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DAMERAU LEVENSHTEIN MATHEMATICAL MODELING FOR PINNA IDENTIFICATION USING FUZZY MATCHING

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***Abstract*—** Biometrics recognition makes more concentration by the society with lot of emerging technologies. The pinna is one among an ideal root of data for personal identification. Pinna can be easily acquired from a long without fully cooperation. It has lot of specific and unique features for recognizing a person. It has distinctiveness and permanence. In this research we presented a new algorithm for pinna recognition based on geometrical features extraction. A median filter is implied to remove the noise. The sobel edge detection is performed to extract the pinna image. Damerau Levenshtein method is used for distance calculation of the feature extraction phase. Fuzzy Feature Matching (FFM) is used for find the similarities between the input and the template pinna images. Experimental results shows that the algorithm works well with the all nature. Here we found a better 95.37% of accuracy in matching.
Keywords— Acquisition**,** Bayesian Extraction, Identification, Noise

I.INTRODUCTION

Biometrics identification is the most appropriate way of substantiate an individuals in a valid and quick path through distinctive biological peculiarity. **This authentication** correlate features of a human biometric template to find the resemblance. The need is to acquire the data from the person. It may be a photo, voice, or an image. It label a **long care** to confirm one's identity. It have been inaugurate by experts for civil, criminal or military identification purpose by an organised technical structure. Biometric research is growing faster and faster. Due to the uniqueness, stability, and predictable changes, the pinna features are potentially a promising biometric for use in human identification. Pinna identification is stepped up for this intent. According to cytology pinna, is the visual part of the external ear. Tragus, helix and lobule are the components of pinna. The main canal begins at the outer ear and finished at the ear drum. The auricle formation is initially pointed at the 42-48 days of gestation Hillocks are developed upwards and backwards to the location of the head.

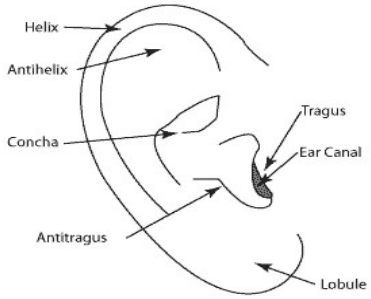

Fig.1. Structure of Pinna

To obtain the highest projection ratio of the affected to well auricle regions. Many methods like Radiological Body Volume Documentation, Computed Tomography and Magnetic Resonance Imaging are recently used.

II. LITERATURE SURVEY

Mark et al. [1] proposed a curve segmentation method for security access. By practical observation they have used three neural network concepts to recognize from two dimension picture of the ear. They used borda, Bayesian, and weighted Bayesian methods. For sampling they used 48 people's data. The observation shows the 93% recognition rate. Improved performance are not achieved. Yuizono et al. [2] experimented genetic algorithm with a system for the ear images. They experimented with ten persons with 660 images. They tested with video images. They concluded that 100% of recognition rate and 100% of rejection rate for unknown people.

III. PROPOSED METHODOLOGY

The main goal of this research is to recognize a person using pinna images using FFM. Images are formed by varied views. The image sets consists of left and right pinna images. The system is viewed as acquisition, pre-processing, feature extraction and matching.

