

Online Voting System by Using Three Step Verification

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Abstract. Voting systems are the backbone of every democracy and organization. India uses an offline voting systems which are inadequate and inefficient due to the need for a large man force, and longer processing time for publishing results. Therefore, to make the system effective, the changes are implemented in the systems that can avoid these disadvantages. The new approach eliminates the requirement of physical presence, reducing overall complexity. Online voting systems have emerged as a convenient and reliable way of conducting elections. The system has the potential to make the process more effective and increase voter participation. However, it also comes with challenges related to security and authenticity. Our research paper outlines the system that employs three levels of authentication to guarantee the authenticity and dependability of the entire voting procedure. The first level involves face verification, followed by Aadhar verification and then voter card verification.

Keywords— Online, Voting, Face, Verification, Implementation, and Authentication.

1 INTRODUCTION

In a democratic society, elections are an essential occurrence, and it is the duty of both the citizens and the authority to ensure that they are conducted securely, smoothly, and without incident. In these systems, individuals are required to capture a facial image before the election, which is then used as a point of comparison during the voting procedure. The Individual Database is managed by the web application program, and permits the users to cast their vote a confirmation message is instantly sent by the website stating that their vote has been successfully registered and in the end they can share the feedback of using the website. The principal agenda of this research is to develop a voting systems that is both efficient and effective using face recognition technology[1],Aadhar Verification and Voter ID Verification giving opportunity to every individual who is qualified to vote from any remote location on earth. The proposed system consists of three levels of authentication. The first level involves face verification, where the voters are compulsory to take a photo of their face which contains three steps before the face is recognized.

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- i. Pre-processing: The process of keeping clear and good photos and discarding the missing or bad photos in the database for face verification.
- ii. Face Detection: The face is detected using the adhaar cascade algorithm which takes eyes as unique element to identify the face of the voter.
- iii. Face Recognition: Once the face is detected it helps in recognizing the person's identity and the voter moves to the subsequent steps of authentication[2].

The second level involves Aadhar verification, where the voter clicks on Aadhar verification and redirects to the official Aadhaar website for Aadhar verification. The voter is required to enter their Aadhar number to verify with the database. The third level involves Voter Id verification, where the voter clicks on Voter Id verification and redirects to the official website of Election Commission for Voter Id verification. The voter is compulsory to enter their Voter Id number and verify it with the database.

2 RELATED WORK

Elections are the primary worry of any nation when to choose somebody. Likewise, direct a solid, secure, quickly, and reasonable political race so individuals can include confidence inside the framework and that they can choose the individual for whom they need close by the minimal expense of desk work and labor. The focus of this research work is to allow users to cast their valuable vote from the remote locations virtually through their computers, mobiles, or laptops, avoiding them to physically visit a polling station through online voting systems. To utilize the online voting system, users are required to record their facial image in the provided system. Multiple instances of the unique facial details and image of every user are captured and placed in the system database to guarantee precision during the voting process. Once a user have registered with their face and provides all the necessary information, they can proceed to cast their votes [3][4].

The online voting procedure is operational solely within the designated timeframe of the electoral process. Users require a reliable internet connection and a webcam are essential for seamless facial recognition. Upon authentication via webcam, the system conducts a comparison of the user's face with the facial images placed in the system database. The proposed method aims to create a safe internet voting systems by utilizing facial recognition technology, which addresses the disadvantages of traditional and current voting systems [5]. The proposed system provides several advantageous facilities such as accuracy, verifiability, and convenience. Unlike the traditional methods that rely on election officers, paper ballots, or electronic voting machines, the proposed system requires only an internet connection and facial scanners, enabling voters to securely submit their ballots from any geographical location[6]. This system offers a safe and trustworthy platform for individuals to work out their voting right without any concerns. It employs robust security measures to safeguard the privacy and integrity of each voter's choice, storing it in highly secure digital format. This system guarantees the utmost confidentiality and ensures that no unauthorized access or leakage of votes can occur [7]. The online voting system encompasses several vital stages that are pivotal in establishing a seamless and secure voting experience. These stages can be broadly classified into two facets: the perspective of the Indian Election Commission as the administrator and that of the voters. Let's delve deeper into these stages for a comprehensive understanding [8][9].

