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VOTE CASTING AUTHENTICATION USING BIOMETRICS

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***Abstract*— This research paper has focused on the process called 'Vote Casting Authentication Using Biometrics (VCAUB)' to provide secure voting platform with the evolution of technology. This kind of voter authentication and false detection metrics is a very important vision application in secure voting platform. The problem in the existing system is, the electronic voting machines do not have any recent security measures by which the voter can verify their identity before casting the vote due to false voters can cast numerous duplicate or fake votes. As we all know that a voter usually takes his voter ID for casting his vote. There may be a chance of using fake Identification Card while casting and he will abrupt the whole voting system. To avoid this overhead we implement some unique traits in this project. VCAUB provides authentication with the measure of biometric attributes that are Iris (Left and Right), Face, Palm, and if possible other attributes to enhance the quality of the system. The dataset (Images of Iris, Face and Palm) that we collect from each individual and manage in database for validation. As we are combining these biometric factors of a voter therefore this process is called fusion technique. If these attributes of a person are matched, then only that person is allowed to vote, or else such voter will be treated as an intruder. To obtain the results more accurately we use Pre-processing methods, Fusion technology and DWT (Discrete Wavelet Transform) methods to achieve the conflicts that we faced in the existing system. Password generation and distribution also plays a key role in the process of providing secure voting platform. We provide extensive security by password allocation to individual voter while casting the vote.**

Keywords*— VCAUB, Fusion Technology, Intruder, Discrete Wavelet Transform, Secure Voting Platform, Authentication and Validation.

1. INTRODUCTION

Biometric attributes such as left iris, right iris, face, and palm images are combined hence they produce a fusion image, that resultant (fusion) image will be compared with biometrics of the voter who is ready to vote. If the fusion image matches with all the above mentioned Biometric attributes of the voter then the person is an authorized person to cast his vote. If the fusion image doesn't match with the Biometric attributes of the voter then the person is an unauthorized person to vote. In recent years, biometric personal identification is in growing state of world, not only that it is the hot cake of both academician and industry.

Traditional methods for personal identification are based on what a person possesses (Identity card, physical keyed, etc.) or what a person knows (a secret password) any how these methods have some pitfalls. ID cards may be forged, keys may be lost, and password may be forgotten. Thus Biometrics –Based human authentication systems are becoming more important as government and corporations worldwide deploy them in such schemes as access and border control, driving license registration, and national ID card schemes. The word "biometrics" is derived from the Greek words bio (life) and metric (to measure). The iris has unique features and is complex enough to be used as a biometric signature. It means that the probability of finding two people with identical iris patters is almost zero.

According to Flom and Safir the probability of existence of two similar irises on distinct persons is 1 in 1072. The DWT is used for iris recognition propose. The proposed iris recognition system is designed to handle noisy conditions as well as possible variations in illumination and camera to face distance. The input image is preprocessed to extract the portion containing iris and then the features are extracted using DWT. The iris is well protected internal organ of the eye, located behind the cornea and the aqueous humor, but in front of the lens. The human iris begins to from during the third month of gestation. The structure is complete by the eight month of gestation, but pigmentation continues into the first year after birth. It is stable, reliable and is unrelated to health or the environment. The iris grows from the ciliary body and its color is given by the amount of pigment and by the density of the iris tissue that means from blue to black. The iris is a protective internal organ of the eye. It is easily visible from yards away as a colored disk, behind the clear protective window of the cornea.

2. Image Processing

Image processing is a method of identifying objects (attributes) in an input image. This process would probably start with processing techniques such as noise removal, followed by (low-level) feature extraction to locate lines, regions and possibly areas with certain textures. 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.

2.1 Biometric features extraction from Iris of an eye:

Iris recognition is an automated method of biometric identification that uses mathematical pattern-recognition techniques on video images of one or both of the irises of an individual's eyes, whose complex random patterns are unique, stable, and can be seen from some distance. Retinal scanning is a different, ocular-based biometric technology that uses the unique patterns on a person's retina blood vessels and is often confused with iris recognition. Iris recognition uses video camera technology with subtle near infrared illumination to acquire images of the detail-rich, intricate structures of the iris which are visible externally. Digital templates encoded from these patterns by mathematical and statistical algorithms allow the identification of an individual or someone pretending to be that individual.

