

A Secure Voting System using Iris Recognition

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Abstract—During elections in democratic countries, the voting mechanism is extremely significant.

India holds elections using either Secret Ballot Voting or Electronic Voting Machines which involves massive costs and manual labor. The election commission is having a lot of problems during the election process. The most common issue that the electoral commission deals with is the polling arrangement and duplicate or voting fraud. Electronic voting machines need more personnel, are time-consuming, and are less reliable. As a result, the system must be tuned to be efficient, leaving no opportunity for poor voting procedures. In this project, a secure and modern voting system employing iris recognition and facial recognition is built to improve the present voting system. The most reliable biometric of human identification is iris recognition. The proposed system allows users to vote only after verifying their iris image. Iris recognition system is categorized into Canny Edge Detector, iris Circular Hough transformation, symlet wavelet, iris-based authentication detection.

Index Terms— iris, e-voting, secure, hough transform.

I. INTRODUCTION

In any country, the election process is a major administrative task. It employs a number of processes, all of which require human effort. Voting techniques are now transferred to electronic format and used in a variety of automated tasks. This will save time by reducing traditional paper tasks. E-voting is a computer-assisted voting mechanism that can be used both online and offline. Each voter's information is recorded with a unique ID and saved in a database.

Every voter's information is retrieved and confirmed whenever the ballot method is used. In an electronic voting system, voter identification is crucial.

Existing voting systems' core problem is security. An unidentified person may often cast a vote. Some politicians bid to secure elections by unlawful means. Existing systems are very long, difficult, and with time lags. We use an Iris pattern and as a result, the suggested voting mechanism is more secure than the alternating current system.

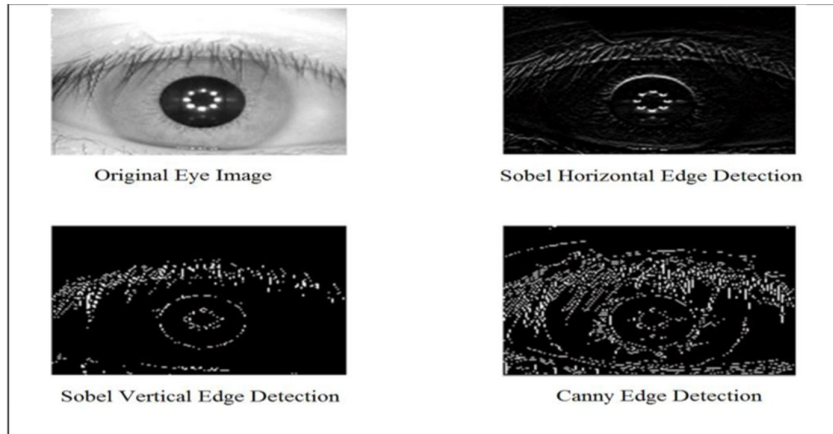
II. METHODOLOGY

Canny Edge Detection:

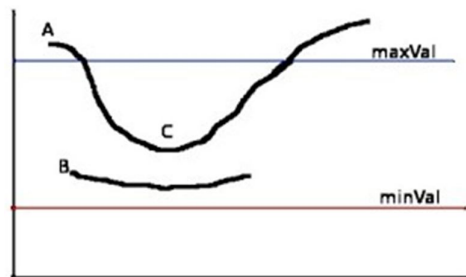
Canny Edge Detection is a popular edge detection algorithm that was developed by John

F. Canny. It takes the Sobel algorithm's output as its input and is a multi-stage algorithm with stages like Noise

Reduction, Finding Intensity Gradient, and Suppression which gives us a binary image with thin edges. It performs Hysteresis thresholding where the real edges are found by using certain threshold values.



All edges with an intensity gradient above the maximum threshold are considered edges, but edges below the minimum threshold are definitely not edges. The edges whose threshold value lies between the maximum and minimum threshold values are determined as edges or non-edges based on how connected they are to the edges and non-edges. Therefore, those connected to edges are considered definitely edges while the ones connected to non-edges are abandoned. At this stage, small pixel noise is also removed, resulting in an image with strong and fine edges.



