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BIOMETRIC IDENTIFICATION WITH COMBINED ALGORITHMS (SURF, HARRIS and MSER)

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Abstract— *Biometric technologies are automated methods of verifying or recognizing. This work is particularly targeted towards the SURF, HARRIS and MSER calculations for biometric fingerprint calculations. These three features are used parallel to get the better identification results, FAR is proved 0 with the three algorithms and FRR is 1 with the same i.e. SURF, HARRIS and MSER and matching the maximum points for a particular fingerprint picture.*

Biometric technologies” are automated methods of verifying or recognizing. The identity of a living person based on a physiological or behavioral characteristic. There are two key words in this definition: “automated” and “person”. The word “automated” differentiates biometrics from the larger field of human identification science. Biometric authentication techniques are done completely by machine, generally (but not always) a digital computer. Forensic laboratory techniques, such as latent fingerprint, DNA, hair and fiber analysis, are not considered part of this field.

Biometric systems inherently require no identity data, thus allowing unidentified recognition.

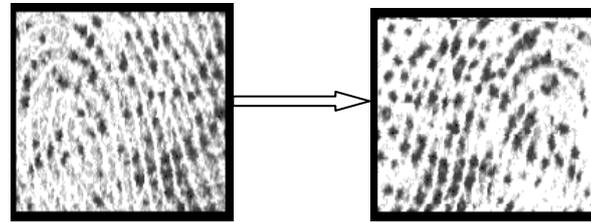
I. INTRODUCTION

Biometrics has become a vital part of today's life. This is an area of technology which deals with identification of different features of the person like iris, speech, hand prints etc. Verification involves the validation of claimed identification which enrolled these traits and now a days it has become more difficult as number of increased traits. The field of biometrics has received much attention in the last years because it is an interesting alternative to traditional authentication systems like passwords etc. Authentication is required when it is necessary to know if a person is who they claim to be. Sometimes the traits are increased due to enhancement in number of users which affect the database and authentication system's performance. Single biometric based systems are do extremely well as it is very easy and fast system to access the biometric features of a person. For the enhancement of security at this level, combination of different biometrics which is known as multi biometrics is shown in Fig. 1 in which two or more biometrics traits are combined like face and fingerprints or speech and signature, have been current area of research. Multi biometrics integrates different biometrics systems for verification in making a personal identification. This system has advantages to the capabilities of each individual biometrics. Identification is defined by the one-to-many process of matching submitted biometric data against all other Biometric reference templates to determine whether it matches any of the templates and to determine the identity of the enrolled whose template matches the biometric data. Verification is defined by the process of matching by comparing a given biometric data which is not stored in a database with the biometric reference template (stored in a database) of a single person whose identity is being checked to determine whether it matches the enrolled template. For example on a computer system, a unique verification token with direct correspondence to each username is intended to verify the identity of a justifiable user. All unimodal biometric systems can be used with combination of other to form a biometric.

Fingerprint and hand Geometry.

The fingerprint matcher compares data from the input search print against all appropriate records in the database to determine if a probable match exists.

Minutia relationships, one to another are compared. Not as locations within an X-Y co-ordinate framework, but as linked relationships within a global context.



Live image

Latent image

Fig 1: Fingerprint matcher



Fig.2 Examples of some of the biometric traits

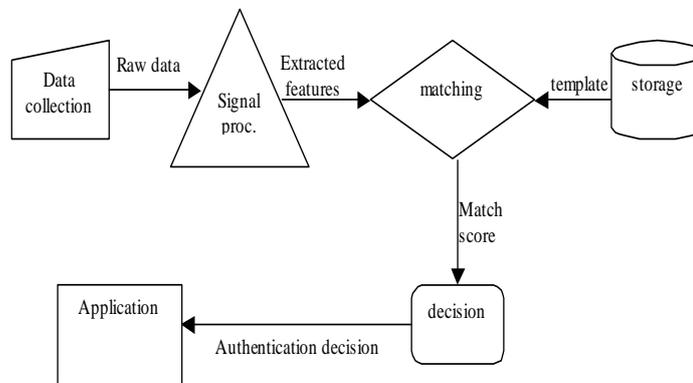


Fig 3: General model for fingerprint identification

Cameron Whitelam *et. al*. introduced the two different methods which are applied on different biometrics data and those two different method were Watermarking and Steganography. But these method was introduced for the purpose to enhance the security of biometric templates in the data base from the unauthorized attackers. So that provided an increased level of security and authentication and the introduction of the concept of an asymmetric watermarking and steganography framework. And Combining numerous biometric traits for data transfer is essential when multimodal verification is necessary [1]. Vabhive B. Joshi *et. al*. presented about the reversible watermarking technique to make the authentication system more secure on the biometric ways. As well as which given that watermark reversibility in the proposed method ensured that its presence do not affect native biometric authentication. Moreover presence of watermark in the biometric template provides security against replay attack [2]. Emanuele Maiorana *et. al*. discussed about one other way to give the enhancement in the security of signature templates by applying the cryptosystem on the date base of online signature which

