

Compression of Iris using Delta-Shannon Fano Source Codes

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ABSTRACT: Increase of computing has led to an explosion in the volume of information to be saved on hard disc and send over the internet. This enlargement has led to a need for data compression which is the ability to reduce the amount of or Internet-Bandwidth required managing this information. The study of data compression is the science which attempts to advance toward manners that can be applied to information to make it take up less space. The uses for this are vast and algorithms will need to be improved to sustain the certainly larger files. The Authentication process involves verifying the identity of an individual claim access to one or more resources of a system. My paper provides a review of compression of data techniques. The aim of this Research work is to improve the performance of the system by using the Adaptive Delta & Shannon-Fano Codes.

KEYWORDS: Error detection and correction, Delta code, Shannon-fano code.

I. INTRODUCTION

Human were confronting with the trouble of authenticate unknown person, previously in ancient Egypt when grain was contracts or delivered were concluded. On the other hand other nations such as France and Germany were also familiar with this individuality. Hence, Assyrian potters distinct their earth vase with their Biometrics [1]. For this reason visible body individuality, such as colour of eyes, height of body or even the complexion of a person were used. A person can know the whole thing such as passwords, Personal Identification Number (PIN) and any specific number, how they are often used commercially to see the difference of associates and enemy [2]. At present a day the job of recognizing person is no longer restricted to human. There exist many ways to recognize oneself acknowledgement [3]. As a member of this procedure of progression we ever more often have to verify our identity to technological systems [4, 5].

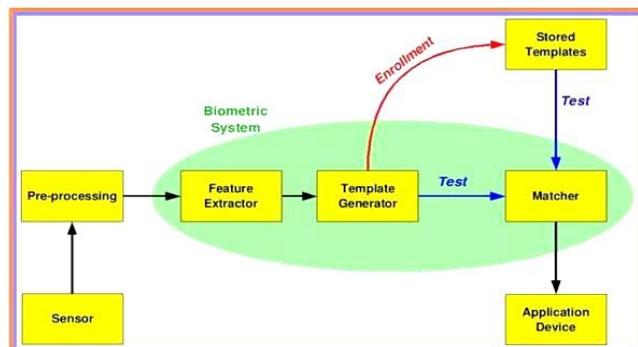


Fig 1: Detection by Biometric uniqueness

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II. RELATED WORK

Unique that is basis for distinguishing identification is given by both dots patterns on the iris and blood vessel pattern on retina. Just a single organization, Eye-Dentify Inc. generates retinal scan items, and no others are relied upon to enter the field. Anyway numerous organizations taking a shot at gadgets that look at the human iris; the most well known, Iris Scan possesses the patent.



Fig 2: Scanning the Eye of Individual

This strategy's fundamental benefit over retina scans is the customer does not have to concentrate on an object, since this is exist on the eye's surface. Retina scans, performed by coordinating a low force IR light through the pupil and Retina of the eye; has been accessible commercially from when 1985. An organization that has authorized the iris filtering innovation, from IriScan wants to position its Iris dent product into ATMs in the coming years is Sensar. Most installation to date has involved more control, including various bank and military facilities. The toughest problem is the consumer resistance.



Fig 3: Iris Scan products

You-Ran Liu and Lih-Jen Kau et al 2017 [1], in this paper we propose a scalable face image compression algorithm based on Principal Component Analysis (PCA) and Entropy Coding. By using PCA and some training face image patterns, we can extract the most representative Eigen image of human faces. To reduce the coding complexity as well as to achieve a higher compression ratio, only the first term of the extracted Eigen images will be used for the encoding of the human face, i.e., only the Eigen image with maximal energy strength will be selected for the encoding process. After the process of PCA decomposition and arithmetic coding, the generated bit stream has only 45201 bits. They then evaluate the compression ratio (CR) according to the following equation.

$$CR = \frac{X}{X''}$$

Where X and X'' corresponding to the size of the image before and after compression respectively. With the definition, we can find the compression ratio is 1.823.

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Nidhi Dhawale et al 2014 [2], Huffman coding is especially used in the applications where loss of information is not tolerated such as in the compression of text file. Huffman coding is also known as prefix coding or prefix elimination coding.

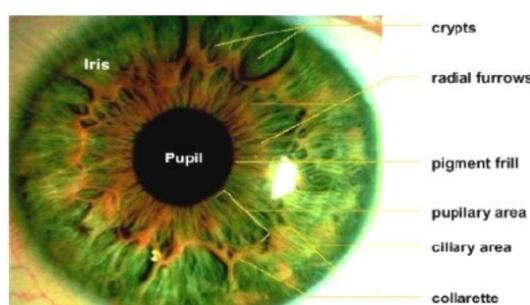


Fig 4: Typical Iris Structure

John Daugman and Cathryn Downing et al 2008 [3], They have contemplated the impacts of three plans for picture pressure on iris acknowledgment execution, prompting the astounding end that even pictures packed as extremely as 150:1 from their unique full-measure positions, to only 2000 bytes, stay entirely useful.

