Three Dimensinal Biometric System To Recognize Palm Print

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ABSTRACT:

Biometric systems are used to authenticate the identity by measuring the physiological and/or behavioral characteristics. So, the two main categories of biometrics are 'physiological' and/or 'behavioral'. The physiological category includes the physical human traits such as palm print, hand shape, eyes, veins, etc. The behavioral category includes the movement of the human, such as hand gesture, speaking style, signature etc. The measurement of these traits helps in authentication using the biometric systems. The palm print based systems for verification make use of ink marking to capture the palm print patterns. These systems are not widely accepted because of high attention and co-operation of users to provide data. Recently digital camera is used to capture images and users hand placing is constrained using pegs.

1. INTRODUCTION

Palm print recognition is one of biometrics available at present. Biometric systems are used to authenticate identity by measuring physiological and/or behavioral characteristics. So, two main categories of biometrics are 'physiological' and/or 'behavioral'. The physiological category includes physical human traits such as palm print, hand shape, eyes, veins, etc. The behavioral category includes movement of human, such as hand gesture, speaking style, signature etc. The measurement of these traits helps within authentication using biometric systems. One of most successful biometric systems is palm print recognition system. This system recognizes on basis of palm print of a person. It is reliable due to fact that print patterns are always unique. Palm print is made up of principal lines, wrinkles, & ridges. Three kind of features are within palm print: geometry features (width, length, & area of palm), line features (principal lines, coarse wrinkles, & fine wrinkles), & point features (minutiae & delta points). Palm print verification uses these features to verify identity of a person.

Biometrics is technology of identifying uniquely human subjects by means of measuring & analyzing one or more inherent behavioral or physical traits. These human body characteristics include fingerprints, voice patterns, eye retinas & irises, facial patterns & hand dimension. Biometric systems include applications making use of biometric technologies & which allow identification automatically, verification or authentication of a natural person. In principle, processing of personal data involving use of a biometric system is considered by privacy experts to be only justified within places requiring a high level of security & absolute identification procedures.

Fig. 1: Applications- Doors, Cars, Garage Access
Benefits of Adopting Biometrics

No Need to Remember Passwords: As this uses our biometry we are not supposed to give any password. Because where ever we go our finger print, iris pattern, our face, voice definitely with us!

Unauthorized Access to Personal Data could be Prevented: It is a one type of security system that no one could hack this because they do not have our fingerprint, iris, voice, face etc. So, this prevents data from an unauthorized person.

Fraudulent Use of ATMs, Credit Cards could be Prevented: None could use our ATM just by knowing our PIN. Because no number or password is there.

2. LITERATURE REVIEW

The year 2000 envisaged first face recognition vendor test FRVT, 2000) sponsored by US Government agencies & same year paved way for first research paper on use of vascular patterns for recognition (Imet al., 2001). During 2003, ICAO (International civil Aviation Organization) adopted blueprints for integration of biometric identification information into passports & other Machine Readable Travel Documents (MRTDs). Facial recognition was selected as globally interoperable biometric for machine-assisted identity confirmation with MRTDs.

Thomas Heseltine, et al., (2002) have done evaluation of image pre-processing techniques for eigenface based face recognition. "They have presented a range of image processing techniques as potential pre-processing steps, which attempt to improve performance of eigen face method of face recognition. Verification tests are carried out by applying thresholds to gather false acceptance rate (FAR) & false rejection rate (FRR) which results from a data set comprised of images that present typical difficulties when attempting recognition, such as strong variations within lighting direction & intensity, partially covered faces & changes within facial expression. Results are compared using equal error rate (EER), which is error rate when FAR is equal to FRR. The work determines most successful methods of image processing

used with eigen face based face recognition, within application areas such as security, surveillance, data compression & archive searching".

Philip L. Worthington (2002) has proposed enhanced canny edge detection using curvature consistency. "Edges are often considered as primary image artifacts for extraction by low-level processing techniques, & starting point for many computer vision techniques. As a result, reliable edge detection has long been a research goal. This author has described initial investigations into recovering reliable edges using curvature models. Canny's edge detector has been enhanced by adjusting gradient finding zero crossings within those directions".

The first statewide automated palm print database was deployed by US within 2004. The Face Recognition Grand Challenge (FRGC) began within same year to improve identification problem. In 2005, Iris on move was announced by Biometric Consortium Conference for enabling collection of iris images from individuals walking through a portal.

Nas sir Salman (2006) has put forward a work within image segmentation based on watershed & edge detection techniques. "A combination of K-means, watershed segmentation method, & Difference In Strength (DIS) map was used to perform image segmentation & edge detection tasks. An initial segmentation is obtained based on K-means clustering technique. Starting from this, two techniques are used; first is watershed technique with new merging procedures based on mean intensity value to segment image regions & to detect their boundaries. The second is edge strength technique to obtain accurate edge maps of images without using watershed method. By methodology authors have solved problem of undesirable over segmentation results produced by watershed algorithm, when used directly with raw data images. Also, edge maps obtained have no broken lines on entire image & final edge detection result is one closed boundary per actual region within image".