A. Hough Transformation

Hough Transformation is done using the Circular Hough Transform algorithm whose main aim is to find the aligned edges in the images that create circles. This is used to perform the segmentation of the image. This algorithm is based on the formula of a circle equation with radius r and center (a, b)

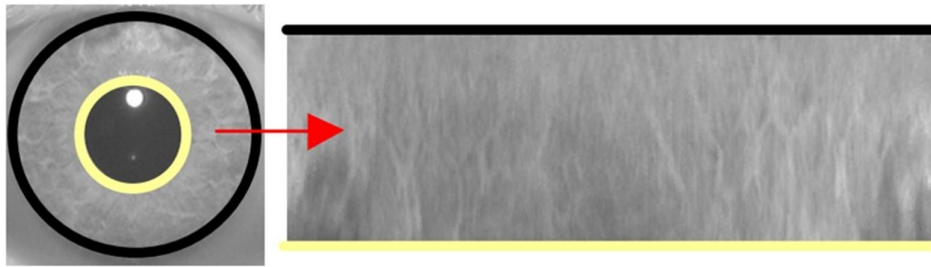
$$(x - a)^2 + (y - b)^2 = r^2$$

In the proposed system, the boundary of the iris and the pupil is determined from the image of the eye using this algorithm. It is also used to find the iris where the pupil junction and the iris boundary are present.



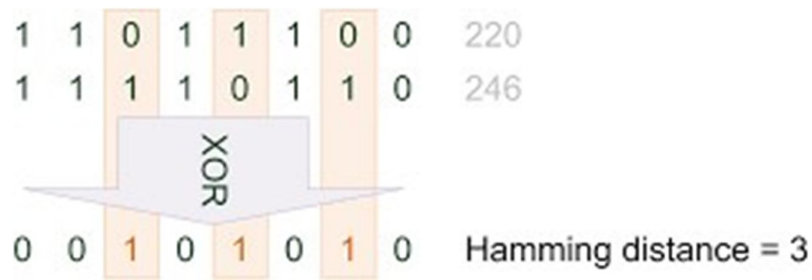
B. Normalization

Daugman proposed the rubber sheet model which is used to do Normalization. This technique transforms each point in the segmented iris region from Cartesian (x, y) coordinates to polar coordinates (r, θ) .



C. Hamming distance

The number of distinct bits in two strings of the same length is measured by Hamming distance. In other words, it counts how many bits must be shifted to match two strings. Because the templates are in binary format, Hamming distance has a rapid matching speed. Hamming Distance is calculated by performing the Exclusive-OR (XOR) operation on the two binary patterns. If the hamming distance between two templates is 0, they are a perfect match; otherwise, they are not.

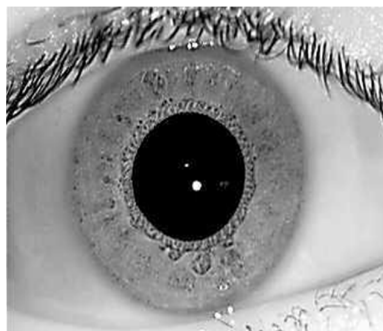


D. Proposed Voting System

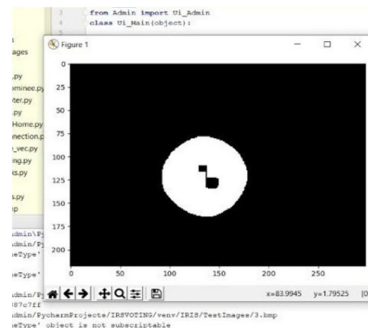
Our proposed voting system has two interface modules - Admin and Voters. Admin is solely for the administrator to register the voters and their iris image and add party candidates with their details. The administrator can also view the number of votes for each party and also the results. On the other hand, the Voter interface is only for the voters to participate in the election after they have been successfully registered with the system.

- The first step is the registration of voters with the system. The iris image uploaded during this time gets registered and saved with the voter ID in the database.
- When the voter approaches to vote, they are asked to provide their Voter ID and Iris Image. After this, the process of iris recognition starts with segmentation. Algorithms like Canny Edge detection and Hough Transform are used here.
- Normalization is done and the Hamming distance is calculated. This entire process is done for the uploaded iris image as well as for the iris image used while registering.

