AN APPROACH TO ENHANCING SECURITY OF BIOMETRIC IMAGE WITH RETRIEVAL SYSTEM

Mr. P. ANJAIAH
Institute of Aeronautical Engineering, Hyderabad
Email id: anjaiah.pole@gmail.com

ABSTRACT:
To ensure the security of biometric samples, we require the development of new and efficient protection measures. A software based fake detection technique is implemented in multiple biometric systems to detect the different types of fraudulent attacks. This method is implemented using an image quality assessment (IQA) algorithm. It uses 25 general image quality measures like MSE, PSNR, TED, TCD, etc. from an image to identify fake samples. In the existing system, the security provided was less. So in proposed system we need to improve the Security to protect our data from hackers or from any fraudulent attacks. The objective of the proposed system is enhancing security using multi biometric images with fake detection. The proposed technique includes vein biometric frame work to increase the accuracy of the security system.

Keywords: *Biometrics, Multi Biometrics, Fraudulent attacks, Fake Samples, Security, Image Quality Assessment (IQA), MSE, PSNR, TED, TCD, etc.*

INTRODUCTION

A. Image processing

An image is an array, or a matrix, of square pixels (picture elements) arranged in columns and rows.

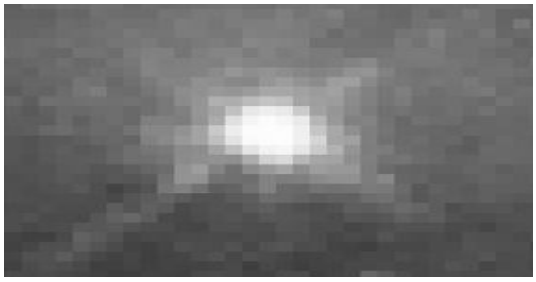

Fig 1.1 an image- an array or a matrix of pixels arranged in columns and rows.

In a (8-bit) grey scale image each picture element has an assigned intensity. Normally people will call the grey scale image as the black and white image. But the image won't contain any black and white colour it is purely of grey.

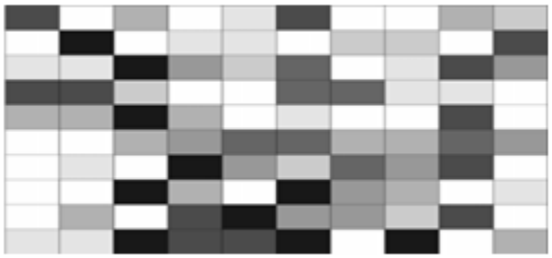

Fig 1.2 each pixel has a value.

A normal grey scale image has 8 bit colour depth = 256greyscales. A —true colour image has 24 bit colour depth

= 8 x 8 x 8 bits = 256 x 256 x 256 colors = ~16 million colors.

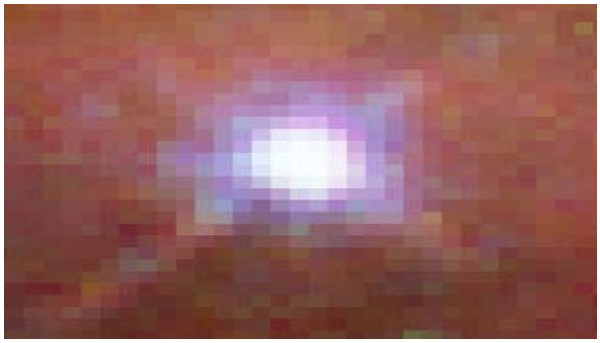

Fig 1.3 a true-colour image assembled from three grey scale images

There are two general groups of images': vector graphics (or line art) and bitmaps (pixel-based or images'). Some of the most common file formats are:

GIF- an 8-bit (256 colour), non-destructively

compressed bitmap format. Mostly used for web. Have several sub-standards one of which is the animated GIF.