[1] Databases of enrolled templates are searched by matcher engines at speeds measured in the millions of templates per second per (single-core) CPU, and with remarkably low false match rates. Several hundred million persons in several countries around the world have been enrolled in iris recognition systems for convenience purposes such as passport-free automated border-crossings and some national ID

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programs. A key advantage of iris recognition, besides its speed of matching and its extreme resistance to false matches is the stability of the iris as an internal and protected, yet externally visible organ of the eye. The iris (plural: irises) is a thin, circular structure in the eye, responsible for controlling the diameter and size of The pupil and thus the amount of light reaching the retina.

The color of the iris is often referred to as "eye color". Iris recognition is the process of recognizing a person by analyzing the random pattern of the iris (Figure:1). The Human iris, an annular region located around the pupil and covered by the cornea, can provide independent and Unique information of a person.

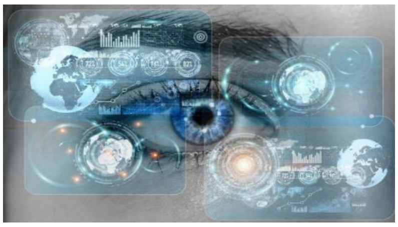

Fig 1: Biometric features extraction from a Human Eye

2.2 Biometric features extraction from Palm:

A palm print refers to an image acquired of the palm region of the hand. It can be either an online image or offline image where the image is taken with ink and paper. The palm itself consists of principal lines, wrinkles, and epidermal ridges. Palm print Image Database contains 5,502 palm print images captured from 312 subjects. For each subject, we collect palm print images from both left and right palms. All palm print images are 8 bit gray-level JPEG files by our self-developed face recognition device. In our device, there are no pegs to restrict postures and positions of palms. Subjects are required to put his face into the device and lay it on a uniform-colored background. The device supplies an evenly distributed illumination and captures palm print images using a CMOS camera fixed on the top of the device and finger print it takes the biological features of a person. Fingerprint Recognition System has high acceptability, immutability, refers to the persistence of the fingerprint over time, and individuality, and refers to the uniqueness of ridge details across individuals. The fingerprints created by that friction ridge structure. A fingerprint in its narrow sense is an impression left by the friction ridges of a human finger. In a wider use of the term, fingerprints are the traces of an impression from the friction ridges of any part of a human hand.

Fig 2: Biometric features extraction from a Human Palm

2.3 Biometric features extraction through Facial recognition:

A facial recognition system is a technology capable of matching a human face from a digital image or a video frame against a database of faces, typically employed to authenticate users through ID verification services, works by pinpointing and measuring facial features from a given image. A facial recognition system is a computer application that is capable of identifying or verifying a person from a digital image or a video frame from a video source. One of the ways to do this is by comparing selected facial features from the image and a facial database. It is typically used in security systems and can be compared to other biometrics such as fingerprint or eye iris recognition systems.[1]Recently, it has also become popular as a commercial identification and marketing tool

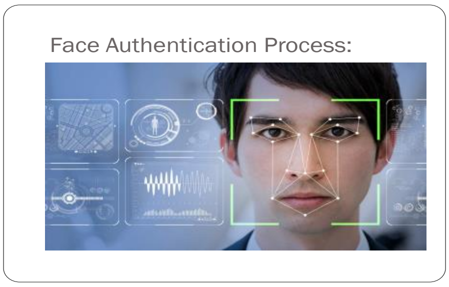

Fig 3: Biometric feature extraction from a human Face

2.4 Secure Key (Password) distribution to every individual :

The addition of 4 bit password by the administrator while a voter enrolls for his Identification card for the purpose of future voting is taken place. This 4 bit password will be generated and shared with the voter. At the time of voting the voter is supposed to be authenticated with the provided password also along with the biometric verification phenomena. Therefore password generation, storing in our database and secure distribution to every individual, collaboratively enhancing the security of our voting system.

