Multimodal Bio-Metric Recognition With Fusion on Face Finger and Iris Pattern

Malathi S.[1], Nandhini N.[2], Nandhitha S.[3], Sharmila S.[4], Mangai S[5]
[1, 2, 3, 4] Dept of Biomedical Engineering
[5]Professor and Head, Dept of Biomedical Engineering
[1, 2, 3, 4, 5] Velalar College of Engineering & Technology

Abstract- *This paper presents fusion of three biometric traits, i.e., iris, face and fingerprint, at matching score level architecture using weighted sum of score technique. The features are extracted from the pre-processed images of iris, face and fingerprint. These features of a query image are compared with those of a database image to obtain matching scores. The individual scores generated after matching are passed to the fusion module .The existing solutions for finger trait are edge detection , segmentation and feature vector .It is not flexible because duplication of finger prints can be made and people an be fooled. It is not efficient .The eye images are preprocessed by applying downscaling and color level transform. The downscaling of the eye image is done to reduce the search area for pupil and iris boundaries. Biometric system can be made based on the combination of iris palm print and finger print features for person authentication using sequential modified haar wavelet and energy feature extraction .This module consists of three major steps i.e., preprocessing, DWT segmentation and image fusion .The final fusion is then used to declare the person as authenticate or un authenticate with*

Keywords- Biometric recognition ,Fusion, DWT Process, Segmentation , Feature vector.

I. INTRODUCTION

The identification of objects in an image and the process such as noise removal, followed by (low-level) feature extraction to locate lines, regions and possibly areas with certain textures is necessary .The clever bit is to interpret collections of these shapes as single objects, e.g. cars on a road, boxes on a conveyor belt or cancerous cells on a microscope slide. One reason this is an AI problem is that an object can appear very different when viewed from different angles or under different lighting. Another problem is deciding what features belong to what object and which are background or shadows etc. The human visual system performs these tasks mostly unconsciously but a computer requires skillful programming and lots of processing power to approach human performance .An image is usually interpreted as a two-dimensional array of brightness values, and is most familiarly represented by such patterns as those of a photographic print, slide, television screen, or movie screen. An image can be processed optically or digitally with a computer.

II. SOFTWARE DESCRIPTION

MATLAB is a high-performance language for technical computing. It integrates computation, visualization, and programming in an easy-to-use environment where problems and solutions are expressed in familiar mathematical notation. Typical uses includes Math and computation, Algorithm development, Modelling, simulation, and prototyping ,Data analysis, exploration and visualization, Scientific and engineering graphics. Application development, including graphical user interface building MATLAB is an interactive system whose basic data element is an array that does not require dimensioning. This allows to solve many technical computing problems, especially those with matrix and vector formulations, in a fraction of the time it would take to write a program in a scalar non interactive language such as C or FORTRAN. The name MATLAB stands for MATrix LABoratory. MATLAB was originally written to provide easy access to matrix software developed by the LINPACK and EISPACK projects.

Today, MATLAB uses software developed by the LAPACK and ARPACK projects, which together represent the state-of-the-art in software for matrix computation .MATLAB has evolved over a period of years with input from many users. In university environments, it is the standard instructional tool for introductory and advanced courses in mathematics, engineering, and science. In industry, MATLAB is the tool of choice for high productivity research, development, and analysis .MATLAB features a family of application-specific solutions called toolboxes. Very important to most users of MATLAB, toolboxes allows to learn and apply specialized technology .Toolboxes are comprehensive collections of MATLAB functions (M-files) that extend the MATLAB environment to solve particular classes of problems. Areas in which toolboxes are available include signal processing, control systems, neural networks, fuzzy logic, wavelets, simulation, and many others.

III. PROPOSED METHODOLOGY

The proposed method is implemented by pre-processing the eye image by applying downscaling and colour level transform. The downscaling of the eye image is done to reduce the search area for pupil and iris boundaries. Biometric system based on the combination of iris palm print and finger print features for person authentication is done using sequential modified haar wavelet and Energy feature extraction using key generation analysis.

Median filtering is one of the most important steps of the proposed method. Median filter is a kind of nonlinear spatial filter whose response is based on ordering the pixels contained in the image area encompassed by the filter, and replacing the value of the center pixel with the value determined by the ranking result. Median filter replaces the value of a pixel by the median of the intensity values in the neighborhood of that pixel. They have got excellent noise reduction capabilities with considerably less blurring than linear smoothing filter of similar size. Median filter can remove additive white noise. They are very efficient in the removal of noise having long-tailed distribution.

The wavelet transform (WT) has gained widespread acceptance in signal processing and image compression. Because of their inherent multi-resolution nature, wavelet-coding schemes are especially suitable for applications where scalability and tolerable degradation are important. Wavelet transform decomposes a signal into a set of basis functions. These basis functions are called wavelets.