JPEG- a very efficient (i.e. much information per byte) destructively compressed 24 bit (16 million colours) bit map format.

TIFF- the standard 24 bit publication bit map format. Closely pressed non-destructively with for instance, Lempel-Ziv-Welch (LZW) compression.

PS- Postscript, a standard vector format.

PSD- a dedicated Photoshop format that keeps all the information in an image including all the layers.

Image processing is any type of signal processing for which the picture will be as an input, for example, a photograph or any frame of videos, the output of image processing might be either an image or a set of characteristics or parameters related to the image. Most processing of the image includes treating the image as a two-dimensional signal and applying standard signal- processing techniques to it. Image processing usually refers to digital image processing. The obtaining of images (producing the input image in the first place) is referred to as imaging.

Computer graphics and computer vision are firmly related to image processing. In computer graphics, images are manually made. Computer vision is frequently considered as the high-level image processing out of which a machine/computer/software intends to translate the physical contents of an image or a sequence of images (e.g., videos or 3D full-body magnetic resonance scans).Nowadays in the modern sciences and technologies, images also obtain much scope due to the growth of scientific visualization.

Image processing is a technique to change over a picture into computerized frame and play out a few operations on it, with a specific end goal to get an expanded quality picture or to get some valuable certainties from it. It is a flag regulation in which picture will be as info, similar to edge of recordings or photo and yield might be picture or qualities related with that picture. As often as possible Image Processing system includes regarding pictures as two dimensional signs while applying officially set flag handling strategies to them.

Image processing basically includes three steps.

1. Importing the image with optical scanner or by digital photography.
2. Analyzing and manipulating the image which incorporates data compression and image enhancement and spotting patterns that are not to human eyes like satellite photographs.
3. Output is the last stage in which result can be altered image or report that is based on image analysis.

The necessities of image processing are

1. Digital image is invisible it must be set up for viewing one or more output device (laser printer, monitor).
2. It may be possible to investigate the image in the computer and give clues to the radiologist to help identify critical/suspicious structure, example: CAD (computer aided diagnosis).Image enhancement is mainly for improving quality of image, Two kinds of work area are there in image enhancement. One is special domain, in special domain enhancement is accomplished by preparing on the actual pixels of picture. Another one is frequency domain, in frequency domain it is accomplished by handling on a frequency or intensity.

Essentially image processing comprises of three steps:

1. Importing the image with optical

scanner or by digital photography.

2. Analyzing and controlling the picture which incorporates information pressure and picture improvement and spotting designs that are not to human eyes like satellite photos.
3. Output is the last stage in which result can be changed image or report that is based on image analysis.

B. Purpose of Image Processing

The reason of image processing is mainly of five groups:

1. Visualization - Observe the objects that are not visible.
2. Image sharpening and restoration - To create a better image.
3. Image retrieval - Seek for the image of interest
4. Measurement of pattern – Measures different objects in a picture.
5. Image Recognition – Distinguish the objects in an image.

C. Types

The two types of techniques utilized for image processing are analog and digital image Processing. Analog strategies can be utilized for the hard copies like printouts and photographs.

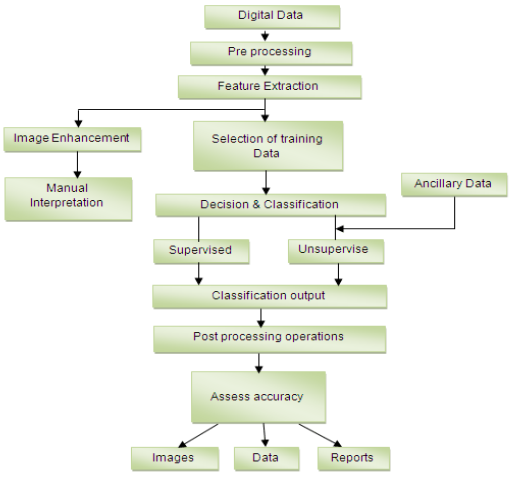

Fig 1.4: Processing of digital data

Image analysts utilize different essentials of interpretation while at the same time utilizing these visual systems. The image processing isn't just enclosed to area that has to be studied but on knowledge of analyst. Involvement is another important tool in image processing through visual techniques. So analysts apply a combined the own knowledge and collateral data to image processing.

