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المجلد ٨، العدد ٢، حزيران ٢٠١٨
Website: jceps.utq.edu.iq Email: jceps@eps.utq.edu.iq

Hereditary Human Disorders Identification through Fingerprint Analysis

Abbas K. Ali
abbas@utq.edu.iq
Computer Center

Abstract

Fingerprints play an important role in our daily lives especially in security and medical fields so we will discuss in this research the problems of human diseases genetic type II diabetes mellitus, which is a common disease in the world and in Iraq especially. It will be based on some methods of detection of diabetes mellitus genetic and accurate and fast without resorting to traditional methods (blood test) by fingerprint analysis. The fingerprint of a patient from a family history analysis by the extraction of ripples and the fingerprint ridge count are keep in the data base to future as a reference to be matched with people of the same race or family they have genetic diabetes by analyzing the fingerprint and compare with thefingerprint is stored in the system

the accuracy of success in realty for this paper is 90% based on opinionof doctors in al-Hussein hospital in al-Nassriyah City because how it's evaluated person if he /she has diabetes in early way don't need to blood test.

Keywords: Fingerprint, diabetes mellitus, ridge counts.

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تشخيص الاضطرابات الوراثيه للبشر عن طريق تحليل بصمة الاصابع

م.م. عباس كاظم علي
abbas@utq.edu.iq
مركز الحاسبة الالكترونية

الخلاصة

تلعب بصمة الاصابع دورا مهما في حياتنا اليوميه وخصوصا في مجالات الامنية ومجالات الطب حيث سنناقش في هذا البحث مشاكل الامراض البشرية الوراثية واهمها مرض السكري الذي هو من الامراض الشائعه في العالم عامة وفي العراق خاصه . حيث سيتم الاعتماد على طرق اكتشاف مرض السكري الوراثي وبصورة دقيقة وسريعه دون اللجوء الى الطرق التقليدية (عينات الدم) عن طريق تحليل بصمة الاصابع . حيث تتم اخذ بصمة لشخص من عائلة مصابة بمرض السكري الوراثي وتحليلها عن طريق استخراج التموجات وعدد الخطوط في البصمه (Ridge count) ويتم الاحتفاظ بها في المستقبل كمرجع يتم مطابقتها مع الاشخاص من نفس العرق او العائلة المحتمل اصابتهم بداء السكري الوراثي عن طريق تحليل بصمة ومقارنتها مع البصمة المخزونه في النظام .نسبة نجاح هذا البحث وتطبيقه عمليا على عينات من الاشخاص هو ٩٠ % حسب رأي الاطباء في مستشفى الحسين التعليمي في مدينة الناصرية لما يحتوي من تخمين اصابة بمرض السكري بصورة مبكره ولا يحتاج الى تحليل باستخدام عينات الدم.

كلمات مفتاحية:- بصمة الاصابع , داء السكري , عدد خطوط البصمة

Introduction

Finger print recognition is regarded as the faster and accurate process in recognizing the distinct results from the humans. Finger print analysis is regarded as the most reliable source to reveal the distinct patterns and wavelets of the ridges and valleys. Finger Print will be predominantly used in the law enforcement and forensic science community. The recent improvements have paved the way for utilization of finger print analysis in diagnosing the diseases or disorders in clinical field. The reliability of fingerprints have paved the way to perform many research work in the health care industry in diagnosing the dermatology complications and human disorders[11].

Fingerprint scanning and identification of persons is regarded as the most versatile process inherited by biometric identification system from long years. Finger print identification can be done with the help of finger print scanners. The finger print scanners are changing from time to time to increase the scanning capacity with the output of clarity. The scanning process is an easy method to take the print of the finger and verify the same with the similar kind of finger print stored in the database [3]. When the same pattern is matched it will send the signal that the finger print is matched [4].