The relevant information about the user is stored in the system main database of Indian Election Commission through their unique Aadhar Number[7].Every Indian citizens or

voters are assigned by this number and is recognized by the system to determine their respective constituencies. However, the voters registration procedure is only completed after the assigned field officer verifies all your documents. Additionally, the AADHAAR ID Number is verified against the main AADHAAR system database by the field officers to ensure accuracy[10]. Uploading candidate Information:-The Administrator is given all the information by a candidate with their Aadhar Number to verify the candidate. The Administrator registers the candidate based on their respective constituencies only after verifying their data. At this stage, to maintain the uniqueness of each candidate they were provided with a unique candidate ID. The candidate's profile picture and party symbol are also uploaded with other relevant information during this phase. It is mandatory for every candidate to register with their AADHAAR Identity number [9][11].

Mobile booths are set up in all voting constituencies by the Indian Election Commission on the day of election. The online voting system is opened until the specified closing time by the Administrator [10]. The registered voters can cast the vote conveniently from remote locations. Vote Submission:-During this stage, the user is compulsory to log in to their election account using their unique AADHAAR ID, Face Recognition and Voter ID Verification. Once logged in, the user is prompted to verify all their details before proceeding to the e-ballot paper[12]. All the important information about the candidates, including their name, AADHAAR ID, party logo, background details, party name, candidate profile picture, and an option to view other party members and their backgrounds is displayed by e-ballot paper. After the voter clicks the "SUBMIT VOTE" button, the server performs automated security verification. At this point, the server prompts the voter to enter a high-security submission password, which is sent to the voter's personal mobile at the voting time. The acceptance of votes is restricted to the Indian Election Commission and the District Magistrate if the correct high-security submission password is entered. However, if the password is incorrect, the voter is given another chance to enter the password. If the password is still incorrect, the user is blocked from submitting their vote. This two-step security process ensures that only authorized and authenticated voters are able to participate in the election. The District Magistrate election database is checked to verify voters who have exercised their voting right by the Indian Election Commission.

During this phase, the election results are promptly declared as these votes are automatically verified and tallied in real-time throughout the election time. The system model proposed in this paper, as depicted in Figure 1, is considerably more safe and effective than the conventional voting systems. The system significantly reduces the possibility of vote manipulation and result delay. Our model revolves around the unique AADHAAR identity, which facilitates the simple verification of voter and candidate alike [12][13].

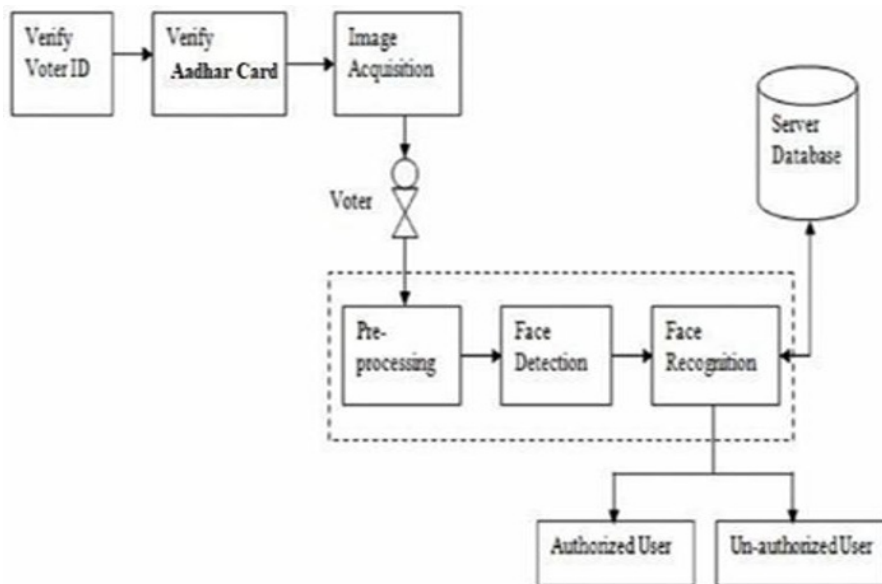


Figure 1. Architecture Diagram

Biggest democracy using either Secret Ballot Voting (SBV) or Electronics Voting Machines (EVM) to conduct its elections. However, both of these procedures comprises significant costs, physical labor, and are not very efficient. Moreover, the existing system only verifies identification proof, which creates opportunities for fraudulent voting[14]. To overcome these issues, a team has developed a novel web-based smart voting system that incorporates advanced face detection and recognition techniques, as depicted in Figure 2. This online platform empowers citizens to cast their vote from any place in the world, ensuring the safety and privacy of their vote. With this new system in place, the necessity for physical labor and associated costs will significantly reduce. Moreover, the use of facial recognition technology which allows qualified voter to cast vote, reducing the chances of fraudulent voting. Overall, this system promises to revolutionize the way India conducts its elections, making them more accessible, secure, and efficient. The proposed strategy was comprehensive of three- level security layers to such an extent that interaction dependability is guaranteed. Presently at the democratic time, in the drive a citizen should check his/her administration character like the Aadhar card with his/her appropriate picture whenever it is confirmed, he/she moves to the subsequent advance.