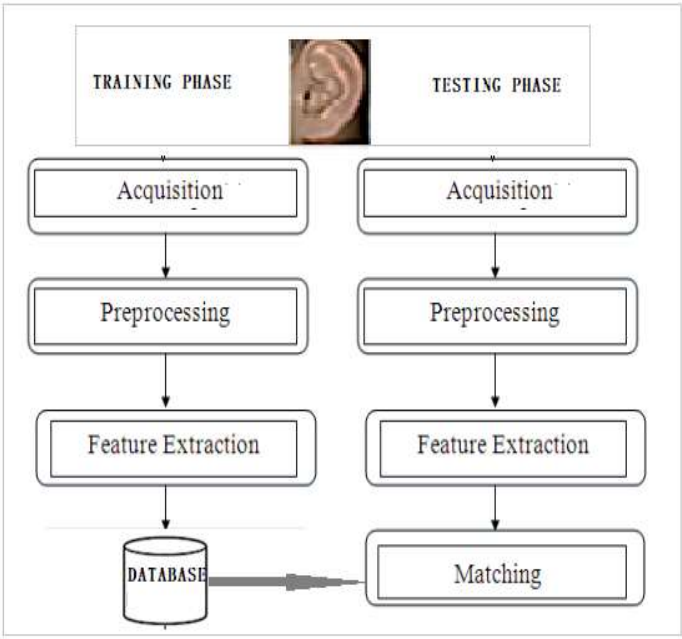

Fig. 2. Architecture of the System

For handling the experiment the image database is formed by collecting the pinna images from the postgraduate students of computer science of St. John's College of Arts and Science, Ammandivillai. The acquired images are of .bmp format. The Pixels per Inch of the images is 800*600 pixels. The available database consist of 20 persons left and right pinna each of with five pose images variations. The median filter is used for the disposal of impulse noise is which is apparent in a digital image of the acquired image. After the colour regularization, filter reduces noise present in the pinna images. The filtered image is obtained by changing the

middle pixel value and the median value computed from the nearable pixels of the pinna region. Then the pinna image is prepared in the X and Y directions. This is grouped to shape a fresh image which shows the whole aggregate of the X and Y edges. In the Sobel method initially the RGB image is transferred to a Grayscale. For an edge detection, a 3 x 3 matrix depict the filter that will be effectuate for the result.

1. Transferring image to grayscale.
2. Arrange the resultant image with Sobel-x filter.
3. Arrange the resultant image with Sobel-y filter.
4. Estimate the gradient
5. Estimate the magnitude
6. Estimate the direction

TABLE:1 EDGE DETECTION PROCESS

PREPARED IN X DIRECTION			PREPARED IN Y DIRECTION		
-1	0	1	-1	-3	-1
-3	0	3	0	0	0
-1	0	1	1	3	3

On extracting the features, geometrical views are introduced in the pinna region of the ear. Near the pinna the meatus bony segment is used for plotting the graph. After finding the local points on the pinna, we can collect all triangular features. By the points noted triangles are formed. Totally four triangles are formed in an ear. For an individual, on considering the right and left ear eight triangles are used for the manipulation. Damerau-Levenshtein distance algorithm, computes by preparing a matrix of size (M+1)x(N+1) . Where M and N are the lengths of the 2 strings m and n can be defined by using a function $f_{m,\,n}(i, j)$**.** Levenshtein distance algorithm is implied to get the distance between the two strings in order to apply this measure of pointed vertices and edges in the pinna.

Fig. 3. Triangle Patterns in pinna

The chain of the resembling is the geometrical triangular feature of the pinna. Eight triangles are constructed in pinna of a human. That is sum of eight and eight. The vector of triangular structure is viewed by the distance and angle of direction of the exact points. Before measuring the homogeneity among the fuzzy feature set. Assume F_{temp}= { i, j, k, Ψi , Ψj , Ψk, Ar, Pe} is a controlled l triangle feature in a template pinna and F_{inp} = { il , j l , kl ,Ψ l i , Ψ l j , Ψ l k, AT l, PT l } is a controlled feature in an input pinna, The pattern parameters such as len-diff, Ψ-

diff, Ar-diff and Pe-diff are computed. The the original data x are described by the membership function then, the membership function for X is found by implying x= X-a/k. Use $2k^2 = K^2$ to the Cauchy membership function.

$$\mu_{Cau}(X) = \frac{1}{1 + \frac{(X-a)^2}{K^2}}$$

Cauchy membership function is little bit fuzzier than the Gaussian. It is best to differentiate between data points described by the fuzzy set. The Cauchy membership function in computing is much more brilliant in the gradient of the cost function. To derive the pattern parameter space we used the training set. The similarity is estimated from the constructed triangle similarities. The fuzzy measure for template and input pinna is defined as

$S= [[(1-p)\ wea+ we_b]]\ L^{(T,\ 1)}$

Here we_a is the area percentage of both template and input pinna, we_b is the weight of triangle neighbor the midpoint, p € [0,1] .

