diabetes are very difficult to identify as it cannot be detected early, it results in causing other diseases. Eye retina is mainly affected by diabetes. Iridology helps us in detecting diabetes in early stages. By using this method we can identify the state of body organs before the organs affected by disease. In this paper, we are developing an application to detect diabetes at early stages by using image processing[1]. The pre-existing systems are developed based upon algorithms like k-map, support vector machine (svm), decision trees etc. but those are very difficult to develop and understand for further development[3]. To overcome these difficulties, this paper proposes a new system in which we detect symptoms of diabetes in early stages. In our venture we took eye pictures of 40 individuals having sound eye and another 40 individuals having diabetes influenced eye by utilizing 2D wavelet tree. The exactness got by our examination is 87.50%.

*Index Terms - Diabetes, 2D discrete wavelet transform, Support vector machine, Gaussian polynomial, Radial basis function(RBF)*

### I. INTRODUCTION

Validation of each individual with the assistance of a biometric framework which depends on human qualities, for example, finger, face, voice and iris are fascinating regions for research[3]. Out of these, the outcomes acquired by utilizing iris acknowledgment framework are generally exact and dependable. Presently Iris acknowledgment framework is for the most part utilized in different security systems[8]. Iris acknowledgment framework is additionally utilized in clinical applications. A large portion of the analysts utilized iris acknowledgment based calculations together with iridology to distinguish the status of each and every individual in regards to their wellbeing. 2D wavelet tree is utilized for highlight extraction. To decide diabetes SVM is utilized as a classifier[7]. Diabetes is a metabolic malady which happens because of absence of insulin or the cells to react to the insulin created. Nowadays the main keyword around the world is "Health care". Diabetes causes a worldwide Health Care crisis. A fast and quick look on it reduces the human's fatal rate. It is a metabolic disease in which a person contains high blood sugar because of insufficient insulin in the body or cells in the body does not respond to the insulin produced [1].

Health care management and Medical science gives top priority to diabetes. A huge amount of data and records are maintained on diabetes patients. Clinical decision support may use results [2] obtained from predictive models that combine patient data and prognostic data to improve patient care [4]. Data mining extracts knowledge from large databases. It involves different fields of computer science with the computational process, statistical techniques, machine learning, clustering and discovering patterns [8]. Data mining provides effective prediction and accurate results to save lives and reduces the cost of treatment. The management of diabetes and its complications can be done by predictive models and several models are being proposed over decades. User authentication can be done by using the biometric system based on features of finger, face, and voice. Iris has a strong area of research on authentication. Iris recognition system is used in various systems such as ATM machines, airports, etc are applications [9]. We are using some algorithms for iris recognition and along with iridology to know the status of the diabetic person [7]. In this paper, we are using the SVM algorithm for classification and 2-D wavelet tree for extraction.

## II. RELATED WORK

Diabetes chiefly comprises of 3 kinds in particular, type-1, type-2, and gestational diabetes. In type-1 diabetes body will deliver exceptionally modest quantity of insulin. It is frequently happened in childrens youngsters and now and then in grown-ups too. For the most part it is alluded to as insulin dependent diabetes mellitus (IDDM) [4]. In type-2 diabetes, the body can't utilize the accessible insulin. It mostly happened in grown-ups beyond 40 a years old, presently a-days it has been distinguished in childrens too. Gestational diabetes as a rule happens in pregnant ladies, who are never influenced by diabetes yet have a high blood glucose level during pregnancy [6]. The ordinary side effects of high glucose are weight reduction visit inclination to pee and hunger [5]. The capacity of pancreas is to give insulin which is grayish pink organ around 5 in long, fish formed that extends over the rear of midriff behind stomach.

For discovering whether an individual is diabetic or not there are different strategies which incorporate estimating glucose levels through pee, eye liquids, sweat, blood, and salivation [5]. Some of these techniques require test readiness ahead of time. This obtrusive strategy can be covered with the assistance of Iridology [1]. It is a science that interfaces designs, shapes, tissue harm, and so on. The current framework isn't helping most of individuals get analyzed because of which, their issues turn out in not all that beginning times [10]. Recognition of diabetes utilizing Iris filtering should be possible physically by an ophthalmologist or a specialist. When with this technique, the old strategy of in-person assessments are not all that manageable for the immense size of the diabetic populace. Diabetes is of three sorts to be specific, type I, type II and gestational diabetes [4].

- When the body delivers an irrelevant measure of insulin it is the sort I diabetes. This is for the most part seen in kids and young people. It is likewise called as IDDM (Insulin Dependent Diabetes Mellitus).
- When the body doesn't deliver insulin effectively it is the sort II diabetes. This sort of diabetes is for the most part seen in grown-ups of 40 or more. Nonetheless, because of high stoutness rates, adolescents and youthful grown-ups are additionally determined to have this issue.
- The third sort which is gestational diabetes is seen in pregnant ladies. A couple of ladies with no record of diabetes will have high glucose levels in their blood, which prompts diabetes.