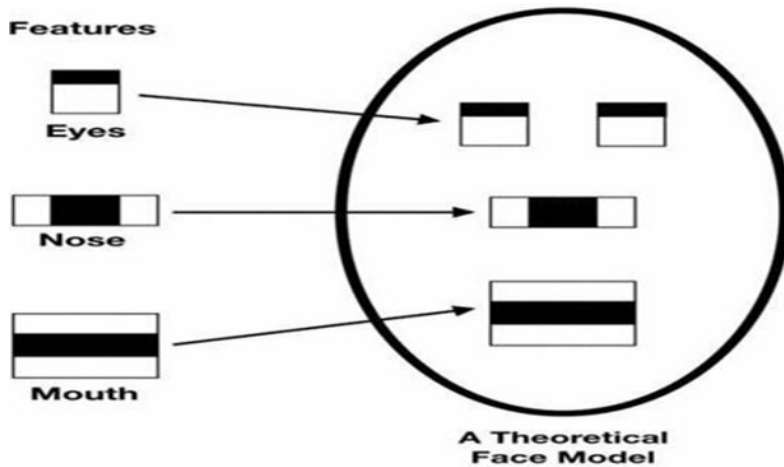


Figure 2. Extraction of Face Features

This system is the design of the online voting systems which facilitates a voter, which is highly secure and simple. All users need to authenticate themselves with their voter ID, mobile number, and faces to cast the vote by online. It will make the voting procedure simple. Hence it will increase the voting percentage. It minimizes the fake votes because it increases the authentication level in terms of: - Privacy: All the votes are confidential while casting their votes[15]. Which are not connected with any other user who casts Accuracy: All votes which are cast by the voters cannot be changed, duplicated, or removed without being noticed. Fairness: Without a result, no incomplete results are available.

3 METHODOLOGY

The proposed strategy was comprehensive of three-level security layers are depicted in Figure.3 to such an extent that interaction dependability is guaranteed. Presently at the democratic time, in the drive a citizen should check his/her administration character like the Aadhar card with his/her appropriate picture, whenever it's confirmed, he/she moves to the subsequent advance. In the subsequent advance, the citizen has to give a Voter ID number of Verification. Whenever it is checked, he/she moves to the third step. In the third step, the citizen must go under the face acknowledgment measure.

