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Elect Smart: Casting Vote Using Facial Recognition

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Abstract - *The adoption of face feature recognition technique in smart elect voting system is a crucial advancement in the election process. The system suggested enhances the productivity, convenience and security of voters. Through the use of biometric algorithms, only authentic voters can cast their vote. When a voter registers, his or her face is captured and kept in a computerized database in encrypted form. Voters on election day simply go through the kiosks. Their faces are captured in real time and compared in real time with data in storage. The voice assistant helps in opening up and running through the VoIP interfacing choice system; confirming choices through voice instructions makes it easier to expedite the election which quickens the vote-taking process. Physically challenged individuals are sure to be aided by this facility as well as a larger voters' constituency who do not understand the computer system. Additionally, the smart vote-casting system has been developed towards flexibility and scalability. The system accommodates a massive voter turnout and conducts different types of elections at a national and local level and simultaneously or separately. The overall system is designed with security as its core focus the modern techniques of encryption protect highly sensitive information like voter records. The face recognition software has proactive measures put in place such as routine evaluations aimed towards previously established cybersecurity issues that are prone to exploitation so overhaul updates can be administered frequently guarantee bolstered defense against new cyber threats. Overall sophisticated methods are used to encrypt information thus putting relentless effort into defending voter data.*

Keywords - *face recognition, electoral process, encrypted database, cybersecurity, disabilities, smart voting*

1. INTRODUCTION

The outdated methods of voting have their own challenges, particularly when it comes to usability and security. These are reasons enough to reconsider existing procedures in practice. Election systems must be efficient as well as effective, since problems arising from too much time being taken in processing votes, fraudulent activities, and cumbersome procedures in giving a vote are all issues. In addressing these issues, there is a need for a superior system of voting that utilizes facial feature recognition software like Doing This by Facial Recognition (DTBFR). Your identity is authenticated by checking whether you are qualified/voteable thus protecting against unauthorized actors. Since you do not need a paper-based document confirming identity, less chances for impersonation and expedited processes. Keeping a person's privacy secure helps in the agenda of being safe while keeping processes user-friendly. When a person registers, his or her face is scanned and kept securely with encrypted codes in the vault in the system ensuring data protection. The computerized interface gives adequate guidance through all the procedures in the entire voting process, thus making it usable irrespective of technological literacy or age. The use of facial recognition in the voting process is a massive revolution in how we technologically enhance elections. The new system is in an effort to ensure that people trust the process more and participate more in democracy. The process also makes it easier, swifter, and safer to vote.

The classical models are seriously flawed. Those include possible tampering by voters, logistical challenges, and inaccessibility by the disabled. Such dynamics rob elections of fairness, and therefore, the population does not trust governance. Hand checking ballot papers has challenges in efficiency and accuracy by virtue of human error. Those challenges make it amply clear that there is a need for a system that is efficient and easy to use on a larger scale. Making smart systems capable of permitting facial recognition can make a system more effective and secure. Storage and verification of facial data enable a prevention against fraudulent activities and ensuring minimum error on election day. Furthermore, with voice assistant capability, more people are willing to participate since it is a less cumbersome activity. Our main goal is to build a smart elect system for eligible persons who are supposed to vote can vote,

and this is based on facial recognition. This is achieved through capturing a person's face through a camera and recognizing it through the use of Haar Cascade method. Violas and Jones added edge and line detecting features in the Haar Cascade system in order to recognize faces. A person interested in learning machine learning, particularly for job reasons, first ought to take the basic machine learning course an introductory course.

2. PREVIOUS WORK

Blockchain and Machine Learning integrated voting system Authors Findings and Discussion This study takes into account a new form of voting via an intricate process which combines both blockchain technology and machine learning. Adamya Sharma, Deepak Tripathy, K. Deeba also presented their work at ICETITE 2024. The mission of the system they created is to address a few of the long-existing issues concerning the election process. Through modern technology, it guarantees that no elections are manipulated or biased. The advanced systems are meant to recognize any form of fraud while an indelible record (the blockchain aspect) ensures that every vote cast is done in total security and confidentiality. These inclusions are meant to enhance voter authentication as well as access which reverse multiple demerits associated with classical modes of voting [1]. Blockchain- powered Electronic Face Recognition Voting System Writers: A. Vijay Vasanth, P. Pooja, and N. The authors presented a hybrid electronic system to vote using blockchain technology with facial recognition at the ICICT 2023 conference. The system employs robust mechanisms for voter identity verification and implements immutable vote storage to mitigate electoral fraud risks and enhance electoral accessibility. [2].