## III. BENEFITS OF PROPOSED SYSTEM

Iris recognition algorithms together with clinical iridology are utilized for the improvement of a mechanized PC model to distinguish the status of a person. There are five phases in iris acknowledgment based analysis model as appeared in the beneath figure 1.

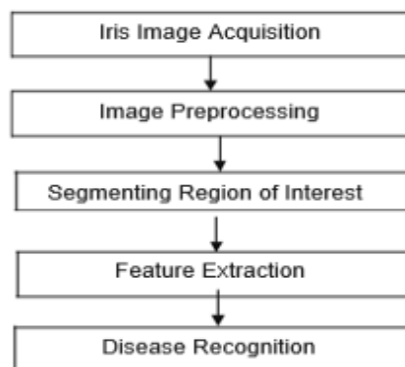


Fig.1 Different stages of proposed system

### A). Iris Image Acquisition

Presently we store the eye pictures of solid individuals who are experiencing diabetes. These eye pictures have been made by utilizing I-SCAN-2 for our analysis. In our work eye picture dataset of 80 individuals i.e 40 diabetic (25 female, 15 male) and 40 sound people (22 female, 18 male) has been utilized. We accumulate pictures of various matured gathering individuals cautiously. For this exploration we have taken educated composed assent from every individual and moral endorsement from the institutional moral committee [9].

Iris acknowledgment utilizes numerical example acknowledgment strategies which follow the techniques for biometric distinguishing proof. The mind boggling and irregular examples of iris pictures which are extraordinary are obvious from a separation. Our framework utilizes camera innovation to get pictures which give rich insights

regarding the structure of iris.

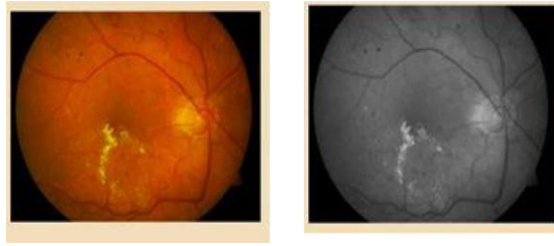


Fig 2: Data Pre-processing Phase (a) Input Image (b) Gray scale Image

## B). Image Processing

This procedure includes transformation of iris picture to reasonable structure to get required highlights. It for the most part comprises of three stages. They are iris standardization, picture improvement and iris limitation/division. Iris division isolates eye picture into two circles, one for iris-understudy limit and the another is for iris sclera limit. The pictures got from the database are pre- handled utilizing the accompanying methods:

1. Resizing the retinal dim pictures The given retinal pictures which are taken as information are resized or compacted into little pictures which assists with maintaining a strategic distance from time utilization.
2. Color to Gray Scale change - To change over RGB pictures into Gray pictures .
3. Filtering-A non-straight channel named Median Filter is utilized which diminishes twists in a picture and stifles commotion without obscuring sharp edges.

## C). Segmenting Region of Interest

Iridology diagram encourages us separating the iris into various portions. Each fragment speaks to various organs. The progressions delivered in these sections will advise us that a few changes happened in the organs of the body. The pancreas comprises of basically three regions[12]. They are Head, Body and tail. Somewhere in the range of 7 and 8 o' clock the iridology diagram shows the leader of the pancreas in the correct eye. Somewhere in the range of 7 and 8 o' clock the iridology graph shows the body of the pancreas in the left eye and in the middle of 4 and 5 o'clock it shows the tail. In our venture we are doing tests just by thinking about the left eye.

## D). Feature Extraction

A lot of nerves and veins comprise of iris surface. In the iris surface we watch certain progressions like gaps , hyper pigmentation, radii Solaris, crack ,lines , nerve rings and shade of iris relying on the wellbeing of the person. For the iris acknowledgment framework numerous specialists proposed numerous calculations, for example, total Sum – based change examination , wavelet change , Hilbert change , gabor channels. In our undertaking to extricate the noteworthy highlights from iris pictures 2D discrete wavelet change( DWT) was actualized. Discrete wavelet change separates a picture into four sub pictures , they are approximation(LL), vertical (LH), level (HL), diagonal(HH) as appeared in figure.