Our suggestion work is early detection of patient they may have hereditary diabetes the fingerprint scanning and identification mechanism is predominantly used with simple and easy process. The process starts with storing the finger prints in a database or a file storage folder for one person from family history as a reference to check others who are from the same family . When the finger print is scanned from the finger print scanner (for person from family history as we said) the photorefractive polymers will convert the image of the thumb impression into jpeg format. The jpeg file of specific finger print will be stored in the file format in the internal folders of the computer system or stored in a column of a database. The finger print identification process will be done with the new finger print which is scanned by the person and verify or compare the same format jpg with the stored finger print jpeg files.

In the comparison process if the external jpeg scanned from the scanner is fully matched with the sored jpeg image it will notify that the finger print is matched [5].

The image comparison and verification process comparison will reveal the results with accuracy. The minute and unique pixel to pixel verification process of the JPEG will leads to get the results. Apart from the human identification with the unique finger print scanning and verification, a new version has been developed in the recent years to distinguish the dermatology disorders and grasping the symptoms of diabetes mellitus in distinguishing the type 1 and type 2 disorders. Asymmetry scores are predominant in identification of diabetes mellitus symptoms in the patients. The biometric

scanning is considered to be the most economic and inexpensive examination process when compared with other tests and examinations [7].

CrossMatch Verifier 320 LC scanner

In this clinical operations in identification of diabetes mellitus with finger print a powerful version is need to be used to get the clarity and obviousness of the finger print without any variation. In finger print scanning the image formulated by the scanner would be slightly different from the originally stored images in the database. The variation can be neglected when the patterns are measured accurately. The recent years observations and research outcome has revealed that the finger print ridges are slowly changing in the diabetes mellitus patients. Finger print scanning and verification can be done with the help of Ridges and Valleys. The effective scanning can be done with the higher power scanners like 320 LC. The cross match verifier scanner shown in the figure 1 will be widely used in the clinical observations and disorders identification mechanism in the medical field. The Crossmatch verifier 320 LC will reduce the variations in scanning process to distinguish the human disorders like type 2 diabetes mellitus in the early patients with symptoms [2].

In our work we will depend on matching the count of ridge of fingerprint to patient with other fingerprint the person may have this disease, the values of matching are difference between fingerprint that work as reference and fingerprint to new person want to check, so value of ridge (ridge count) will compute by program we suggest it doing by .Net the maximum value is 1 and the minimum value is 0 when we get ridge count we check if ridge count more than 0.5 that is mean the person is health if the ridge count less than 0.5 it's patient

In the following figure 1 we can see clearly the carve of two fingerprint first when person healthy the ridge count for 10 places measure fingerprint start from left carnal, core and right carnal between (0 - 0.9) , other case that is patient in diabetes the range was between (0-0.2)

Figure 1 the ridge count carve

Predominantly the finger print analysis will be done in the pattern matching and changing variations of Ridges and Valleys observed in the finger prints. It is observed from the finger prints of patients who have the family history of diabetes for their parents. The diagnosis process is basically compared with the pattern asymmetry scores and wavelet asymmetry scores for a finger pair. The distinguished reading of the wavelet asymmetry scores taken from the finger pair can reveal the predicted risk of Type 1 Diabetes Mellitus.

Related work

Type II diabetes is a identified as the chronic hyperglycemia attributable to insulin resistance. It is caused by the pancreatic Bata cell dysfunction. Type II Diabetes Mellitus leads to the microvascular and macrovascular complications. The disorder is frequently found in the adults and rarely in children and adolescents. The root cause of the Type 2 Diabetes is smoking, aging, obesity, heavy consumption of alcohol, decreased physical activity and low amount of fiber contents diet. The identification methods with different tools are expensive in the medical examinations. The symptoms of diabetes are not known the patients are affected unknowingly with high range of diabetes [8].

Identification of diabetes mellitus with the help of finger print analysis could be most economic method with high accuracy. The examination with the finger print analysis will be done with the comparison of wavelet transformation found in the finger prints. The statistical analysis and asymmetry scores measurement reveals the symptoms of Diabetes Mellitus in the patient. In this

process the rolled finger prints are scanned with high ppi resolutions with 256 level grayscale. The uncompressed digital images are evaluated for finding the symptoms of Type 2 Diabetes Mellitus. The ridge and valley counts are predominantly taken into the account and the pattern analysis will be done to estimate assumptions [2] [9].