Fig 4: 4 Bit, pass code to be entered for genuine voter validation

3. Various types of techniques involve in the feature extraction process from Biometrics:

Recognition algorithms can be divided into two main approaches, geometric, which look at distinguishing features, or photometric, which is a statistical approach that distills an image into values and compares the values with templates to eliminate variances. Popular recognition algorithms include Principal Component Analysis using eigenfaces, Linear Discriminate Analysis, Elastic Bunch Graph Matching using the Fisherface algorithm, the Hidden Markov model, the Multilinear Subspace
Learning using tensor representation, and the neuronal motivated dynamic link matching.

3.1Traditional Methods:

Some facial recognition algorithms identify facial features by extracting landmarks, or features, from an image of the subject's face. For example, an algorithm may analyze the relative position, size, and/or shape of the eyes, nose, cheekbones, and jaw.[3] These features are then used to search for other images with matching features.[4] Other algorithms normalize a gallery of face images and then compress the face data, only saving the data in the image that is useful for face recognition. A probe image is then compared with the face data.[5] One of the earliest successful systems [6] is based on template matching techniques[7] applied to a set of salient facial features, providing a sort of compressed face representation.

3.2 Dimensional recognition:

A newly emerging trend, claimed to achieve improved accuracies, is three-dimensional face recognition. This technique uses 3D sensors to capture information about the shape of a face. This information is then used to identify distinctive features on the surface of a face, such as the contour of the eye sockets, nose, and chin.[8]

One advantage of 3D facial recognition is that it is not affected by changes in lighting like other techniques. It can also identify a face from a range of viewing angles, including a profile view.[4][8] Three-dimensional data points from a face vastly improve the precision of facial recognition. 3D research is enhanced by the development of sophisticated sensors that do a better job of capturing 3D face imagery. The sensors work by projecting structured light onto the face.

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Up to a dozen or more of these image sensors can be placed on the same CMOS chip—each sensor captures a different part of the spectrum.[9]

Even a perfect 3D matching technique could be sensitive to expressions. For that goal a group at the Techno applied tools from metric geometry to treat expressions as isometrics[10] A company called Vision Access created a firm solution for 3D facial recognition. The company was later acquired by the biometric access company Bios crypt Inc.which developed a version known as 3D Fast Pass.

A new method is to introduce a way to capture a 3D picture by using three tracking cameras that point at different angles; one camera will be pointing at the front of the subject, second one to the side, and third one at an angle. All these cameras will work together so it can track a subject's face in real time and be able to face detect and recognize.

3.3 Skin texture analysis

Another emerging trend uses the visual details of the skin, as captured in standard digital or scanned images. This technique, called skin texture analysis, turns the unique lines, patterns, and spots apparent in a person's skin into a mathematical space. Tests have shown that with the addition of skin texture analysis, performance in recognizing faces can increase 20 to 25 percent.

3.4 Thermal cameras

A different form of taking input data for face recognition is by using thermal cameras, by this procedure the cameras will only detect the shape of the head and it will ignore the subject accessories such as glasses, hats, or make up. A problem with using thermal pictures for face recognition is that the databases for face recognition are limited. Diego Socolinsky, and Andrea Selinger (2004) research the use of thermal face recognition in real life, and operation sceneries, and at the same time build a new database of thermal facial images. The research uses low-sensitive, low-resolution ferro-electric electrics sensors that are capable of acquire long wave thermal infrared (LWIR). The results show that a fusion of LWIR and regular visual cameras has the greater results in outdoor probes. Indoor results show that visual has 97.05% accuracy, while LWIR has 93.93, and the Fusion has 98.40, however on the outdoor proves visual has 67.06, LWIR 83.03, and fusion has 89.02. The study used 240 subjects over the period of 10 weeks to create the new database. The data was collected on sunny, rainy, and cloudy days.