Chi Chang-Yanab, et al., (2008) have done a study on methods of noise reduction within a stripped image. Through their analysis they have found out by image spectrum that its difference could help us to choose different methods to do noise reduction while information of image is reduced to be least. They have also illustrated some methods of noise reduction & taken one test image as an example. Since this image is affected by notable striping, noise reduction methods of this stripped image are being mainly studied. "The Gray Value Substitution & Wavelet Transformation are satisfactory within stripped noise reduction. Then, MSR & PSNR are calculated to evaluate processed image. Results suggest that methods used are suitable within processing this noise".

3. PROBLEM FORMULATION

Voice print – Voice recognition is very different to speech recognition. Speech recognition detect words & sentences from an incoming audio signal whereas voice recognition tries to detect speaker given a voice sample. But as each & every person has got different voice pattern that's why no two voice prints are matched.

Signature Recognition- Signature recognition is based on dynamics of making signature, i.e., acceleration rates, directions, pressure, stroke length, etc., rather than a direct comparison of signature after it has been written.

Fig-2 Signature Recognition

DNA- At present, there exists no technology to allow for instant & automated recognition of DNA samples. DNA analysis & profiling (*genetic fingerprinting*) requires a lab environment & at least several hours. However, significant R&D efforts are underway to develop this technology,

& also to enable governments to better use millions of DNA profiles collected & archived within DNA databases.

Retinal Scan- Retinal Scan technology is based on blood vessel pattern within retina of eye. A retinal scan could produce almost same volume of data as a fingerprint image analysis. The user positions their head against a support, & a low power infrared light is directed against back of retina. The image of pattern of veins is reflected back to a camera.

retinal scan

Fig-3. Retinal Scan

4. PROPOSED WORK

Transmission- Not all biometric systems process & store data on measuring device. Often measurement is made using relatively simple device to a computer or server for processing and/or storage. Depending on system, data might be relatively large & thus would need to be compressed for quick transfer. The compression algorithm needs to be selected carefully; otherwise it might introduce some artefacts that could impact decision process. In any image scanning Biometric system, JPEG compression is preferred due to blackness it produces at high compression ratios. The data could also be transmitted to database for storage as raw data.

Signal Processing

The signal processing unit uses features extraction algorithms to extract true biometric information from sample within presence of noise introduced during data collection & transmission. Additional measurements are made if any flaw or corruption is noted, to make certain good quality. Pattern matching comprise comparing feature sample to a stored sample. (The biometric data could be stored locally on biometric data could be stored locally

on biometric device, some central database/server, or on a smart card issued to client.) The result of comparison is sent to decision system to determine match.

Image pattern Processing within Matlab

In imaging science, image processing is any form of signal processing for which input is an image, for instance a snap or video frame; yield of image processing might be either an image or a set of characteristics or parameters related to image. Most image-processing techniques involve treating image as a two-dimensional signal & applying standard signal-processing techniques to this. Image processing usually refers to digital image processing, but optical & analog image processing also are possible.

Fig. 4. Constrained Image Acquisition

5. RESULT & DISCUSSION

Image Processing In Matlab Using Edge Detection Mechanism

In Matlab we have used canny based edge detection to find edges of palm as it is consider better than other edge detection mechanisms.

```
im=imread('1.jpg');
imagesc(im);
```

Fig. 5: Existing Image(1.jpg)

```
im=imread('1.jpg');
img=rgb2gray(im);
sob_im=edge(img,'sobel');
figure(2);
imagesc(sob_im);
axis('square');
colormap('gray');
imshow(sob_im);
```

Fig. 6: Image(1.jpg) After Applying Sobel Operator Based Matlab Code

```
im=imread('2.jpg');
imagesc(im);
```

Fig. 7: Existing Image(2.jpg)

```
imread('3.jpg');
img=rgb2gray(im);
sob_im= edge(img,'sobel');
figure(2);
imagesc(sob_im);
```



```
axis('square');
colormap('gray');
imshow(sob_im);
```

Fig 8 Sobel Operator Based Matlab code on image

6. CONCLUSION

For 3 D recognition multidimensional data has been taken & complexity of algorithm increases as array of matrix are compared in such cases. It will increase accuracy but takes lot of time on rendered images. So we have extract only useful part of biometric object such as pattern of palm in multidimensional form. During this instance of time, several different glitches related to palm print recognition have been addressed. Furthermost of studies has been done in palm print recognition due to its stability, reliability & exclusivity. Furthermore, this has been employed for law enforcement, civil applications & access control applications. Verification rate could be computed by employing False Acceptance Rate (FAR), False Rejection Rate (FRR), as well as Equal Error Rate (EER). FAR is percentage of accepted not genuine claims over total number of not genuine accesses. FRR is percentage of rejected genuine claims over total number of genuine accesses.

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