World Health Organisation has given clear instructions to conduct the evaluating screening procedures to find the diabetes. The evaluation screening procedures and performance indicators will help the clinicians to identify the diabetes in the patients. Early detection of diabetes will reduce the damages to the organs by using the prescribed medication with epidemiological considerations. The health system capacity can be estimated and prescribe the appropriate medication to the patient. WHO also suggested to proceed with the finger print pattern evaluation to identify the symptoms of type 2 diabetes mellitus. The severity of the disorder can be revealed by the blood tests and needful medication can reduce the damage to the organs in the further due course [10].

Methodology

The diabetic Mellitus can be identified with the distinct process with the patients. The patients are distinguished with the family history of diabetes. Genetic studies revealed that the finger prints are predominantly influenced by the genetic and gestational environment. The fluctuating asymmetry in finger prints can be the distinguishing point to identify the natural disorders of the human body. The participants who don't have any deviation in asymmetry patterns will be observed some more period. The participants who are not affected with the diabetes even they were from the diabetes affected family. The observations will be done for a period of time, when the observations reveal the fluctuating asymmetry in fingerprints then the symptoms are identified in the patients.

The process is depending on the count taken from ulnar loop count and whorl count in the fingerprints. The variation leads to the identify the symmetric fluctuations in the finger prints. This is the first process to examine the finger prints [11].

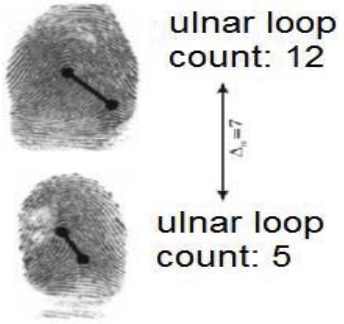

Figure 2 Ulnar loop count process

In above figure $2\Delta_{re}$ refers to difference count between ulnar loop 13 and ulnar loop 6 so it is 7 as show and so on

The count is taken from the pixels count with the measurement of 64X64 pixels size. In this process Wavelet decompositions are computed for the images stored and captured. The image features are counted with the image vectors and Euclidian distance can be measured. The above picture describes the whorl count of pixels of a finger print with distinct ridges and valleys [8].

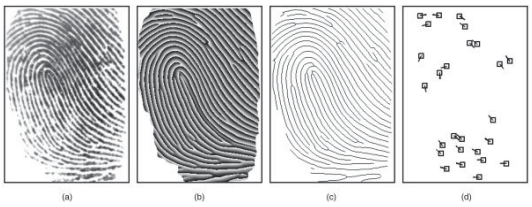

Figure 3 wavelet analysis

The wavelet analysis is shown in Figure 4 reveals the patient diabetes symptoms in figure a, b, c, and d. figure d represent the miniature diagram represented by the thumb impression of the specific patient. The figures shown above demonstrating the pattern change in the fingerprints predominantly influenced by the genetic and gestational environment.

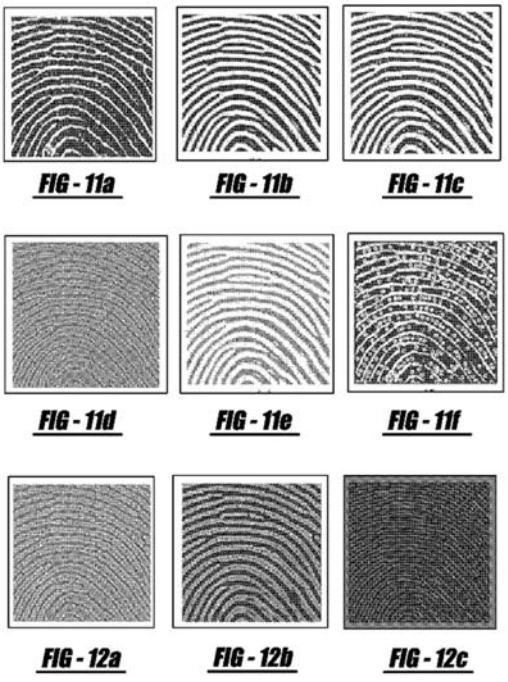

Figure 4 wavelet distinction in the same finger print

Figure 4 is showing the finger prints consists of Ridges analysis of the same person and the variation of the discrete analysis exemplify the symptoms of the diabetes mellitus of the patient. The computational analysis is linked with the age of the finger print. Type II Diabetic Mellitus can be