4. Methodology of Voter Identification Using Biometrics:

Multimodal recognition requires 8 main steps-

- Input Image Selection
- Grayscale Conversion Process
- DWT Segmentation
- Fusion Technique
- Feature Extraction Process
- Database Up Loading
- Matching of both Input Fusion Image and Database Images
- Recognition Process

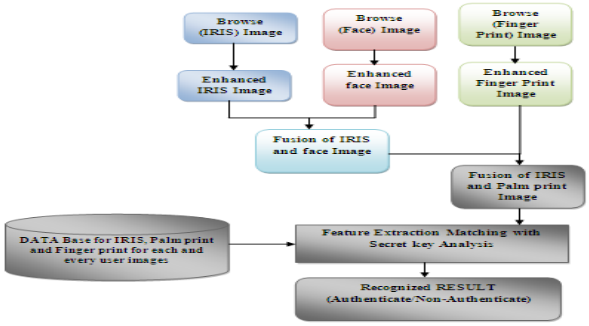

Fig 5: Process Diagram4

5. Input Image Selection:-

Digital images of melanoma and benign nevi were collected in JPEG format from different sources totaling 72, half melanoma and half benign. MATLAB's Wavelet Toolbox only supports indexed images with linear monotonic color maps so the RGB images were converted to grayscale images. The next step in the process was to segment the lesion from the surrounding skin. Since a clear color distinction existed between lesion and skin, thresholding was very suitable for this task. A black and white image was produced and its size increased by six pixels all around in order to include the entire border region in the segmented image.

1. An image can be defined as a two-dimensional signal (analog or digital), that contains intensity (grayscale), or color

information arranged along an x and y spatial axis.

2. Also it is defined as collection of pixels.

3. Mathematically it defined in terms of Matrix (m x n)

4. Pixels – it is point that is having location(x, y) and value(I)

5. Two Coordinates – Spatial and Pixel Coordinates

An image is a picture that has been created or copied and stored in electronic form. An image can be described in terms of vector graphics or raster graphics . An image stored in raster form is sometimes called a bitmap .

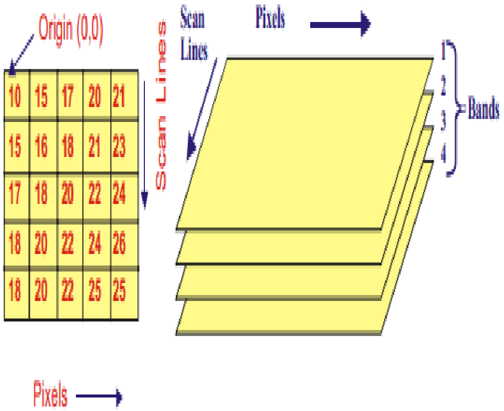

Fig 6: Two Dimensional Image Processing (Into pixels)

6. RGB Color Model in Image Files

Red, green, and blue light are added together in various ways to reproduce a broad array of colors.

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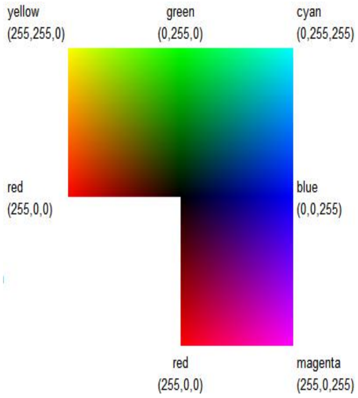

(0, 0, 0) is black (255, 255, 255) is white (255, 0, 0) is red (0, 255, 0) is green (0, 0, 255) is blue (255, 255, 0) is yellow (0, 255, 255) is cyan (255, 0, 255) is magenta

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Fig 7: RGB Color model and codes for various colors

7. Plane Separation Process

While displaying the different bands of a multispectral data set, images obtained in different bands are displayed in image planes (other than their own) the colour composite is regarded as False Colour Composite (FCC).

Fig 8: Plane separation process to estimate every attribute of an Image

8. Discrete Wavelet Transform:

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 Recently the JPEG committee has released its new image coding standard, JPEG-2000, which has been based upon DWT. Wavelet transform decomposes a signal into a set of basis functions. These basis functions are called wavelets. Wavelets are obtained from a single prototype wavelet y(t) called mother wavelet by dilations and shifting:

$$\psi_{a,b}(t) = \frac{1}{\sqrt{a}}\psi\left(\frac{t-b}{a}\right)$$

Where a is the scaling parameter and b is the shifting parameter

8.1 Theory of Wavelet:

The wavelet transform is computed separately for different segments of the time-domain signal at different frequencies. Multi-resolution analysis: analyzes the signal at different frequencies giving different resolutions MRA is designed to give good time resolution and poor frequency resolution at high frequencies and good frequency resolution and poor time resolution at low frequenciesGood for signal having high frequency components for short durations and low frequency components for long duration.e.g. Images and video frames Theory of WT (cont.) Wavelet transform decomposes a signal into a set of basis functions. These basis functions are called wavelets. Wavelets are obtained from a single prototype wavelet y(t) called mother wavelet by dilations and shifting

$$\psi_{a,b}(t) = \frac{1}{\sqrt{a}}\psi\left(\frac{t-b}{a}\right)$$

Where a is the scaling parameter and b is the shifting parameter

1D-WT:

The 1-D wavelet transform is given by:

$$W_f(a,b) = \int_{-\infty}^{\infty} x(t)\psi_{a,b}(t)\,dt$$

The inverse 1-D wavelet transform is given by:

$$x(t) = \frac{1}{C}\int_{0}^{\infty}\int_{-\infty}^{\infty} W_f(a,b)\psi_{a,b}(t)\,db\,\frac{da}{a^2}$$

$$\text{where } C = \int_{-\infty}^{\infty}\frac{|\psi\omega)|^2}{\omega}\,d\omega < \infty$$

Discrete wavelet transforms (DWT), which transforms a discrete time signal to a discrete wavelet representation. it converts an input series x0, x1, ..xm, into one high-pass wavelet coefficient series and one low-pass wavelet coefficient series (of length n/2 each) given by:

$$H_i = \sum_{m=0}^{k-1} x_{2i-m} \cdot s_m(z)$$

$$L_i = \sum_{m=0}^{k-1} x_{2i-m} \cdot t_m(z)$$

Where sm(Z) and tm(Z) are called wavelet filters, K is the length of the filter, and i=0, ..., [n/2]-1.

In practice, such transformation will be applied recursively on the low-pass series until the desired number of iterations is reached.

9. FEATURE EXTRACTION:

Entropy:-Hence, for each texture feature, we obtain a co-occurrence matrix. These co-occurrence matrices represent the spatial distribution and the dependence of the grey levels within a local area. Each (i,j) th entry in the matrices, represents the probability of going from one pixel with a grey level of 'i' to another with a grey level of 'j' under a predefined distance and angle. From these matrices, sets of statistical measures are computed, called feature vectors.

Energy: It is a gray-scale image texture measure of homogeneity changing, reflecting the distribution of image gray-scale uniformity of weight and texture..

E=∑∑p(x, y) ^2 P(x, y) is the GLC M

Contrast: Contrast is the main diagonal near the moment of inertia, which measure the value of the matrix is distributed and images of local changes in number, reflecting the image clarity and texture of shadow depth.

Contrast I=∑∑(x-y)^2 p(x,y)

Entropy: It measures image texture randomness, when the space co-occurrence matrix for all values is equal, it achieved the minimum value.

S=∑∑p(x, y) log p (x, y)

Correlation Coefficient: Measures the joint probability occurrence of the specified pixel pairs.

C=∑∑((x- μx)(y-μy)p(x , y)/$\sigma_x\sigma_y$))

Homogeneity: Measures the closeness of the distribution of elements in the GLCM to the GLCM diagonal.

H = ∑∑ (p(x , y)/(1 + [x-y])))

10. Fusion Process:-

In computer vision, Multisensor Image fusion is the process of combining relevant information from two or more images into a single image.[1] The resulting image will be more informative than any of the input images.[2]

In remote sensing applications,the increasing availability of space borne sensors gives a motivation for different image fusion algorithms. Several situations in image processing require high spatial and high spectral resolution in a single image. Most of the available equipment is not capable of providing such data convincingly. Image fusion techniques allow the integration of different information sources. The fused image can have complementary spatial and spectral resolution characteristics. However, the standard image fusion techniques can distort the spectral information of the multispectral data while merging.

In satellite imaging, two types of images are available. The panchromatic image acquired by satellites is transmitted with the maximum resolution available and the multispectral data are transmitted with coarser resolution. This will usually be two or four times lower. At the receiver station, the panchromatic image is merged with the multispectral data to convey more information.Many methods exist to perform image fusion. The very basic one is the high pass filtering technique. Later techniques are based on Discrete Wavelet Transform, uniform rational filter bank, andLaplacian pyramid.