IV. EXPERIMENTAL RESULTS

An experiment is performed to evaluate the effectiveness and robustness of the proposed system. To evaluate the proposed pinna identification, the pinna images of postgraduate students of computer science of St. John's College of Arts and Science, Ammandivillai were acquired. The system is developed using Visual Studio. The work tremendously decrease the computational complexity. A better performance of 95.37% accuracy is also obtained. The complexity in fuzzy based methodology is less.

The system is analysed to find an individual as a true or an imposter. To compute the achievement of the methodology, a standard measurement is used to check the acceptance errors and rejection errors by False Reject Rate (FRR) and False Acceptance Rate (FAR) The FRR is the percentage of an individual that the system fails to accept. FAR is the percentage of unauthorized individual that the system fails to reject. The accuracy of the work is defined as Accuracy = max (100 – (FRR+FAR)/2).

TABLE:2 EXPERIMENTAL RESULT

Traits	Algorithm	FAR (Percentage)	FRR (Percentage)	Accuracy (Percentage)	Execution Time(Sec)
Pinna	FFM	8.49	0.87	95.37	2.54

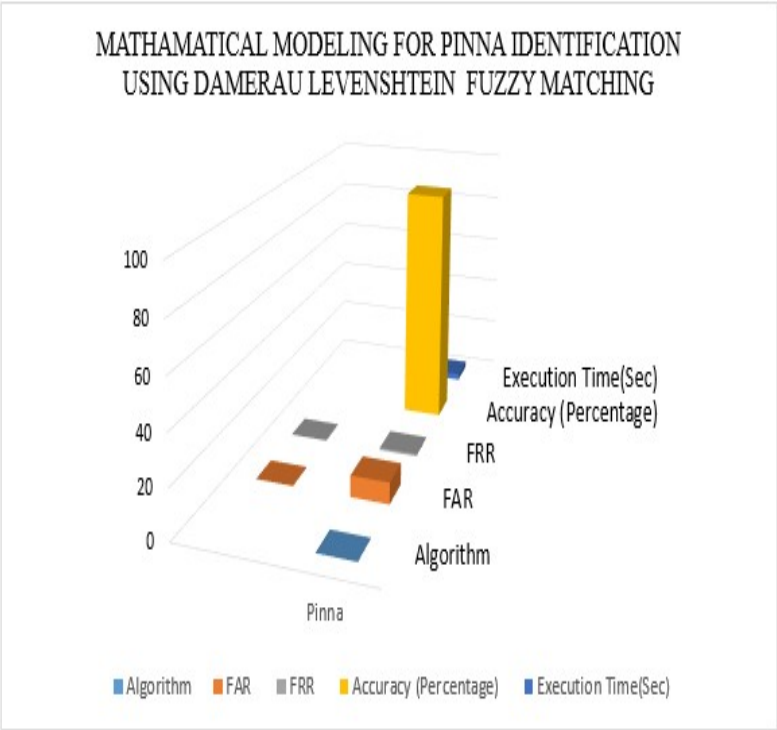

Fig. 4. PLOTTING THE RESULTS GRAPHICALLY

V. CONCLUSIONS

A new method for pinna identification is analysed. Apart from ear biometric the pinna is more efficient. The left and right pinnas are represented by the fuzzy feature. Local triangles are constructed in the image. The similarity among the features are used to identify the similarity among pinna images. The matching methodology visualize the similarity pair of the overall image to similarity within the real interval [0, 1]. The method has been experimented and evaluated with the pinna of postgraduate students of computer science, St. John's College of Arts and Science, Ammandivillai database. Experimental results concluded that the algorithm works well with the all nature. Here we found 95.37% of accuracy in matching.

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