traced when the person is belongs to the family with the family history of diabetes. The gender also predominantly influence the occurrence of diabetes with age. The experimental results shows that the diabetes mellitus can happened to most probably to the men rather than women in the middle age group. More frequently the diabetes is found in elders than children [8].

Finger Print Analysis

The previous analysis with finger print was done with the image comparison and image processing techniques with distinct software applications and programs. The digital processing and analysis is advanced with pattern analysis to identify the human disorders. Finger prints are rich with Valleys and Ridges. The patterns of valleys and ridges are analyzed in the form of wavelet analysis and pattern analysis. The wavelets patterns are done with the computer aided program developed with the help of application development tools like java or .Net. The following figures illustrates the wavelet analysis conducted by the application developed by .Net. The image is magnified then the ridges and valleys are analyzed with the wavelet patterns analysis. The results are accurately found in this method. The patients previous thumb impression can be compared with the existing image (that was stored in data base) and the patterns can be verified. The possible identification of the disorders can be revealed from the wavelet pattern analysis system [12].

as a below figure we can see the system how it can checking with two cases first person is healthy and second is patient .

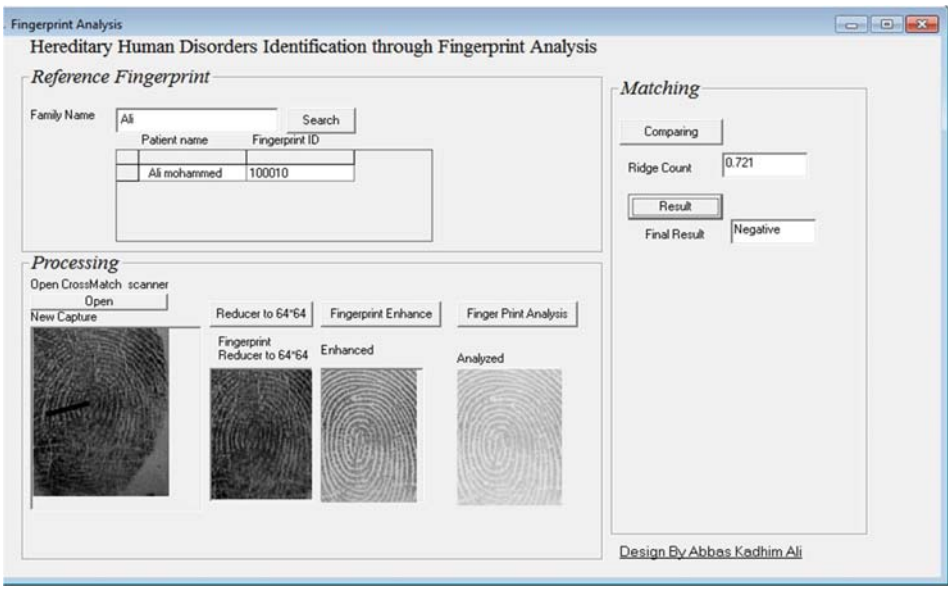

Figure 5 a - wavelet analysis in diagnosing the human disorders for healthy person