show that proposed protected online signature recognize systems which gave the guarantees recognition rates which was totally comparable with those templates which were not secure or which were not protected. So that gave the most reliable signature traits, less effecting the entropy of the employed binary representation which was more deniable to privacy attackers [3]. Mandeep Kaur *et. al.* pioneer the fusion of two different modalities which are speech and signature by which this combination of multimodal increased security and accuracy, yet the complexity of the system increases due to increased number of features extracted out of the multiple samples and suffers from additional cost in terms of acquisition time. As well as in this paper it also discussed about different fusion techniques and resulted as 95% accurate results and gave minimum false accepted rate and false rejection rate which effect the accuracy of the algorithm [4]. Nagesh Kumar *et. al.* has taken the above used algorithms and their methodology for an efficient multimodal biometric face recognition using speech signal into a new application of plastic surgery. In which speaker identity was correlated with the physiological and behavioural characteristics of the speaker. As well as in this it combined plastic surgery face image and speech information in order to improve the problem of multimodal biometric face recognition system [5]. Eshwarappa M.N. *et. al.* presented the combination of three different modalities of speech and signature and handwriting signatures. This is one of the best combinations which could have been used ever. In this paper it also worked on different classifiers which are for feature extraction using DCT and MFCC and using Z-score normalization. As a result, the identification performance is 100% and verification performances, False Acceptance Rate (FAR) is 0%, and False Rejection Rate (FRR) is 0%. The vital features that encourage the use of multimodal biometrics are the performance and accuracy along with the ability to overweigh the drawbacks of unimodal biometric systems [6].

II. PROBLEM FORMULATION

1. The problem with the correlation based algorithm is that the image taken to identify is similar to that of data base that is already stored in system. If we change some features of the image i. e colours, light or intensity etc. then this algorithm fails. For example if the pixel of the image is enlarged then the data base can't match the image and we get invalid match results.

2. So to solve this problem SURF, HARRIS and MSER features are used. These features can match each and every feature of the image .Data base image that may be any text image or fingerprint image will select different-different random pixel points with respect to the selected image (thumb or fingers).

So in this present work ,the problem formulation is to perform various mathematical calculation in a parallel manner such that we get many blobs for one image using different features such as **SURF, HARRIS and MSER** so that we can get best results of FRR and FAR.

III. DATA ANALYSIS

The various parameters related to an image which can be calculated and used to describe the details of an image before processing and after processing can be listed as:

1. Blobs calculation
2. Location of the points
3. Scale
4. metric
5. Sign of laplacian
6. Orientation

IV. RESULT AND DISCUSSION

The developed algorithm was tested over a range of test sets, belonging to different persons from the taken data base:-

1. FAR is proved 0 with the three algorithms and FRR is 1 with the same i.e. SURF, HARRIS and MSER.

DATA SET	Ref. [19]		Ref. [20]		Ref. [21]		Ref [22]		Current Study	
	FRR	FAR	FRR	FAR	FRR	FAR	FRR	FAR	FRR	FAR
DB1	52.58	0	89.3	1.7	23.07	0	10.23	0	1	0
DB	50.03	0	88.6	3.7	19.91	0	7.85	0	1	0
DB3	73.75	0	91.2	2.4	16.68	0	5.51	0	1	0
DB4	65.24	0.015	81.3	0.9	17.09	0.01	7.47	0	1	0

Table 1: Calculation of FAR and FRR from given data set

2. Simultaneous mathematical calculations performed in parallel using SURF, HARRIS and MSER to ensure that the identified image is the same as all three algorithms give same identified image.
3. Better combined results are shown with combined features.

V. CONCLUSION

A biometric identification system for the identification of a person based on combined algorithms has been developed which identifies a person via different feature extractions and condition based algorithm along with adding a high level security using SURF, MSER and HARRIS. The detailed flow chart is as shown follows:-

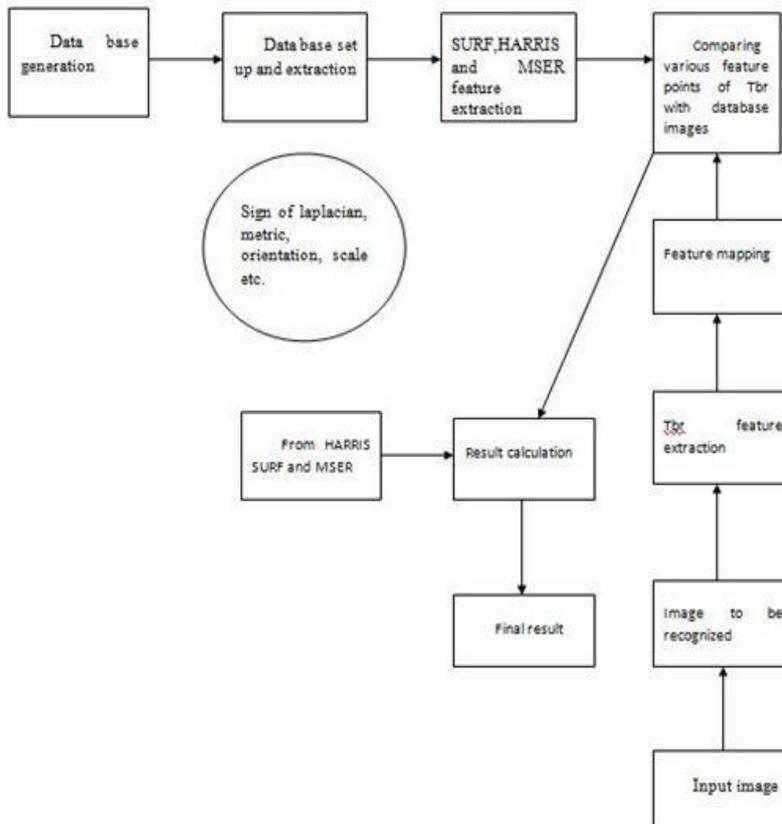


Fig 4: The detailed flow chart

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