Digital Processing procedures help in control of the digital images by using PC. Raw data from imaging sensors from satellite platform as contains a lack of something. To get over such faults and to get real information, it has to undergo different types of processing. The three general forms that all types of data have to undergo while using digital technique are Pre-processing, quality increasing and display, extraction of information.

D. Key Features

Image analysis, including estimation, statistics, morphology, and segmentation.

Image enhancement, deblurring and filtering.

Image registration methods and Geometric transformations.

Image transforms, including fan-beam projection, DCT, Radon and FFT.

Large image workflows, including tiling, block processing, and multi resolution display

Visualization apps, including video Viewer and image Viewer.

E. Image Enhancement

Enhancing of image strategies in Image Processing Toolbox enable you to increase the signal-to-noise ratio and accentuate image features by modifying the color or intensities of an image. The toolbox involves specialized filtering routines and a

generalized multidimensional filtering function that handles integer image types, offers multiple boundary- padding options, and performs convolution and correlation.

By using predefined filters and functions you can:

- Filter with morphological operators
- Deblur and sharpen
- Remove noise with linear, adaptive filtering or median
- Perform histogram equalization
- Remap the dynamic range
- Adjust the gamma value
- Adjust contrast

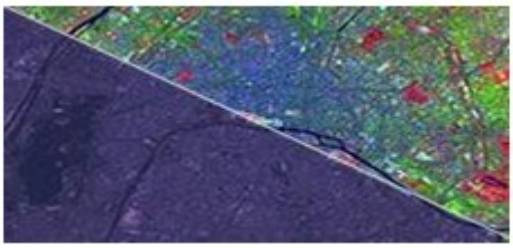

Fig1.5: Enhancing Multispectral Color Composite Images

F. Image Deblurring

Image deblurring algorithms in Image Processing Toolbox include Wiener, blind, Lucy-Richardson, and regularized filter de convolution. These functions help correct blurring caused by out-of-focus optics, camera movement or the subject during capture of the image, short exposure time, atmospheric conditions, and other factors. All deblurring operations work with multi dimensional images.

Fig1.6: Deblurring Images Using the Blind De convolution Algorithm

G. Image Analysis

Image analysis is the process of extracting meaningful information from images such as counting objects, finding shapes, identifying color, or measuring object properties.

Image Processing Toolbox distributes a comprehensive suite of reference-standard algorithms and visualization functions for image analysis tasks such as feature extraction, statistical analysis, and property measurement.

H. Image Transforms

Image transforms play a main role in many image processing tasks, including image enhancement, restoration, analysis, and compression. Image Processing Toolbox provides several image transforms, including DCT, Radon, Hough, FFT, and fan-beam projections. You can reconstruct images from parallel-beam and fan- beam projection data

Fig1.7: Reconstructing an Image from Projection Data

I. Hough Transform

The Hough transform is used to identify curves and lines within an image. Using the Hough transform we can able to do the following:

- Find line segments and endpoints
- Measure angles
- Find circles based on size

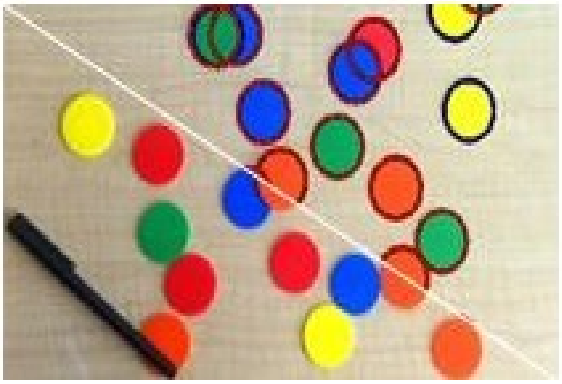

Fig 1.8: Detect and Measure Circular Objects in an Image

J. Image Segmentation

Image segmentation algorithms determine region boundaries in an image. We can provide many different approaches to image segmentation, including progressive methods, edge-based methods, automatic thresholding, and morphology-based methods such as the transform of the watershed that is often used to segment connected objects.