10.1 Importance of Image Fusion:

Multisensory data fusion has become a discipline which demands more general formal solutions to a number of application cases. Several situations in image processing require both high spatial and high

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spectral information in a single image. This is important in remote sensing. However, the instruments are not capable of providing such information either by design or because of observational constraints. One possible solution for this is data fusion.

11. DIGITAL IMAGE PROCESSING

The identification of objects in an image and this process would probably start with image processing techniques such as noise removal, followed by (low-level) feature extraction to locate lines, regions and possibly areas with certain textures.

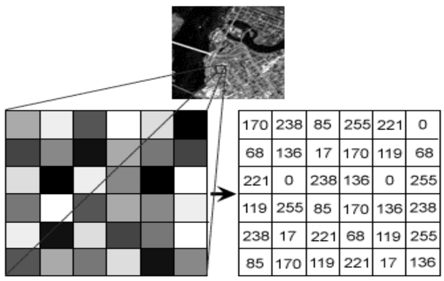
The clever bit is to interpret collections of these shapes as single objects, e.g. cars on a road, boxes on a conveyor belt or cancerous cells on a microscope slide. One reason this is an AI problem is that an object can appear very different when viewed from different angles or under different lighting. 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 skilful programming and lots of processing power to approach human performance. Manipulation of data in the form of an image through several possible techniques. 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.

11.1 IMAGE:

An image is a two-dimensional picture, which has a similar appearance to some subject usually a physical object or a person.Image is a two-dimensional, such as a photograph, screen display, and as well as a three-dimensional, such as a statue. They may be captured by optical devices—such as cameras, mirrors, lenses, telescopes, microscopes, etc. and natural objects and phenomena, such as the human eye or water surfaces.

The word image is also used in the broader sense of any two-dimensional figure such as a map, a graph, a pie chart, or an abstract painting. In this wider sense, images can also be rendered manually, such as by drawing, painting, carving, rendered automatically by printing or computer graphics technology, or developed by a combination of methods, especially in a pseudo-photograph.

An image is a rectangular grid of pixels. It has a definite height and a definite width counted in pixels. Each pixel is square and has a fixed size on a given display. However different computer monitors may use different sized pixels. The pixels that constitute an image are ordered as a grid (columns and rows); each pixel consists of numbers representing magnitudes of brightness and color.



Each pixel has a color. The color is a 32-bit integer. The first eight bits determine the redness of the pixel, the next eight bits the

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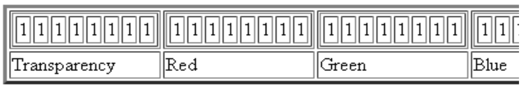
greenness, the next eight bits the blueness, and the remaining eight bits the transparency of the pixel.



12. FUNDAMENTAL STEPS IN DIGITAL IMAGE PROCESSING:

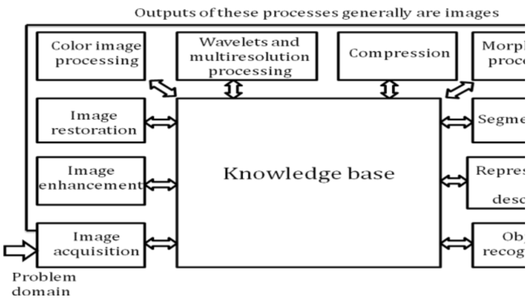


Fig 9:- Digital Image Processing Fundamental Diagram

13. PROBLEM FORMULATION:

13.1 Edge detection (Iris verification):

It is a linear filter used for edge detection. Frequency and orientation representations of Gabor filters are similar to those of the human visual system, and they have been found to be particularly appropriate for texture representation and discrimination. In the spatial domain, a 2D Gabor filter is a Gaussian kernel function modulated by a sinusoidal plane wave. Gabor filter: (Dennis Gabor, 1946) is a linear filter whose impulse response is the multiplication of a harmonic function with a Gaussian function. As per convolution theorem the convolution of Fourier Transformation (FT) of harmonic function and FT of Gaussian function is nothing but FT of a Gabor filter's impulse response