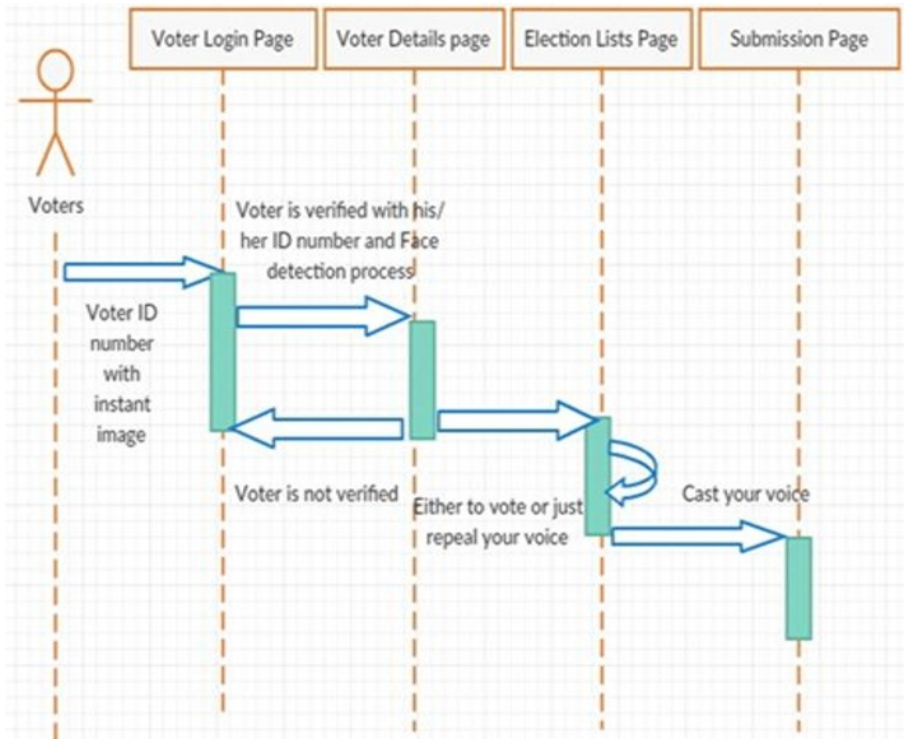


Figure 3. Sequence Diagram

In the face recognition process, it captures the face of the users by digital camera (Figure 4). The voter's face is detected using the HaarCascade classifier algorithm. Face recognition is the process of identification of the person in the live stream or the photograph by matching the facial features with the facial data features the system stored previously [16]. The existing image of the user is matched with the database images. Once the corresponding matching, then he/she is an authorized voter. Haar Cascade classifiers are used for face detection, this is an effective tool for detection is depicted in the Figure 4. There are many XML files used based on our needs. Among the many cascade classifiers “haarcascade_frontalface_default.xml” is the classifier used for human face detection. The algorithm for face detection and resizing the image is shown below in the following steps. The images are taken from the web cameras, where dimensions are large, so scaling scaling is completed on the image dimensions for optimal results.

- a. Load the image.
- b. Extract structures in images by using haarcascade_frontalface_default.xml.
- c. Detect Multiscale () function is applied to return four values to draw a rectangle around the face. The values are X-Coordinate, Y- Coordinate, width, and height.

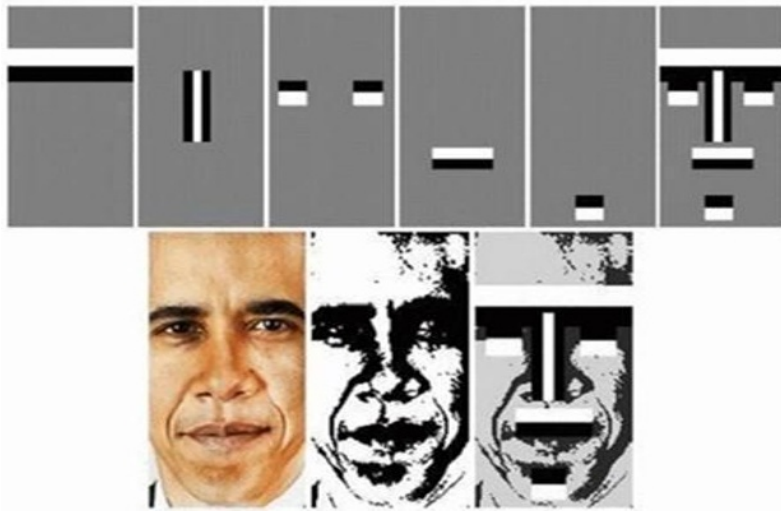


Figure 4. Face Detection

4 RESULTS & ANALYSIS

Security Risks: Online voting systems are susceptible to security risks, including hacking, malware, and denial-of-service attacks, which can compromise the confidentiality and integrity of the election results. User acceptance is a crucial factor in the success of online voting systems. Researchers have found that users are more likely to use online voting systems if they perceive to be secure, reliable, and user-friendly. Online voting systems can increase accessibility for voters who are physically disabled, geographically isolated, or have limited mobility. However, researchers have shown that online voting systems can create new barriers to access for voters who lack internet access or digital literacy skills. The trust and confidence of the voters in election process are critical for the legitimacy of elections result. Studies have demonstrated that the online voting systems can improve voter trust and confidence if they are designed to be transparent, auditable, and accountable. Online voting systems can reduce the cost and increase the efficiency of the election process by automating many of the tasks involved in vote counting and tallying. However, the initial investment and ongoing maintenance costs of online voting systems can be significant. In Figure 5 and Figure 6, it is shown that a user is asked to verify its face before moving ahead during voting day.