Fig1.9: Color-Based Segmentation with Live Image Acquisition

K. Edge Detection

Edge-detection algorithms let us to identify object boundaries in an image. These algorithms include the Prewitt, Sobel, Canny, Roberts, and Laplacian of Gaussian methods. The Canny method can find the real weak edges without being fooled by noise.

Fig 1.10: Detecting a Cell Using Edge Detection

L. Image Registration and Geometric Transformations

Image registration is important in medical imaging, remote sensing, and other applications in which images must be aligned to enable quantitative analysis. Image Processing Toolbox has intensity-based image registration, which automatically aligns the images using relative intensity patterns.

The toolbox also has control-point image registration, which requires the manual selection of the control points in each image to align two images.

In addition to, the Computer Vision System Toolbox supports feature-based image registration, which automatically aligns images using feature extraction, detection, and matching followed by geometric transformation estimation.

M. Target Hardware

By using Image Processing Toolbox with MATLAB Coder and HDL Coder, you can generate C, C++, and HDL code directly through the MATLAB. Many image processing functions support code generation, allowing us to run image processing algorithms on PC hardware, ASICs, and FPGAs. This enables us to develop imaging systems for the aerospace, medical, and defense fields.

N. Stretch function

One particularly important aspect of image processing is the choice of the best stretch function. You choose which stretch function or representation to use in Fits Liberator window.

A logarithmic representation of the pixel values tends to suppress the bright parts of the image. This can be attractable if the faint stuff'needs a boost', but a logarithmic stretch function can also reduce the contrast of an image, producing a lower dynamic range.

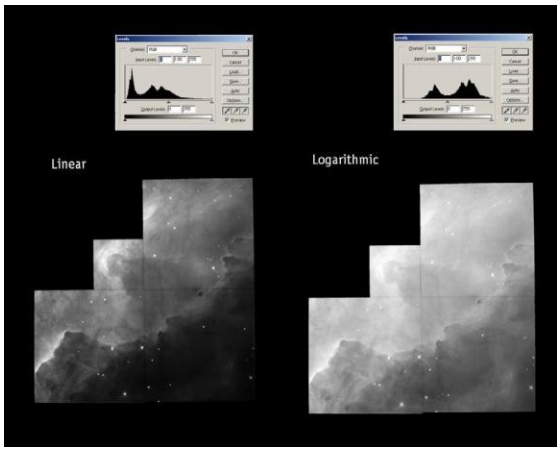

Fig 1.11: The difference between two stretches functions are shown here. The left is a linear representation of the pixels and the right is a logarithmic. It is seen that the log decreases the contrast too much and therefore is not the aesthetically desirable function to choose here.

RELATEDWORK

The scope of our project work is to detect the fake sample efficiently to enhance the security of biometric system. The proposed technique includes vein Multi biometric frame work to increase the accuracy of the security system. The quality between the trained feature image and test feature image varies (skin tone, colour, appearance, texture, brightness, fairness). Sometimes the values of parameter obtained for the images will be mismatched. The accuracy tried to obtain is up to 95%.

In the existing system only single biometric technique was used. That is sensors sense the identification by using body temperatures, blood pressures, modification of faces etc. Here hackers can be able to easily hack our datum or files. Spoofing is also possible. So in the existing system less security was provided. Multiple images can't be compared with the reference images since here multi biometric is not used.