The Blockchain-Based E-Voting machine was created by S. Prakash, Vijay Laxmi Vashisht, and Harsh Mohan: The ICAC3N conference in 2022 presented a study on a blockchain-based voting platform that prioritizes enhanced security and decentralization. The research outlines an architecture leveraging can help make important tasks like checking votes and counting results automatic. This means we need less human help, which can make the voting process more honest and faster [3].

Biometric Authentication for Online Voting Writers: Usha K. and Divya K. Conference: ICITIIT 2022 The study introduces a biometric system to vote via online that comprehends faces and human fingerprints. The main goals are to reduce the likelihood of impersonation and boost voter convenience, particularly to elderly or distant voters. [4].

Smart Voting System using Face Detection and Recognition Authors: M. Kandan et al. Conference: ICISSGT 2021 to authenticate voters, this study employs facial identification algorithms to implement a smart voting system. Targeting scalability for national elections, it creates an impact on secure vote casting and real-time verification [5].

Biometric-Based Online Voting using CNN Authors: S. Jehovah Jireh Arputhamoni, A. Gnana Saravanan Conference: ICICV 2021 conference for online voting, the authors suggest a CNN-based biometric system that combines fingerprint and face recognition. accordingly, to improving support for voter who can't commute, the system seeks to eliminate duplicate votes [6][7].

Smart Online Voting System with OTP and Face Recognition Authors: S. Ganesh Prabhu et al. Conference: ICACCS 2021 conference in this paper, a dual-authentication voting system utilizing facial recognition and OTP is presented. It provides a multi-layered defense against illegal access and vote tampering by improving security and user verification [7].