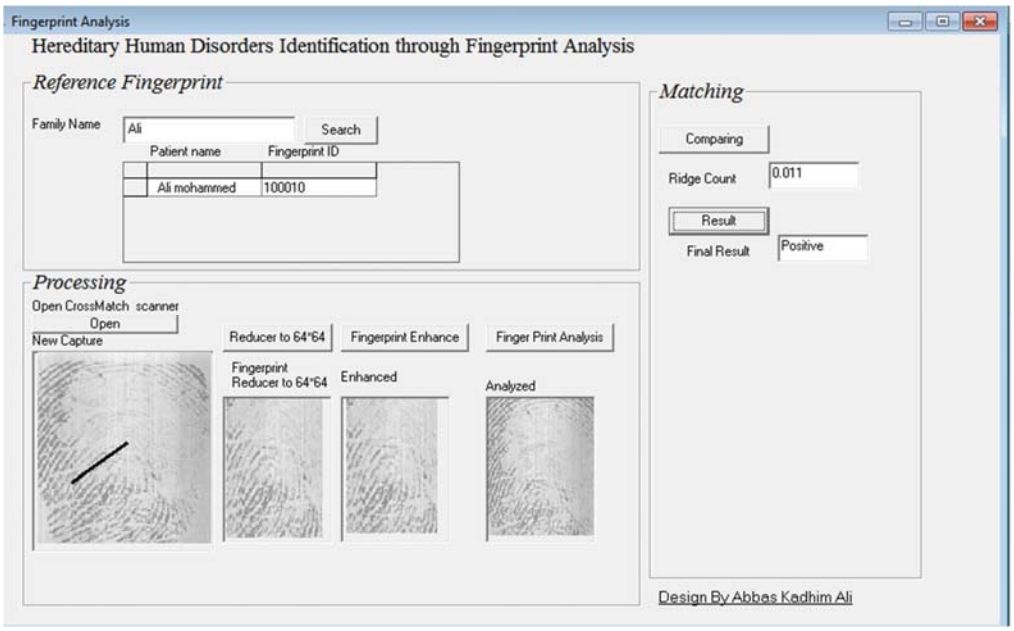

Figure 5 b- wavelet analysis in diagnosing the human disorders for patient

The wavelet analysis will be done with the session file comparison and image comparison with captured image recently taken for consideration and examination. In this process the patient's finger prints are stored in the database. When the patient visits the hospital or clinic the image will be taken for analysis. The patterns variation and ridges variation with negligible values will be identified and the symptoms can be presumed. The specific computation program can be designed and developed with the application developing tools like java or .Net programming [13].

Image Comparison Technique

Image comparison technique is predominantly used with the pixel comparison. The patient's first visit will give the first impression and scanning of a finger print. The finger print will be stored in the database in open and uncompressed image format. When the patient visits in consecutive periods to the hospital the finger print will be obtained by the doctor and send it for analysis in the same computer. The previous finger print image and new finger print image will be compared with the minutest part of the image i.e pixel. The pixel to pixel image comparison will provide the accurate results can reveal the minute variation of the patterns of ridges and valleys [7].

We are suggest two algorithms to do our work:-

Algorithm (A) steps.

That will take an image to our system as reference

- Start
- Read image
- Fouce on core of fingerprint as 64*64 pixel
- Fingerprint enhancement
- Fingerpint classification
- Fingerpint analysis to wevelet
- Rigde cont for fingerprint
- Store to Data base
- End

After we implment above algorithm now we have a good data base to check other people that may have genitic daibete by the goolowing algorithm

Algorithm (B) steps.

- Start
- Read a new iamge (thumb impression)
- Cut a center of fingerprint as 64*64 pixel
- Fingerprint enhancement
- Fingerpint classification
- Fingerpint analysis to wevelet
- Rigde cont for fingerprint
- Compare fingerprint for new person with his family reference
- Get result of compare
- If result <0.5 then our case is nagetive
- Else our case is Postive
- End if
- End