[FT(Gabor) = FT(Harmonic) FT(Gaussian)].The filter consists of a real and an imaginary component, which represent the orthogonal directions. The two components are used individually or in a complex form. Complex :

$g(x,y;\lambda\theta,\hat{},\sigma,\gamma) = \exp(-(x12+ \gamma 2y12)/2\sigma 2)$. $\exp(i.(2\pi x1/\lambda+ \hat{}))$ ---------- (1)

Real :

$g(x,y;\lambda,\theta,\hat{},\sigma,\gamma) = \exp(-(x12+ \gamma 2y12)/2\sigma 2)$. $\cos(2\pi x1/\lambda+ \hat{})$ ---------- (2)

Imaginary :

$g(x,y;\lambda,\theta,\hat{},\sigma,\gamma) = \exp(-(x12+ \gamma 2y12)/2\sigma 2)$. $\sin(2\pi x1/\lambda+ \hat{})$ ---------- (3)

Where,

$x1 = x\cos\theta+y\sin\theta$

and

$y1 = -x\sin\theta+y\cos\theta$

In eq.-1,2,3

λ: wavelength of sinusoidal factor,

θ: orientation of normal to parallel stripes,

⍰: phase offset,

σ: sigma of Gaussian envelope,

γ: spatial aspect ratio (specifies the ellipticity).

Daugman (J. Daugman; 1980, 1985) extended the Gabor filter into two dimensions.

13.2 Segmentation (Palm print verification)

Threshold (image cropping) ProcessSegmentation involves separating an image into regions (or their contours) corresponding to objects. Usually regions are segmented by identifying common properties. Or, similarly, contours are identified by identifying differences between regions (edges).

The simplest property that pixels in a region can share is intensity. So, a natural way to segment such regions is through thresholding, the separation of light and dark regions. Thresholding creates binary images from gray-level ones by turning all pixels below some threshold to zero and all pixels about that threshold to one. If g(x, y) is a threshold version of f(x, y) at some global threshold T,

Thresholding is the simplest method of image segmentation. From a grayscale image, thresholding can be used to create binary images

13.3 Feature vector(Finger Print Verification)

The PCA (Principal Component Analysis) method uses the statistical distribution of input samples to find the best projection bases. It is widely used in the computer vision application . The advantages of PCA method are that the principal eigenvectors are orthogonal and represent the directions where the signals have maximum variation. This property will speed up the convergence of model training and improve the system performance. The PCA method tries to find the projection of the feature vector on a set of base vectors. Let X={xt, t=1, 2... M} be a set of M n-dimensional feature vectors.

PCA algorithms are generally implemented for pattern recognition systems. Principal component analysis involves a mathematical procedure that transforms a number of possibly correlated variables into a smaller number of uncorrelated variables called principal components. The first principal component accounts for as much of the variability in the data as possible, and each succeeding component accounts for as much of the remaining variability as possible. It is also named as the Karhunen–Loeve transform which is also called as (KLT) the Hotelling transform.

14. BENEFITS

1. Minimizing the cost of the ballot's printing and employing more staff.
2. The human errors are reduced in voting final result as well as minimize the expenses of the election.
3. More participation, fast process, lower costs, precision placing better access and versatility for disabled. 6 resultsshowing casting of votes

15. CONCLUSION:-

'Vote Casting Authentication Using Biometrics (VCAUB)' system is absolutely accurate, and it avoids voting related problems and enhances the credibility of Election Process. This voting system is completely secured and it detects and prevents unauthorized persons from voting, therefore eligible candidates only can poll the vote. In case, any unauthenticated individuals try to cast their votes, it will alert through the corresponding notifications on the screen.

We provide the utmost secure mechanism while voting by the biometrics (Left Iris, Right Iris, Palm Images, and Face Images) along with the distribution of **'Secure Password Key Generation'** with every individual. Implementation of 'Vote Casting Authentication Using Biometrics' based on Internet of Things had been proposed. The proposed schemes are very suitable for real time management. Therefore these attributes are collaboratively enhancing the security measures of the thesis.

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