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3. PROPOSED FRAMEWORK

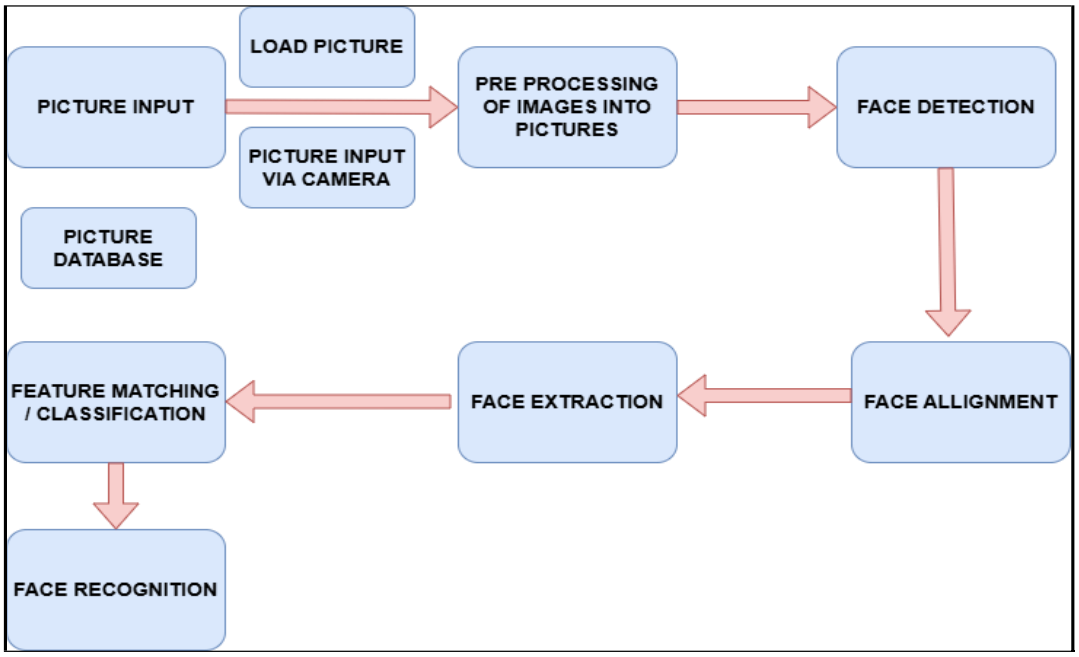
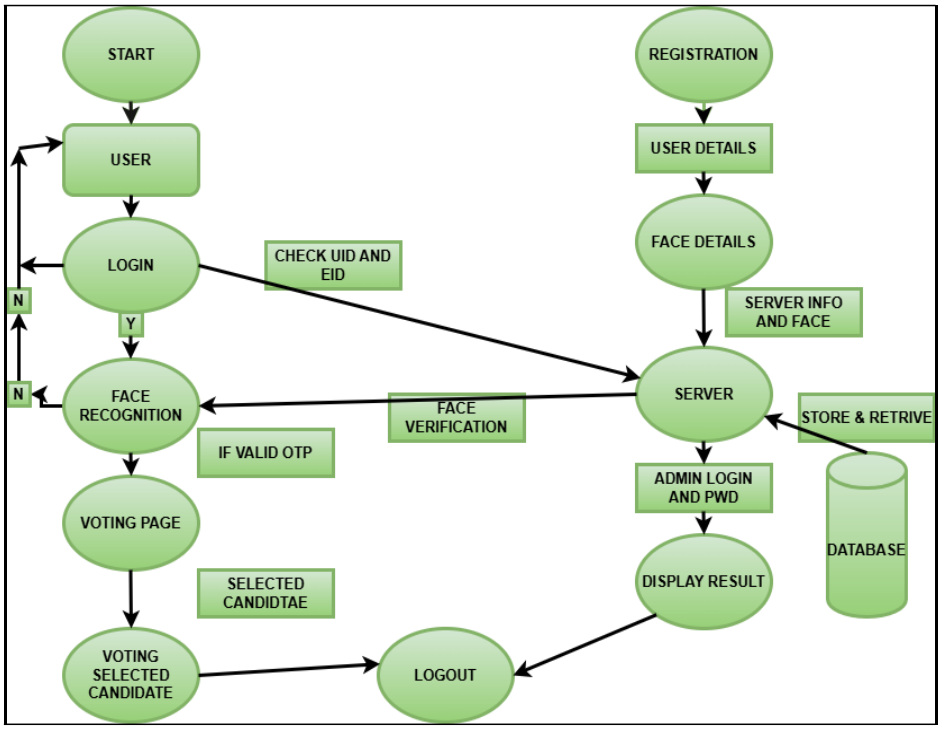


Fig 1: Block Diagram

Once the images are captured, a series of steps are taken to get them ready for a closer look as shown in fig 1. First, a special part of the process finds and focuses on the faces in the images. After all that, the alignment of features is performed step by step to confirm consistency in every aspect. Important facial traits are captured for analysis as well. These traits undergo evaluation against a predetermined database to ascertain their classification. In the end, face recognition is achieved through identifying the individual using all the matched traits. A picture database has all files and contains pertinent information needed for subsequent operations Stated.



the database. It checks how similar they are to verify your identity. If everything checks out, you're allowed to vote. Voters get to pick their favorite candidates by casting their ballots, making sure their preferences are recorded. Once you submit your ballot, your session ends and you're logged out. Administrators have to log in with their specific credentials to see the voting results. This helps them keep a close eye on everything and make sure the election runs smoothly.