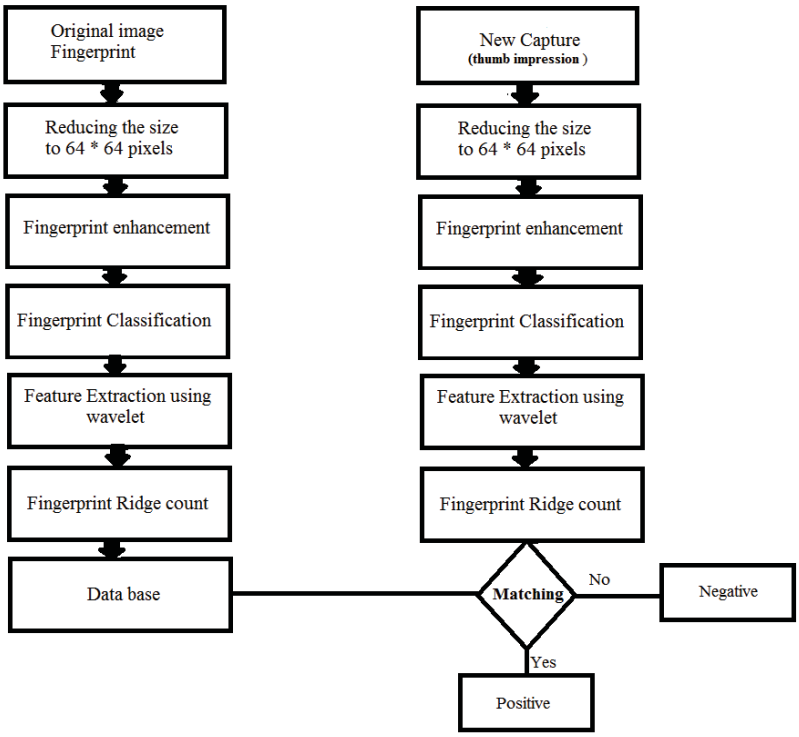

Figure 6Algorithm Processing

Image comparison process is done by the highly computational analysis with the pixel to pixel comparison between two images depend on the ridge count. The captured image to stored image in the database will be incorporated in the image comparison with x-axis and Y-axis points positioned pixels. The millions of pixels comparison will provide the accurate results [14] [2].

The process of image comparison will be done with finger print enhancement and finger print classification process. The comparison will be configured especially focused with the ridges and valleys patterns comparison. This will be done by the finger print features template process. The finger print matching process is predominantly accurate with this pattern template setting process comparison. This will be done on the basis of valleys and Ridges comparison with minute verification process [9].

Results

Here we can see our work result compare with traditional way (blood test – by using Glucose test) so we depend in our work on 20 casesfrom Al-Hussein Hospital in Al-Nassriyah City- the first 10 patient with family history and 10 also from family history but they are not casually , the percent of our work matching almost 90 % , as show in following table

Table 1 : The Result of the fingerprint analysis compare with traditional test

Fingerprint analysis				Glucose test	Matching
No	age	Ridge count	Result	Traditional way (blood test)	
1	70	0.022	Positive	450 mg/dl	100%
2	65	-0.056	Positive	400 mg/dl	100%
3	61	0.01	Positive	300 mg/dl	100%
4	33	0.22	Positive	325 mg/dl	100%
5	40	0.21	Positive	360 mg/dl	100%
6	39	0.022	Positive	250 mg/dl	90%
7	38	0.233	Positive	250 mg/dl	90%
8	10	0.211	Positive	200mg/dl	90%
9	12	-0.001	Positive	200 mg/dl	90%
10	16	0.32	Positive	225 mg/dl	90%
11	65	0.9	Negative	150 mg/dl	95%
12	63	0.8	Negative	125 mg/dl	95%
13	57	0.88	Negative	125 mg/dl	100%
14	40	0.75	Negative	100 mg/dl	100%
15	33	1	Negative	80 mg/dl	95%
16	32	0.95	Negative	95 mg/dl	95%
17	27	0.95	Negative	90 mg/dl	80%
18	10	0.77	Negative	75mg/dl	80%
19	11	0.701	Negative	80 mg/dl	80%
20	15	0.784	Negative	85mg/dl	80%

Conclusion

The finger print is rich with ridges and valleys. the pattern analysis of ridges and valleys are used for wavelet analysis to distinguish the symptoms of diabetes mellitus. The results have revealed that the occurrence of diabetes symptoms are more visible in the men with the family history of diabetes at mostly elderly age only. In this research the focus is on finger print wavelet analysis and pattern analysis to distinguish the symptoms of the diabetes mellitus. The results have taken from different persons of different age groups to find the results for occurrence of diabetes mellitus. The results have been extracted on the basis of pattern analysis and wavelet analysis of the ridges and valleys

found in finger print images. The image comparison and analysis is done in computerized pixel analysis with high accuracy.