Private information is traditionally provided by using passwords or Personal Identification Numbers (PINs), which are easy to implement but is vulnerable to the risk of exposure and being able to forgotten. Biometrics has attracted more attention and is becoming one of the most popular and promising alternatives to the traditional password or PIN based authentication techniques. Moreover, some multimedia content in consumer electronic appliances can be secured by biometrics. There is a list of available biometric patterns, and many such systems have been implemented and developed, including those for the iris, face, fingerprint, palm print, hand shape, voice and signature.

Not with standing this great and increasing variety of patterns of biometrics, no biometric have still developing that is perfectly secure or reliable. For example, fingerprints and palm prints are usually frayed; signatures, voice, iris and hand shapes images are easily forged; face recognition can be made difficult by occlusions or face-lifts; and biometrics, such as fingerprints and face recognition, are likely to be influenced to spoofing attacks, that the biometric identifiers can be copied and used to create artifacts that can deceive many currently available biometric devices. The main challenge to biometrics is to improve recognition performance in terms

of both accuracy and efficiency and be maximally resistant to deceptive practices.

Biometrics refers to metrics related to human characteristics and traits. Biometrics authentication (or realistic authentication) is used in computer science as a form of access control and identification. It is also used to identify many individuals in groups that are under surveillance. Behavioral characteristics are related to the pattern of behavior of a person, including but not limited to typing gait, rhythm and voice. Some researchers have defined the term behavior metrics to describe the latter class of biometrics.

2. SYSTEM ARCHITECTURE

Block diagram

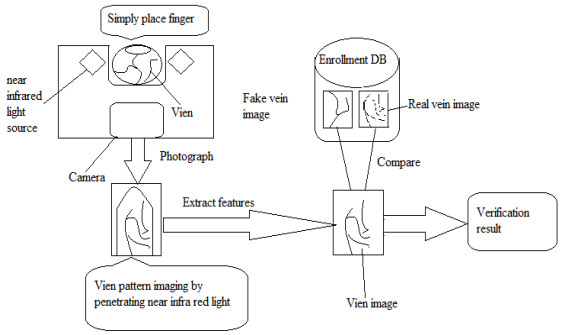

Fig 2.1: Vein recognition

In the vein recognition scanning architecture simply place the finger in between the infrared light source. The vein will be captured by the camera and the photograph of the vein image will be compared with certain reference images. If the image matches with the reference images means then it will be a real image or it will be a fake image.

Here the vein recognition scanning will be done for the iris, finger and palm because we are providing multiple securities.

Flow diagram

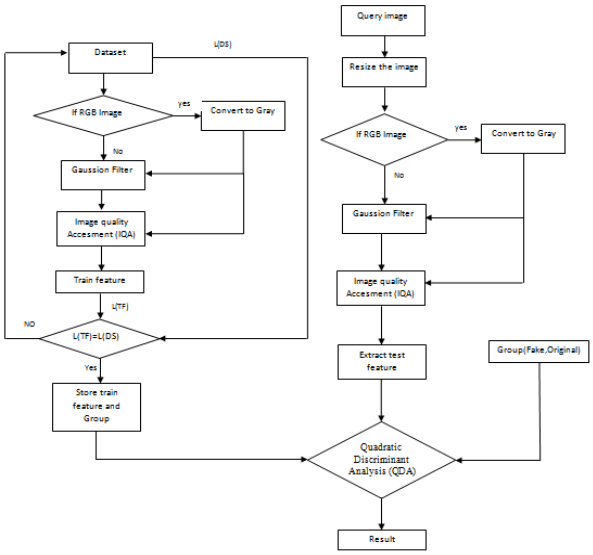

Fig 2.2: Image quality assessment

CONCLUSION:

We propose the future work using veins (palm, finger vein, retinal vein). It's more secure than all system it cannot be tracked by hackers. Vein always differ even between 2 identical twins. We also overcome the disadvantages of the existing paper and also improve the security features.

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