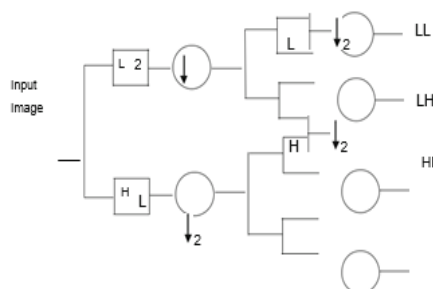


Fig 3. 2D- Discrete wavelet transform

Size of the iris image is  $N$ . Here  $N$  is split into four sub parts of size  $N=2$  and  $N=2$ . It contains different frequency components information. The blockwise representation is shown by following figure 3. By utilizing low-pass separating LL sub-band is gotten and it contains the unpleasant portrayal about the picture. HH sub-band is gotten by high-pass separating and it contains high-recurrence parts. HL and LH are gotten by applying the low-pass separating one way and high pass sifting toward another path. Vertical information data considered in LH and it relates to level edges and HL speaks to flat data from vertical edges. By utilizing DWT we can disintegrate the picture more than once. Deterioration fundamentally comprises of two kinds, in particular, parcel and pyramidal decay. If there should arise an occurrence of pyramidal decay, disintegrations applied distinctly to LL sub-band. If there should arise an occurrence of parcel deterioration, decay isn't restricted. In our undertaking, we actualized pyramidal deterioration of 2-D standardized iris picture.

### E). Disease Recognition

In our proposed model we utilized SVM as classifier and it is an up and coming layout coordinating procedure. SVM depends on the guideline of basic hazard minimization. SVM ideally isolates the two classes. In the improvement of SVM as classifier there are two significant viewpoints. One of them is, assurance of ideal hyperplane which will ideally isolate the two classes. Another perspective is the change of non-directly divisible grouping issues. The idea of SVM is proposed by vavnik and the top to bottom data was given by burges and Cristianini.

## IV. RESULTS AND DISCUSSION

Iris recognition algorithm-based model classifier has been executed utilizing picture handling tool kit of MATLAB 7.1. by utilizing 4-overlay cross approval the analyses have been approved. The all out database is separated into four equivalent allotments. One of them is utilized for testing and the other three are utilized to prepare the classifier[11]. Investigations are directed by choosing three portion capacities. They are in particular, Gaussian, polynomial and spiral premise function(RBF) for SVM. The following table portrays the comparison of various mixes of bit capacity and feature vectors. From the beneath table we see that vector RBF part work gives most extreme precision. The table shows that the outcomes got in the proposed model with include vector produced as a mix of LL and HL is progressively effective.

Table 2. the comparison of different combinations of kernel function and feature vectors

Feature Vector	Gaussian (%)	Radial basis function (%)	Polynomial (2nd order) (%)	Polynomial (3rd order) (%)
LL	81.25	81.25	76.25	75.50
HL	76.25	81.25	75.00	77.50
LH	76.25	80.00	75.00	75.00
LL+HL	86.25	87.50	81.25	77.50
LL+LH	85.00	86.25	81.25	76.25
HL+LH	81.25	85.00	80.00	78.60
LL+HL+LH	81.25	81.25	77.50	78.60

The accuracy of results obtained by our project is shown in the bar chart. From that we observed, maximum accuracy 87.5% is obtained from RBF kernel function. The maximum sensitivity obtained is 0.95 and the maximum specificity is 0.90. In our proposed model we observed that it does not work well for patients having operated on the eye. Another observation from our study is, the person having controlled diabetes for the last 3 years with proper medicines, diet and exercise has also been identified as healthy. While acquiring iris images factors like lighting, position of blinking of eyes and handling of iris scanner need to be considered. The major aspect in system performance is most of the patients do not reveal their true health conditions and this leads to certain kind of bias.

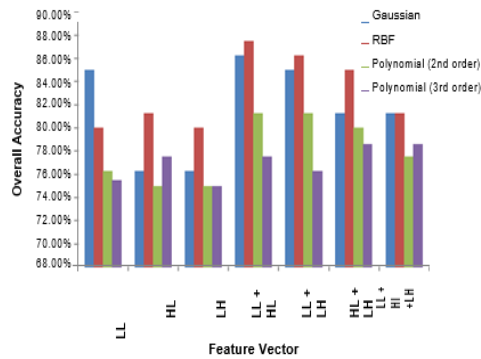


Fig 4. The accuracy of results

## V. CONCLUSION

All the existing systems are developed by using complex algorithms like decision tree, naive bayes, gaussian mixture. Due to this it becomes very hard to understand and develop the system for the developers. In this paper, we developed a system in which by scanning the retina of the eye we can be able to predict diabetes in early stages. It is concluded that the retinal images are evaluated to diagnose the DR. It is however, time consuming and resource demanding to manually grade the images such that the severity of DR can be defined. When the tiny blood vessels present within the retina are damaged, only then can one notice this problem. Blood will flow from this tiny blood vessel and features are formed from the fluid that exists on retina. The diabetes retinopathy detection has the three phases which are pre-processing, feature extraction and classification. By using this retinopathy, the produced results are more efficient and accurate.

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