Comparison of Iris Biometric Algorithms

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Abstract: *In this paper, we have studied biometric authentication technique based on human iris and compared Iris biometric algorithms that includes Avilla, Li ma, Tisse and Daughman based on their accuracy rate. We concluded that Daughman has the highest accuracy rate.*

**Keywords:** *Iris biometric, Iris recognition, Accuracy rate, Daughman algorithm.*

1. INTRODUCTION

Now-a-days biometric authentication system is common to authenticate the person. There are many types of authentication like fingerprints, facial feature, voice authentication system, iris biometric system etc. but the iris biometric is most relevant and secured than the other biometric system.

There are many algorithms for an iris biometric system this paper represent the comparison between the algorithms like Avila, Li ma, Tisse and Daughman.

2. STRUCTURE OF IRIS

Iris is the thin circular structure in the eye which controls diameter and size of the pupil and the amount of light reaching the retina. Eye color is defined by iris.
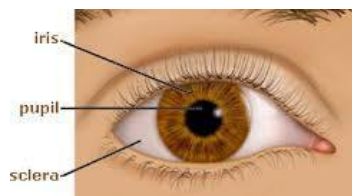
The function of the iris is to control the amount of light entering through the pupil. The iris of the human eye is unique in each individual. The structure of iris remains same throughout the human lifetime. Moreover iris of left and right eye is different. No two individuals may have same iris ,not even twins.

3. IRIS RECOGNITION

Iris recognition is the biometric method of identifying an individual based on iris. In iris recognition, the picture or image of iris is taken which can be used for authentication. Iris recognition has proved to be the most accurate amongst all other biometric systems like face recognition, fingerprint etc.

Daughman proposed an operational iris recognition system. This algorithm is based on iris codes. Basically four steps are carried in this algorithm:-

1. Localization 2.normalization 3.feature extraction 4.pattern matching.

The accuracy of this algorithm is 99.9%. The time required for iris recognition is nearly about one second.

4. COMPARISON OF OTHER ALGORITHMS WITH DAUGHMAN

1. Avila

In Avila, iris features were represented by fine to coarse approximations at different levels. The result which was in the form of signals were compared with model features using different distances. The comparison of the distances and their classification success is given below:

Distance	Classification success
Euclidean	93.6%
Hamming	97.9%
Dz	95.7%

Though the Hamming distance showed better result, the calculation for each person's eye (both left and right eye) from the database was a tedious job.

2. Tisse

In tisse algorithm, new iris recognition system

1) It implements gradient decomposed half transform for iris localization

2) Analytic image concept to extract the information of iris structure.

Tisse algorithm differ from daughmans algorithm in following blocks like – locating the iris and local feature's extraction.[1]

Tisse system achieves high confidence identity verification based iris texture and also it suggests alternative solution to daughmans algorithm for local feature extraction.

3. LI Ma

Li ma algorithm decomposes an iris image into four levels using 2-D Haar wavelet transform and quantized the fourth-level high frequency information to form an 87-bit code. Similar to the matching scheme of Daughman, they sampled binary emergent frequency functions to form a feature vector and used Hamming distance for matching [3].

4. Daughman

Daughman algorithm provides a best result in iris recognition as compared to other algorithms. The comparison was done in the Segmentation stage and based on accuracy and higher efficiency rate. Daughman gives 99% accuracy rate.
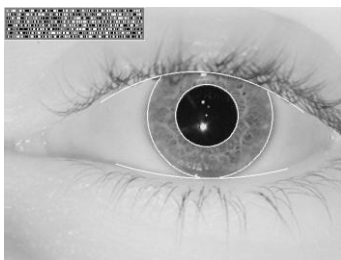

Daughman's first detecting the inner and outer boundaries of iris as shown above and then it process on iris. It does not degrade a result in environmental effects, distance problem etc. Daughman reduce an error rate.

Table 1: *Performance of algorithms*

Algorithm [Reference]	FAR/FRR	Overall % Accuracy
Avila	0.03/2.08	97.89
Li ma	0.02/1.98	98.00
Tisse	1.84/8.79	89.37
Daughman	0.01/0.09	99.90

Graphical representation of algorithm according to the performance of algorithms:
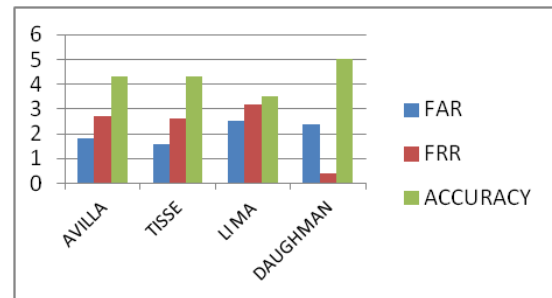
5. CONCLUSIONS

This paper represents comparison of iris recognition algorithms like Avila, Tisse, Li Ma, Daughman etc. which shows that Daughman gives better result and accuracy rate as compare to other algorithms.

Future work would be to combine algorithms to get more accuracy and high efficiency rate, also create iris biometric using less hardware.

REFERENCES

[1] Mayank Vatsa, Richa Singh, P. Gupta, "Comparison of iris Recognition Algorithms" Department of CSE ZIT Kanpur, India, 0-7803-8243-91041$17.0*0*0 2004 IEEE-2014

[2] Prateek Verma, Maheedhar Dubey, Praveen Verma, SomakBasu, "Daughman's algorithm method for iris recognition-a biometric approach", ISSN 2250-2459, Volume 2, Issue 6, June 2012

[3] Li Ma, Tieniu Tan*, Fellow, IEEE*, Yunhong Wang*, Member, IEEE*, and Dexin Zhang, "Efficient Iris Recognition by Characterizing Key Local Variations", IEEE TRANSACTIONS ON IMAGE PROCESSING, VOL. 13, NO. 6, JUNE 2004

[4] Miss. A. J. Dixit1, Mr. K. S. Kazi2, "IRIS Recognition by Daughman's Method", IJLTEMAS, Volume IV, Issue VII, July 2015

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