A Biometric-Secure E-Voting System for Election Process

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Abstract— An electronic voting system is a voting system in which the election data is recorded, stored and processed primarily as digital information. There are two types of e-voting online and Off-line. On-line e.g. via internet, and off-line by using voting machine or electronic polling booth. Authentication of voter’s security of voting process, securing voted data is the main challenges off-voting. This is the reason why designing a secure e-voting system is very important. In many proposals, the security of the system realize mainly on the black box voting machine. But Security of data, privacy of voters and the accuracy of the also main aspects that have to be taken into consideration while building secure e-voting system. In this project the authenticated voters and polling data security aspects for e-voting system was discussed. It insured that vote casting cannot be altered by unauthorized person. The voter authentication in online e-voting process can be done by formal registration through administrators and by entering one time password. In offline e-voting process authentication can be using Iris reorganization which enables the electronic ballot reset for allowing voters to cast their votes. Also the voted data add voters details can be sent to the nearby database administration unit in a timely manner using GSM system with cryptography technique.

Keywords— Iris Reorganization; Offline e-voting; Online e-voting; Electronic voting.

I. INTRODUCTION

A. Biometrics

Biometrics system is used to identify humans uniquely based on their physical or behavioural characteristics. Biometric systems are mainly based on fingerprints, facial features, handwriting, hand geometry, voice and our project, the Iris recognition. Biometrics system first captures a sample of the feature. These extracted features are then transformed into biometrics template. The biometrics template is a normalized, efficient and highly discriminating representation of the feature, which can then be objectively compared with other templates in order to determine identity. A good biometrics template is characterized by the use of a feature that is—

- Highly Unique: A biometrics template should be unique. This allows a person to be uniquely identified with minimum failures.
- Stability: Biometrics feature of the person should remain same or change very little so that the enrolled template in database still will be match-able. The probability of damage and abrasion to this failure should be minimal.
- Easily Captured: Biometric system should be able to extract the biometric feature effectively and efficiently. Hence, the features should be externally visible.

The iris is nothing but the circular region around the pupil. Membrane in the eye is responsible for controlling the diameter and
the size of the central part called as pupil and the amount of light reaching at the retina. The color of the iris is same as that of the eye color; it can be green, blue or brown. Its purpose is to control the amount of light that enters the eye through the pupil, its dilator and sphincter muscles control the size of the pupil, but its construction from elastic connective tissue gives it a complex, bilious pattern. The larger the pupil, the more light can enter.

The iris provides the more security as compare to other biometric system so it’s very useful in security purpose. As iris is the only physical part that never change its unique pattern even though age go on increasing and it can also identify two twins easily. The major achievement of our project is to reduce time required for comparison by reducing stored database with the help of template fusion.

Daugman makes use of an Integrate-Differential operator for locating the circular iris and pupil regions and also the arcs of the upper and lower eyelids. The Integrate-Differential operator is defined as, where \(I(x, y)\) is the eye image, \(r\) is the radius to search for, \(\rho\) is a Gaussian smoothing function and \(s\) is the contour of the circle given by \(r, x_0, y_0\). The operator searches for the circular path where there is maximum change in pixel values, by varying the radius and centre \(x\) and \(y\) position of the circular contour. The operator is applied iteratively with the amount of smoothing progressively reduced in order to attain precise localization. Eyelids are localized in a similar manner with the path of contour integration changed from circular to an arc.

The integrate-differential can be seen as a variation of the Hough transform, since it too make use of first derivatives of the image and performs a search to find geometric parameters. Since it works with raw derivative information, it does not suffer from the threshold holding problems of the Hough transform. However, the algorithm can fail where there is noise in the eye image, such as from reflections, since it works only on a local scale.

B. Eye Lash and Noise Detection

Eyelash removal includes locating the eyelash pixels in the image and excludes the iris code bits generated from these pixels. Eyelashes are distinct from the background that is they are darker than their background in the eye images. Hence can be segmented using simple thresholding. Intensity values corresponding to the eyelashes are ignored. Thresholding can successfully detect and mask eyelashes.

II. LITERATURE SURVEY

A. Hough Transform

The Hough Transform is used to identify different shapes in images. It has been used to detect lines, circles and ellipses. Its major advantage is that it can deliver the same result as that for template matching, but faster and efficient. This is possible by the reformulation of iris recognition process, which is totally

Figure 1: A front-on view of the human eye

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based on the evidence gathering where the evidence is nothing but the votes cast in an accumulator array. The Hough Transform defines a mapping from the image points into an accumulator space. The mapping is done which is based on the function that describes the target shapes, in a computationally efficient manner. This mapping requires less computational resources than template matching. However, it requires significant storage and high computational requirements. The fact that the Hough Transform is equivalent to template matching is most popular of all existing shape extraction techniques. It is applied to images which have already been freed from irrelevant detail applying filters, edge detection and thresholding. This is done in the segmentation step. The idea behind the method is simple in which parametric shapes in an image are detected by looking for accumulation points into the parameter space must cluster around the parameter values which correspond to that space. How does it work? Hough transform converts a point in the x-y-plane to the parameter space. The parameter space is defined according to the shape of the object of interest. The CHT can be defined by considering the equation for a circle given by, This equation defines a locus of points (x, y) centred on an origin (a, b) and with radius r. this equation can again be visualized in two dual ways: As a locus of points (x, y) in an image.