III. PROPOSED METHODOLOGY

The proposed method may be divided into two steps. The first step is for Registration or Enrolment. The second step is for Authenticate the user or client. The overall procedure is described by the flow of the processes. To registering an enrolment is the mainly essential procedure of the biometric detection [9]. The biometric individuality must be taken under best conditions, with respect to a good recognition rate, for example according to lighting. Typically these are captured more than 1, because a later recognition should be even possible if the conditions during the respective collection process are much worse. Successive to the initial collection phase the captured traits, so-called reference individuality, are stored on a smartcard. For verification purposes the reference trait may be stored on a smartcard. In case of identification most likely saved means is the database. For verification purposes the reference trait may be stored on a smartcard. The result of matching process finally indicates whether a person could be successfully identified or verified, respectively. The process itself depends on the recognition function. This work is extension of that algorithm to provide the more security and privacy. There is limited memory space to save the biometric information. Hence compression techniques will be added in future. Generally 29 finer points are extracted by the Iris.

Feature Extraction

To extract the important features or finer points, the scanning device draws some Tiers with respect to the Iris origin. Now it calculated the samples or finer points on each of the Tiers. The finer points may be bifurcation, end, pore or island.

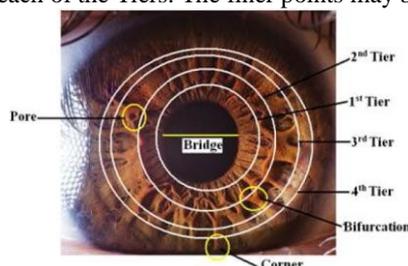


Fig 5: Capturing the Finer points of an Iris

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According to Table 1 & 2, it is clear that here we required about 493 bits to store the Finer Points of single Iris data. In Delta code, we store the first value and from then on record the difference to the next [2]. Before uses of Delta code, Finer Points are arranged in ascending order according to their X-Field value. Its advantage is that we can save more bits for each of the code.

Table 1: Templates storing without compression

S. No.	X- field	Y- field
1	136	10001000
2	167	10100111
3	155	10011011
4	77	01001101
5	22	00010110
6	23	00010111
7	14	00001110
8	24	00011000
9	15	00001111
10	16	00010000
11	22	00010110
12	19	00010011
13	6	00000110
14	14	00001110
15	75	01001011
16	3	00000011
17	37	00100101
18	41	00101001
19	48	00110000
20	4	00000100
21	109	01101101
22	47	00101111
23	45	00101101
24	24	00011000
25	32	00100000
26	1	00000001
27	186	10111010
28	106	01101010
29	153	10011001
Total Bits	8*29 232	8*29 232

Table 2: Templates storing with delta code in x- field

S. No.	X- field	(Ascending)
1	136	1
2	167	3
3	155	4
4	77	6
5	22	14
6	23	14
7	14	15
8	24	16
9	15	19
10	16	22
11	22	22
12	19	23
13	6	24
14	14	24
15	75	32
16	3	37
17	37	41
18	41	45
19	48	47
20	4	48
21	109	75
22	47	77
23	45	106
24	24	109
25	32	136
26	1	155
27	186	167
28	106	186
29	190	190
TOTAL BITS		73

For the remaining column, we can't use delta compression, because numbers are not in ascending order but in the random manner. Hence we use here Shannon Fano code for compression. Hence for that we have created the group of 20 numbers and find the values present in this group.

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Table 3: Periods of finer Points & their respective frequency for the Group of Y Field

S. No.	Periods	Value s	Frequency
1	0-20	13, 19, 7, 2, 17, 15, 13, 7, 4	9
2	20-40	28, 23, 25, 29, 32, 30, 34, 34, 32	9
3	40-60	47, 41, 57, 41, 45	5
4	60-80	80, 73, 61, 77, 70	5
5	80-100	100	1

Let calculate the Shannon Fano codes.

Value	Frequency	Shannon Fano codes	Bit Lengths
0	9	0 0	2
20	9	0 1	2
40	5	1 0	2
60	5	1 1 0	3
80	1	1 1 1	3

Fig. 6: Calculation of Shannon Fano code for the Group of Y Field

Table 4: Calculated Shannon Fano codes & Additional Binary for Y

S. No.	Y- field	BRAKING Y - field	Binary
1	80	80 0	00 0
2	28	20 8	01 1000
3	13	0 13	00 1101
4	47	40 7	11 111
5	73	60 13	100 1101
6	19	0 19	00 10011
7	23	20 3	01 11
8	61	60 1	100 1
9	100	80 20	101 10100
10	25	20 5	01 101
11	7	0 7	00 111
12	2	0 2	00 10
13	17	0 17	00 10001
14	41	40 1	11 1
15	77	60 17	100 10001
16	70	60 10	100 1010

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17	57	40	17	11	10001
18	29	20	9	01	1001
19	32	20	12	01	1100
20	15	0	15	00	1111
21	30	20	10	01	1010
22	13	0	13	00	1101
23	34	20	14	01	1110
24	7	0	7	00	111
25	41	40	1	11	1
26	45	40	5	11	101
27	34	20	14	01	1110
28	4	0	4	00	100
29	32	20	12	01	1100
TOTAL BITS				162	

IV. EXPERIMENTAL RESULTS AND CONCLUSION

Total bits required for storing a single Template of Iris without coding

= 464 bits

Total bits required for storing X Field & Y Field with Delta & Shannon Fano code

= 235 bits

The Compression Ratio of data is:

=

$\frac{464}{235}$

$\frac{4}{23}$

$\frac{5}{5}$

= 1.97

With the technique of Compression by Delta and Shannon Fano codes approximately 1.97 Compression Ratio (CR) can be achieved.

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