3.1 FLOW CHART

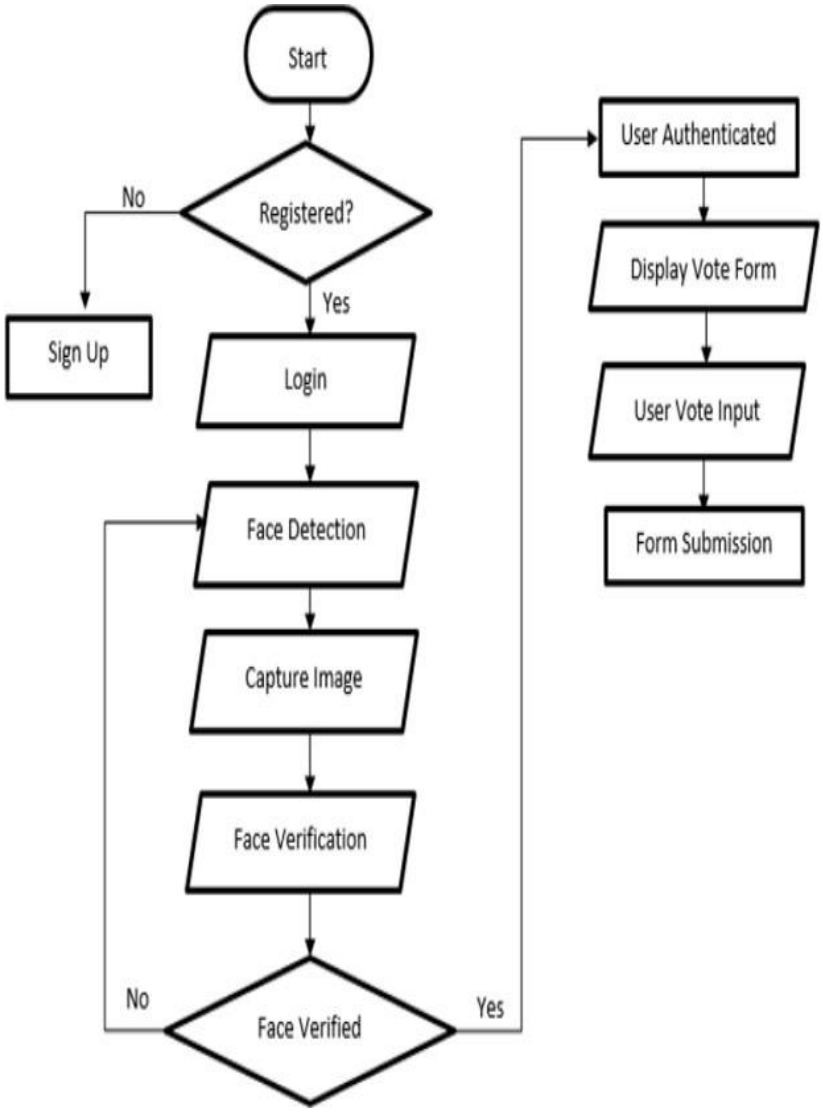


Fig 2: Protocol Architecture

In Fig 2 Start: When user logs into the system, this marks the beginning of processes. Registering as a User. To get started, we need to make sure any new user's data is kept safe, particularly when it comes to collecting and processing it. This includes things like sensitive personal info and those biometric facial recognition details. The server is super important for storing and finding facial recognition data and user profiles, which are all kept in one central database. To get into the system, you'll need to provide your Enterprise ID (EID) and User ID (UID). To confirm who you are, the system checks your face using facial recognition. The server uses smart algorithms to compare the facial data you submit with what's already in

The fig 3 shows how user can get registered by entering proper details, login with credentials and then face is detected using camera, recognized and verified by comparing with stored images.

4. IMPLEMENTATION AND RESULT

User Registration

Objective: To securely register voters with their facial data. Implementation:

- Data Collection: Collect voters' personal details and facial images using a high-resolution camera. Ensure the process is smooth and user-friendly to encourage voter participation.
- Database Creation: Maintain adherence to data protection laws by safely storing the gathered data in an encrypted database.
- Verification: verification procedure to guarantee the integrity and authenticity of the information gathered, avoiding fraudulent or duplicate registrations.

Facial Recognition Algorithm

Objective: To accurately identify voters using their facial features.
Implementation:

- Algorithm Selection: Choose a suitable facial recognition algorithm, such as Convolutional Neural Networks (CNN) or Haar Cascades, based on accuracy and performance metrics.
- Model Training: Train the chosen algorithm using the collected facial data, ensuring a varied and representative dataset to improve recognition accuracy.
- Accuracy Testing: To guarantee the facial recognition system's high accuracy and dependability while reducing false positives and negatives, do thorough testing**.**

Voting Process

Objective: To facilitate a secure and user-friendly voting process.
Implementation:

- Voter Authentication: Use the facial feature recognition system to authenticate voters before allowing them to discharge their votes, ensuring only registered voters can participate.
- User Interface: Design an intuitive and accessible interface for voters to select their candidates, providing clear instructions and support.
- Vote Casting: Implement a secure mechanism for casting votes, essential that every vote is accurately recorded and remains secure from any alterations or tampering.