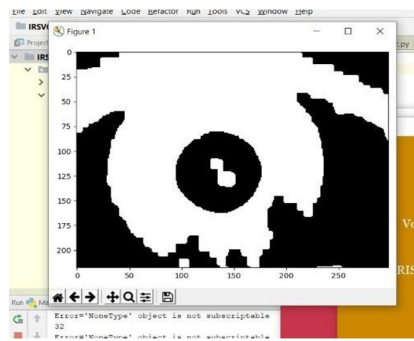
Hence, using Hamming distances of the two, the system is able to check if the pictures are a match. This is also called Matching.



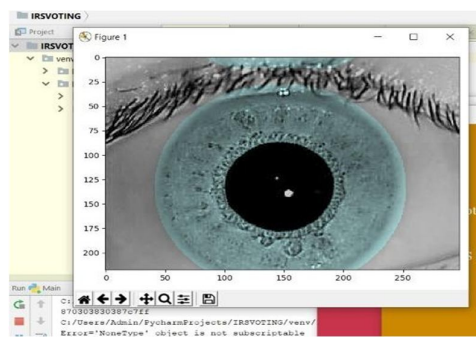
Original Iris Image



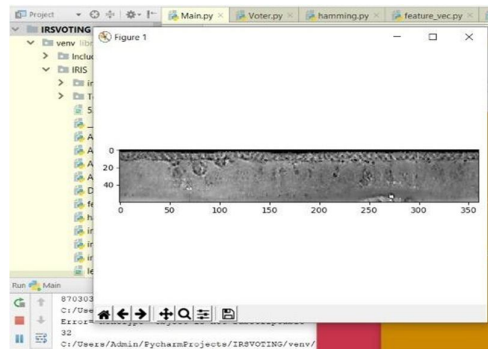
Canny edge detection - for the inner edge