Future scope of Study

The future scope of the study should be done with the iris image analysis which can demonstrate more secrets of human body disorders. The study should be conducted with the help of a computerized application to analyze the image with patterns and wavelet analysis. This can be producing good results to predict the disorders and malfunctionality of the body organs.

Reference

[1] Hamsa A. Abdullah (2012) Fingerprint Identification System Using Neural Networks ,Nahrain University, College of Engineering Journal (NUCEJ) Vol.15 No.2, 2012 pp234 - 244 NUCEJ Vol.15 No.2 .

[2] Molly R. M., Bjoern Ch. L., Evan S., Mahelet N. M. and Jay H. Sh., DO3 (2016)A New Method to Assess Asymmetry in Fingerprints Could Be Used as an Early Indicator of Type 2 Diabetes Mellitus , Journal of Diabetes Science and Technology 2016, Vol. 10(4) 864– 871 © 2016 .

[3] Sona M., Dr. Prasad L. J. (2014) Study of fingerprint pattern in patients with diabetes mellitus in a tertiary care center , IOSR Journal of Dental and Medical Sciences (IOSR-JDMS) e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 14, Issue 11 Ver. VII (Nov. 2015), PP 39-41

[4] Yuvaraj Mahendran (2014) Identification of Biomarkers for Type 2 Diabetes ,Publications the University of Eastern Finland Dissertations in Health Sciences

[5] Marzia Cescon(2013)Modeling and Prediction in Diabetes Physiology , Fc 2013 by Marzia Cescon. All rights reserved.Printed in Sweden by MediaTryck. Lund 2013

[6] P Manjusha, S Sudha, PM Shameena,R Chandni, Sujatha V, and Deepak P (2017)Analysis of lip print and fingerprint patterns in patients with type II diabetes mellitus published by J Oral Maxillofac Pathol. 2017 May-Aug; 21(2): 309–315. doi: 10.4103/jomfp.JOMFP_17_16

[7] Md. K B S, Sheikh Mohammed Sh I, Palash Ch B and Lal B. R (2017) Diabetes knowledge and utilization of healthcare services among patients with type 2 diabetes mellitus in Dhaka,Bangladesh , Siddique et al. BMC Health Services Research (2017)

[8] Department of Noncommunicable Disease Management Geneva (2013)Screening for Type 2 Diabetes Report of a World Health Organization and International Diabetes Federation meeting

[9] Dayeh, Tasnim (2016) The Human Pancreatic Islet Methylome and Its Role in Type 2 Diabetes , LUND UNIVERSITY 2016

[10] Henry S. Kahn Roopa Ravindranath Rodolfo Valdez K. M. Venkat Narayan (2001) Fingerprint Ridge-Count Difference between Adjacent Fingertips (dR45) Predicts Upper-Body Tissue Distribution: Evidence for Early Gestational Programming American Journal of Epidemiology, Volume 153, Issue 4, 15 February 2001, Pages 338–344.

[11] Shivaleela C, Hanji CV, Kumar GV (2013) Utility of dermatoglyphics in Type II Diabetes Mellitus (T2DM) to asses the risk for IHD: A pilot study. , Biomedical Research 2013; 24 (2): 242-244 ISSN 0970-938X

[12] Martin D.,Michal D., Jaroslav U, Eva B. and Tai-hoon K. (2012) ,Influence of Skin Diseases on Fingerprint Recognition , Journal of Biomedicine and Biotechnology Volume 2012 (2012)

[13] John D. W., Jr., Nicholas M. O, and Peter T. H. (2013) Fingerprint Recognition - Biometrics (New York: McGraw Hill Osborne, 2003).

[14] Sachin D., Shrey Sh, Vishwa M, Khatana A A (2013) FINGERPRINT, RETINA AND FACIAL RECOGNITION BASED MULTIMODAL SYSTEMS , International Journal Of Engineering And Computer Science ISSN:2319-7242 Volume 2 Issue 5 May, 2013 Page No. 1487-1500