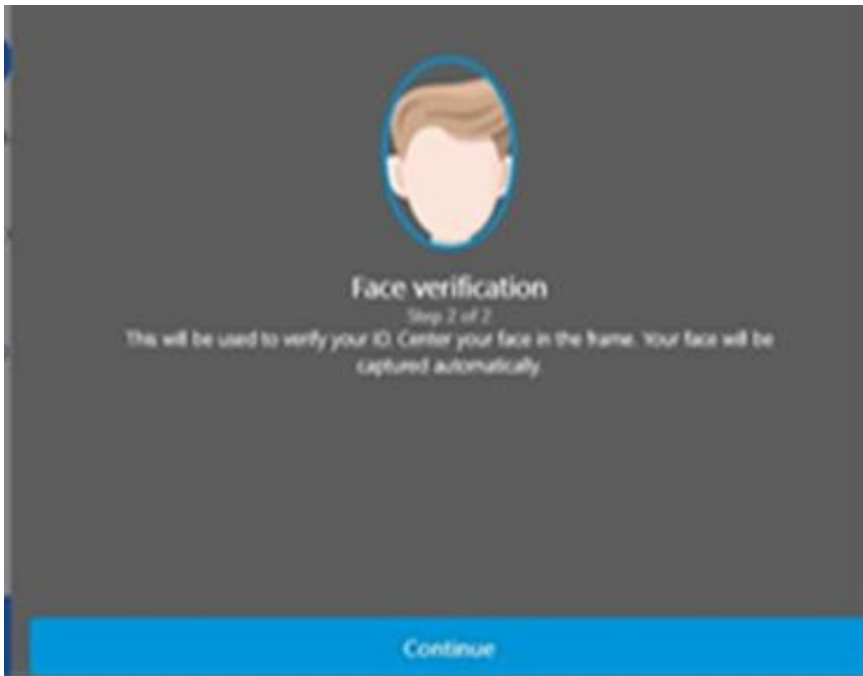


Figure 5. Face Verification

Enter 12 digit Aadhaar number (UID)

Aadhaar Number * 
12 Digit UID (1234/1234/1234)



Captcha Verification * 
Type the character you see in the picture.



Proceed to Verify

Figure 6. Aadhar Website

VoterId Verification: In Figure 7 it is shown that you will be redirected to official website of Election commission to verify your Voter-Id through EPIC NUMBER.



Figure 7. Voter Id Verification

Voter Page : In figure 8, it is shown that a ballot will be created on the voting page containing candidate name and party symbol from which the candidate is competing. The user has to click on the green button in front of each candidate to record his/her vote.

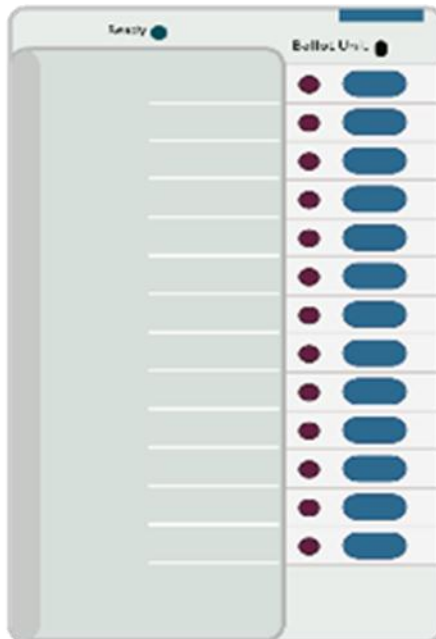


Figure 8. Voting Page

5 CONCLUSION

This research work demonstrates novel online voting systems that utilize a three-level authentication mechanism to bolster the security and voting process integrity. The system was successfully implemented and evaluated for its reliability, accuracy, and security. The study results demonstrated that the system is highly accurate, reliable, and secure, which makes it a potential candidate for increasing voter participation and efficiency in the voting process. Nevertheless, further research is required to evaluate the system's performance on a larger scale and address any scalability challenges that may arise. This paper proposes a novel system that prioritizes the security and voting process integrity by preventing unauthorized access while ensuring that the server is unable to manipulate the votes. The envisioned system strives to enhance transparency and dependability within the current electoral system. The distribution of authority in the server aspect to the proposed research system ensures that no single entity has the power to manipulate the voting results, thereby enhancing the fairness and credibility of the electoral process. With the implementation of advanced security measures, the proposed system holds significant promise for revolutionizing the way voting is conducted and strengthening the democratic process. Overall, the proposed system holds significant promise for revolutionizing the way voting is conducted. It incorporates advanced security features to protect against fraudulent activities and increase voter confidence in the process.

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