



Comparison and Performance of Human Iris for Authentication in Biometrics using GIRIST tool

Surbhi Gaur

CSE Deptt, VITS Ghaziabad
AKT University
Uttar Pradesh, India

Vivek Agarwal

Assistant Professor, CSE Deptt, VITS Ghaziabad
AKT University
Uttar Pradesh, India

Abstract: Iris is occasionally used for authentication in the field of Biometrics. People have different Iris shape, structure and sizes. In this paper, many of the freely available databases of Irises are compared on the free online tool GIRIST. The tool is compared with 4 of the logical methods for comparing the Irises. At the end, the performance of the tool is concluded against the 4 methods used.

Keywords: Authentication, Databases, Grayscale, Irises, Performance

I. INTRODUCTION

Biometrics includes fingerprints, irises, face recognition, voice recognition etc. The most common Biometric authentication is done with the help of Irises nowadays. Iris is the internal part of the eye which is scanned for the authentication of a person. A person can have different irises.

In this paper, different freely online available databases of Iris are compared on the tool GIRIST and 4 methods, for authentication of Iris. At the end, the conclusion would be done as to which method or the tool itself is better to compare the Irises for authentication.[6]

II. METHODOLOGY

There are 11 databases which are to be used here. All these databases are freely online available. The databases are mentioned below:

- UTIRIS(University of Tehran Iris)[3]
- CUHK(Chinese University of Hong Kong)
- UCI
- IITD(Indian Institute of Technology, Delhi)[1]
- SGGSE&T
- UBIID(University of Bath Iris Image Database)[4]
- UBIRIS(Unconstrained Biometrics: Iris)
- UPOL[7][8][9]
- CASIA(Chinese Academy of Sciences, Institute of Automation) V1[10]
- CASIA V2[11]
- CASIA V3[12]

All these databases had a collection of images, both from the left and the right eye. The environment and the devices by which the scanning of the iris was done differ in all the databases .Only 2 of the databases (IITD[2], SGGSE&T) amongst the 11, are national databases, otherwise all are international databases. For some of the databases, special permission or access had to be taken to use them for research.[5]

The tool GIRIST (Grus IRIS tool) is used in this paper to compare the different Irises and to check their efficiency in authenticating the iris. GIRIST (Grus IRIS Tool) is a freely available commercial application from GruSoft which is a GUI front end that demonstrates the commercial Grus SDK

In this tool, different iris datasets were judged on various parameters. In this tool, the Iris can be compared on 1 to 1 basis and 1 to many irises. It gives the result on the basis of pixels position and inner and outer boundary of Irises. It has a constraint that it accepts only Grayscale images.

The different 4 methods used for authenticating the Irises are mentioned below. All the methods are developed using .NET language.

- Histogram- This method gives the pixel position of the Iris. It tells whether the iris is same or not. . In the results it tells which image is larger than the other. The difference of the Iris is also displayed from left, right ,top and bottom.
- Morphological Edge Detection(MED)- In this method, the comparison of the Irises is done on the basis of their pixel position and the values of RGB (red,green,blue) color composition in the image of Iris.
- Image Erosion and Dilation- The results of Image Erosion and Dilation are same as MED.
- Convex Hull- This method tells whether the Iris images are same or different and it also gives the image of differences between the Irises.

III. IMPLEMENTATION

The implementation process consists of the following steps:

- A. All the databases are collected.
- B. Any of the two irises are taken from each of the databases.
- C. The same 2 irises are compared first using GIRIST tool.
- D. In the log files, the time taken to compare the iris is mentioned.
- E. The same set of Irises is compared using Histogram.
- F. The time is noted down manually as timer is not there in the code.
- G. Same steps are taken for all the 3 other methods.

IV. FINDINGS

The various images given below shows the findings from all the 4 methods and the tool, while comparing the different Irises.