Canny edge detection - for the outer edge



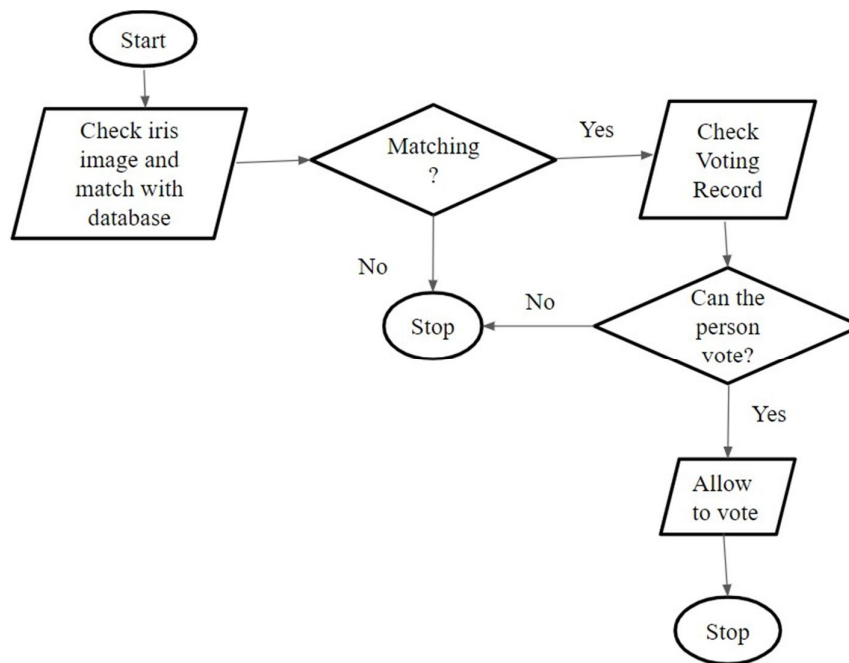
HoughTransform-Pupilan



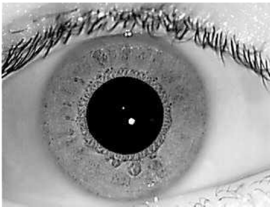
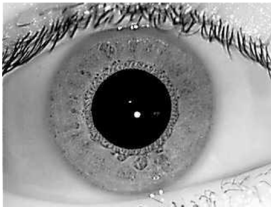
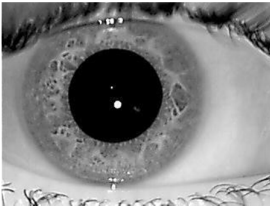
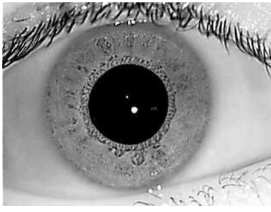
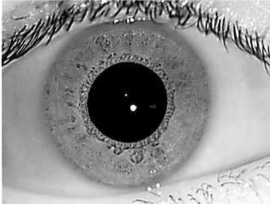
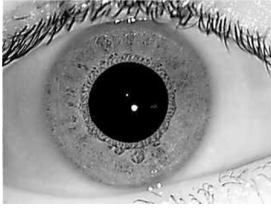
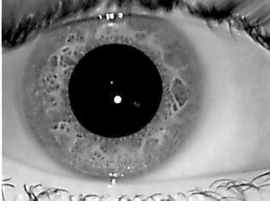
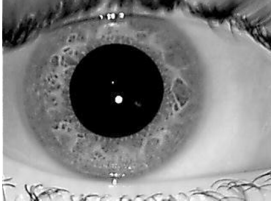
Normalization, converting image to binary

Then the Hamming Distance is calculated using the formula and both the images are checked to see if they are a match or not.

The flowchart of the proposed system is as follows:



E. Observation

Image 1	Image 2	Hamming Distance	Output
		1	Not Matched
		1	Not Matched
		0	Matched
		0	Matched

III. FUTURE SCOPE AND CONCLUSION

The concept of Iris Recognition is rapidly gaining pace due to the fact that it is meticulous. Despite requiring proper tools to precisely capture the iris image, it provides strong biometric authentication. Our proposed system can be integrated into a real-time application with the help of a high-resolution iris scanner that is able to precisely capture the iris image. In such a scenario, it would be possible to capture the iris image of voters when they come to vote and check if they are eligible to do so. Due to its highly secure and fast computational voting along with improved accessibility, greater accuracy, and lower risk of human and mechanical errors, it is bound to give rise to safe and fair polling.

This project can therefore be easily used in actual situations like student body elections in educational institutes, local neighborhood elections, and also in the near future, Government elections.

REFERENCES

- [1] M.Mahiuddin, "Design a Secure Voting System Using Smart Card and Iris Recognition," 2019 *International Conference on Electrical, Computer and Communication Engineering (ECCE)*, 2019, pp.1-6, doi: 10.1109/ECACE.2019.8679118.
- [2] Sarankumar.V, Sasikumar.M, Ramprabu.K, Sathishkumar.A, Mr.S.Gladwin Moses Stephen, Department of Electronics and Communication Engineering, Akshaya College of Engineering and Technology, Coimbatore, March-2017
- [3] Z. Zainal Abidin, M. Manaf, A. S. Shibghatullah, S.H. A. Mohd Yunus, S. Anawar, Z. Ayop, "Iris Segmentation Analysis using Integro-Differential Operator and Hough Transform in Biometric System", *Journal of Telecommunication, Electronic and Computer Engineering*, ISSN: 2180-1843 Vol.4 No.2 July-December 2012.
- [4] Nithya, J. & Abinaya, G. & Sankareswari, B. & Lakshmi, M. S. (2015). Iris recognition-based voting system. 2015. 44-51.
- [5] IRIS Biometric Based Voting System Praveen Santhosh Kumar.G[1], Preethi.I[2], Sindhu. R[3], Sumithra.S[4], Ushanandhini. R[5] Assistant Professor[1], UG Students[2,3,4,5] Department of Electronics and Communication Engineering Nandha Engineering College, Erode, Tamilnadu. *International Journal of Research in Engineering and Science (IJRES)* ISSN (Online): 2320-9364, ISSN (Print): 2320-9356 www.ijres.org Volume 9 Issue 4 | 2021 | PP. 18-23
- [6] UTTania, S. M. Motakabber, M. Ibrahimy, "Edge Detection Techniques for Iris Recognition System", *IOP Conference Series: Materials Science and Engineering*, Volume 53, conference 1, 2013.
- [7] Mahboob Karim, Nabila Shahnaz Khan, Shusmoy Kundu, Ashratuz Zavin, Asibul Islam, Brazab Nayak, "A proposed framework for biometric electronic voting system", *IEEE International Conference on 2017*
- [8] Iris Based E-Voting System Using Aadhar Database Saravanan.N, Pavithra.K, Nandhini.C. *International Journal of Scientific & Engineering Research*, Volume 8, Issue 4, April-2017 ISSN 2229-5518