As a locus of points (a, b) centred on (x, y) with radius r. Fig 2.1 shows this dual definition. Each edge point defines a set of circles in the accumulator space. These circles are defined by all possible values of the radius and they are centred on the co-ordinates of the edge point. Fig 2.1(b) shows three circles defined by three edge points. These circles are defined for a given radius value. Actually, each edge point defined circles for the other values of the radius. This implies that the accumulator space is three dimensional and that edge points map to a cone of votes in the accumulator space. Fig 2.1(c) shows this accumulator. After gathering evidence of all the edge points, the maximum in the accumulator space corresponds to the parameters of the circle in the original image. The votes are generated in cones, according to equation 2.1.

The parametric representation of the equation of the circle is the advantage of this representation is that it allows us to solve for the parameters Thus, the HT mapping is defined by These equations defined the points in the accumulator space (Fig 2.1(b)) dependent on the radius r. Note that is not a free parameter, but defines the trace of the curve. The trace of the curve is commonly referred to as the point spread function.

The two major advantages of the HT and of template matching: its ability to handle noise and occlusion. The HT merely finds the circle with the maximum number of points; it is possible to include other constraints to control the circle selection process, such as gradient direction for objects with known illumination problem. In the human eye, the iris is usually darker than its white surrounding.

Fig 2.1: Illustrating Circular Hough Transform
Some of the difficulties with the HT are that it is essentially an implementation of template matching and does not use some of the richer stock of information available in an image. For example, we might know constraints on size; the largest size. Also, we know some of the topology: the eye region contains two ellipsoidal structures with a circle in the middle. Also, we might know brightness information: the pupil is darker than the surrounding iris. These factors can be formulated as constraints on whether edge points can vote within the accumulator array. A simple modification is to make the votes proportional to edge magnitudes. In this manner, points with high contrast will generate more votes and hence have more significance in the voting process. In this way, the feature extracted by the HT can be arranged to suit a particular application.

III. SCOPE OF THE PROJECT

Iris recognition system consists of five major steps. The first is the image acquisition of a person’s eye at enrolment time. The second is segmentation in which the iris out of the image containing the eye and part of the face is identified and which localize the iris pattern. Third step is the normalization; in this the iris pattern will be extracted and scaled to a predefined size using. Step four is the template generation, here the details of the iris are filtered, extracted and represented in an iris code. The last step is matching, where two iris codes are compared and a similarity score is computed. These steps are shown schematically figure

Fig 2.1.1: An example of how the CHT looks like with the real world data for different radius.

The general approach for iris reorganization using template fusion is as follows:

Iris Image Acquisition, Iris Segmentation, Template Generation, Fusion of Template and Matching

Fig Iris Recognition system

Fig Use Case Diagram
IV. COMPARITIVE STUDY

Feasibility study perform analysis of proposed project to determine whether it is
1. Technically feasible
2. Feasible within estimated cost
3. Will it is profitable

Five key considerations involved in feasibility analysis
1. Operational Feasibility
2. Economic Feasibility
3. Technical Feasibility
4. Behavioural Feasibility
5. Cost Feasibility

Each of them is discussed below.

A. Operational Feasibility
In initially user is trained to handle the system. The GUI should be designed in such a way that it will be user friendly and simpler one, user will be having few problems while interacting. It is not necessary that user should be sophisticated one.

B. Economic Feasibility
This study is carried to determine the effect of this project on the economy of the organization. The amount fund that the company can invest into the research and development of the system is limited.

The expenditures must be justified. Thus the developed system must be within the budget and this was achieved because most of the technologies used are freely available. Only the customized products had to be purchased.

C. Technical Feasibility
This study determines how the system is technically feasible, means what are the technical requirements of the system. Any system developed must not have a high demand available on the available technical resources. This will lead to high demands being places on the client. The developed system must have a modest requirement, as only minimal or null changes are required for implementing this system. This study is done to check the level of acceptance of the system by user. This includes the process of training the user to use the system efficiently. The user must not feel threatened by the system, instead must accept it as a necessity. The level of acceptance by the users solely depends on the methods that are employed to educate the user about the system and to make him familiar with it. His level of confidence must be raised so that he is also able to make some constructive criticism, which is welcomed, as he is the final user of the system.

E. Cost Feasibility
The extracting web pages for profile creation from the search engine are expected to have at least several lines of code. So cost feasibility of this system can be estimated, allows us to estimates cost as a function of size. Thus this also allows us to estimate and analyse the feasibility of the system in the frame. As we have the cost estimate of our system, it will allow us of having a realistic idea.

D. Social Feasibility
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CONCLUSION
As multiple images of the same eye may be required to improve the performance of an image recognition system, this work presents an algorithm by which a given set of base templates are fused to generate one final template for the set. An experimental work using 450 persons from database reveals a reduction in database size by nearly an 80% and an increase of verification speed of about 80% is achieved while maintaining about 99.33% accuracy of matching.

REFERENCES