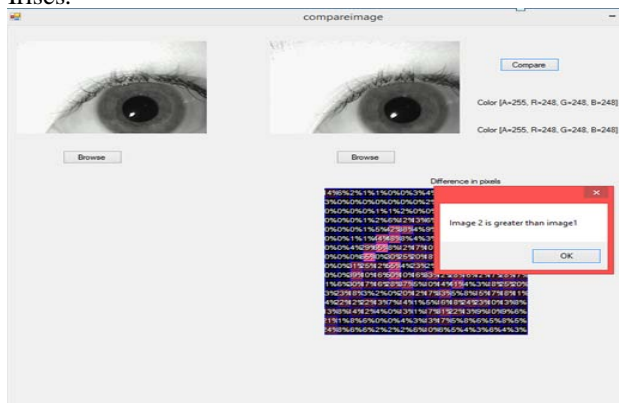


Figure 1: Histogram

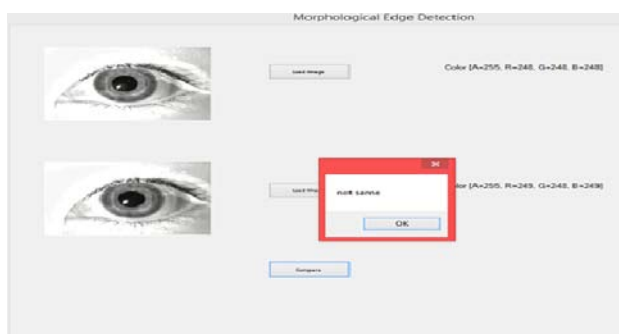


Figure 2: Morphological Edge Detection

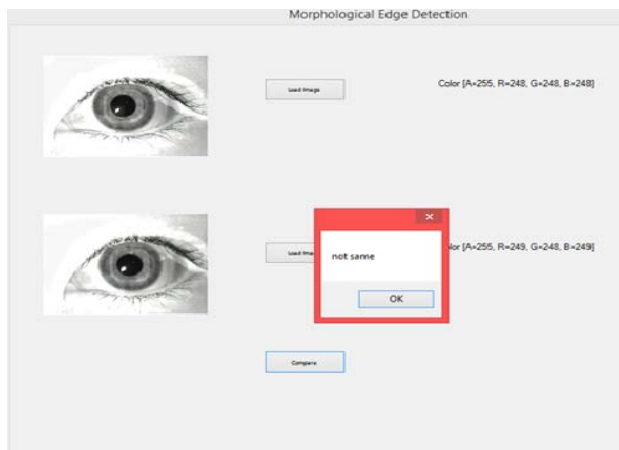


Figure 3: Image Erosion and Dilation

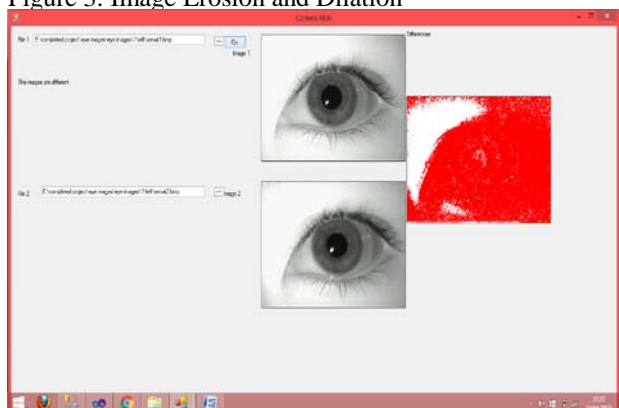


Figure 4: Convex Hull

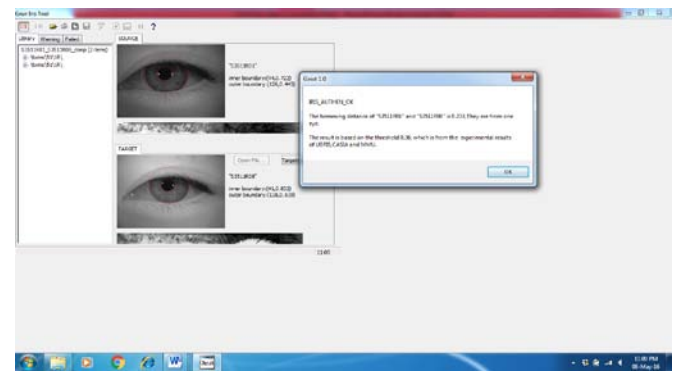


Figure 5: GIRIST Tool

V. EXPERIMENTAL RESULTS

The results obtained from comparing all the Iris databases against the tool and the 4 methods is concluded in the form of the table.

Database	GIRIST (sec)	Histogram (sec)	Morphological Edge Detection (sec)	Image Erosion (sec)	Convex Hull (sec)
UTIRIS	3.245	0.8	0.7	0.5	12.2
CUHK	0.702	0.5	0.6	0.5	2.1
UCI	0.406	0.6	0.6	0.5	1.6
IITD	0.172	0.7	0.6	0.6	1.6
SGGSIE&T	0.14	0.6	0.6	0.6	1.2
UBIID	2.122	0.6	0.6	0.6	19
UBIRIS	0.109	0.6	0.6	0.6	1
UPOL	Only support Gray scale images	0.5	0.6	0.6	0.8
CASIA V1	0.187	0.7	0.6	0.6	1.0
CASIA V2 Device 1	0.603	0.6	0.5	0.5	2.4
CASIA V2 Device 2	0.603	0.5	0.5	0.6	2.1
CASIA V3 Interval	0.194	0.6	0.6	0.6	1.0
CASIA V3 Lamp	0.683	0.6	0.5	0.6	2.4
CASIA V3 Twins	0.757	0.6	0.7	0.6	2.3

The time noted for the 4 methods is not precise as compared to the tool, because the time was noted down manually by a timer.

VI. CONCLUSION

The experimental results shows us that the tool performed better than the other 4 methods for comparing the Irises. The MED and IED were wrong also at times because they just compared the pixels position and the RGB composition of the images. At times, two different images were showed to be same whereas they were different. But there was only 1 issue with the tool, that it could only compare Grayscale images, whereas the 4 methods could compare any images.

VII. ACKNOWLEDGMENT

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- [12]. 12 Portions of the research in this paper use the 'CASIA-IrisV3 collected by the Chinese Academy of Sciences' Institute of Automation (CASIA)' and a reference to "CASIA-IrisV3 <http://biometrics.idealtest.org/>