The first DWT was invented by Hungarian mathematician AlfrédHaar. For an input represented by a list of 2^n numbers, the haar wavelet transform may be considered to pair up input values, storing the difference and passing the sum. This process is repeated recursively, pairing up the sums to provide the next scale, which leads to $2^n - 1$ differences and a final sum. The haar wavelet is also the simplest possible wavelet. The technical advantage of the haar wavelet is of signals with sudden transitions, such as monitoring of tool failure in machines. The DWT provides a compact representation of a signal's frequency components with strong spatial support. DWT decomposes a signal into frequency subbands at different scales from which it can be perfectly reconstructed.

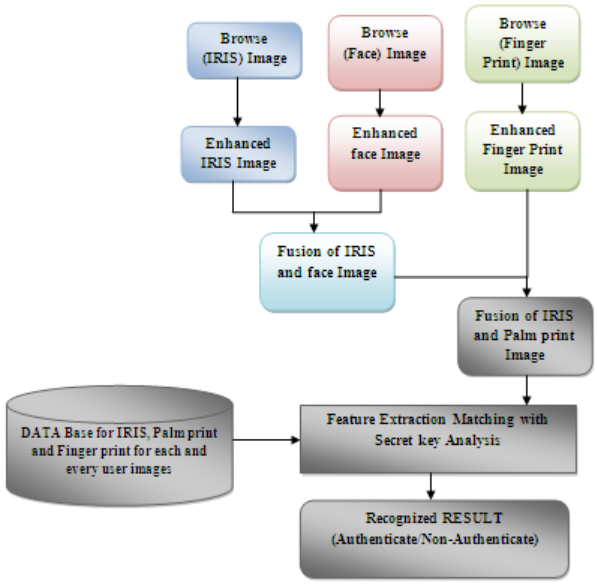

Figure 1. Block Diagram of Multimodal Biometric Recognition

The block diagram of multimodal biometric recognition is been given as shown in the Figure 1 above.

IV. RESULTS AND DISCUSSION

Each of the feature vectors is matched using Euclidean Distance with the remaining 5 feature vectors in the database. The genuine ED distribution graph and imposter ED distribution graph are normalized because for every feature vector, there will be nine genuine matching .Figure 2 shows that the person is authenticated because the feature vectors are matched, whereas in figure 3 the person is unauthenticated due to the mismatch of the feature vector.

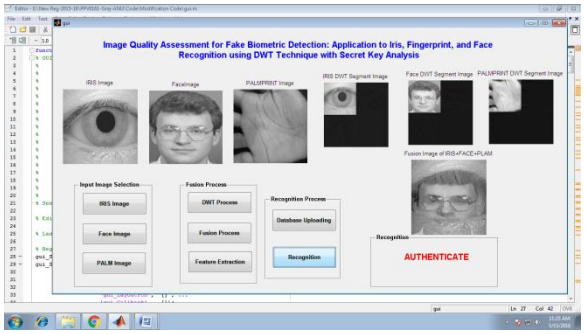

Figure 2. For Authenticate Person

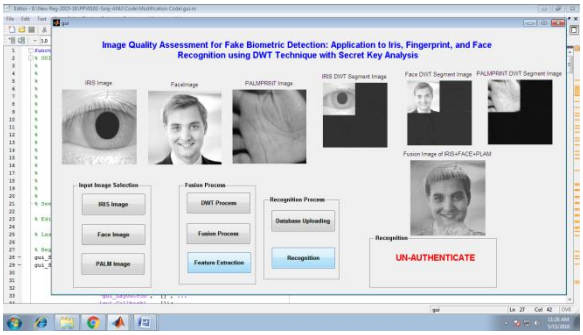

Figure 3. For Unauthenticate Person

V. FUTURE SCOPE

Further scope of this projects are

- Secure data storage.
- Business application
- Immigration services
- Covering government needs
- Staff management
- Health care and social assistance
- Authentication tools
- Multi-factor authentication
- Biometric single sign-on services
- Facial and voice recognition
- Cloud-based biometric solutions
- Mobile biometric technologies

VI. CONCLUSION

From database, different iris, face and finger print images of multiple persons are taken (multiple samples of iris, face and finger print) and code matrix is formed. By concatenation and shifting the feature vectors are fused. When a new iris, finger and face image are presented as an input, the code matrix of the images is found out. Using the feature values, the pattern matching is performed. Based on this value, the class to which the new image belongs to is calculated. The recognition performance of iris feature alone is done using discrete wavelet transform. The key value is generated and recognized as result using wavelet transform.

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