Security Measures

Objective: To safeguard the voting system from fraud and unauthorized access.
Implementation:

- Encryption: Make sure voter information and votes are shielded from unwanted access by using robust encryption solutions for data transport and storage.
- Access Control: Put in place stringent access control procedures that restrict sensitive system components to authorized personnel only.
- Audit Logs: Ensure comprehensive logging of all system activities to create a clear audit trail and uphold transparency at all times.

RESULTS COMPILATION

Objective: To accurately compile and display the election results.
Implementation:

- Data Aggregation: Count the votes from all voting places in real-time, ensuring prompt and accurate result compilation.
- Result Verification: Implement procedures for cross-checking and verifying the results, ensuring their accuracy and integrity.
- Result Announcement: Display the final results in a transparent and accessible manner, assuring everyone can access the information easily to all parties involved.

User Training and Support

Objective: To ensure that users (voters and administrators) are well-versed in using the system.
Implementation:

- Training Programs: Hold thorough training workshops for voters and administrators, covering all aspects of using the system effectively and securely.

- Support Channels: Establish helpdesk support and other channels to support all having questions or needs assistance with problems they may be facing, ensuring smooth operation and user satisfaction.

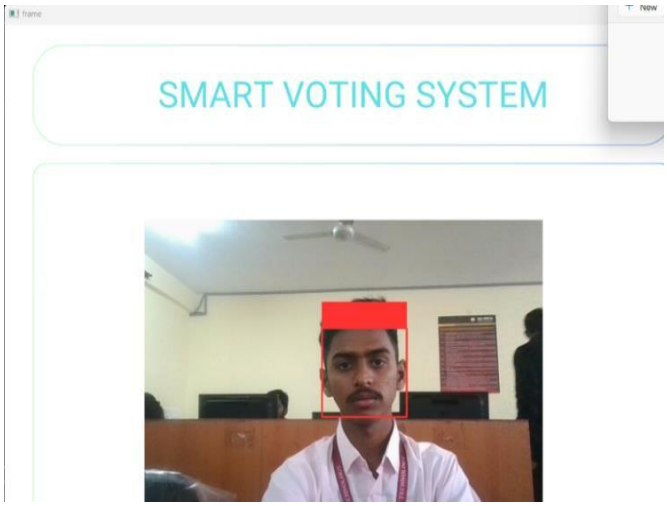


Fig 4: Add face

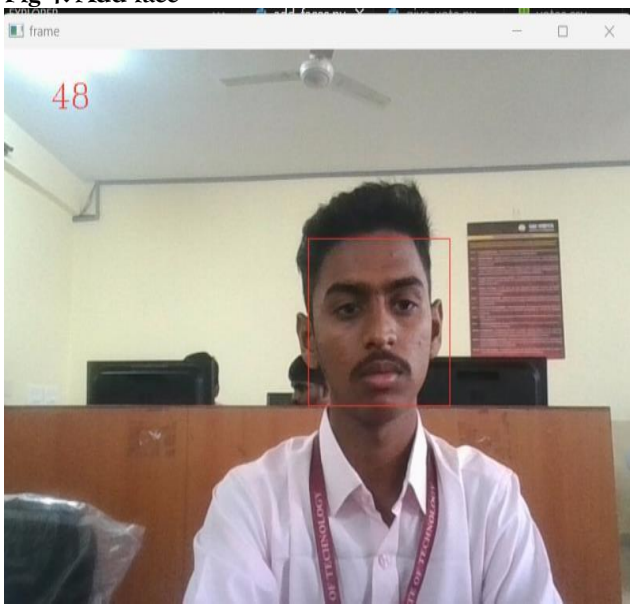


Fig 5: Identify face

cutting-edge facial recognition technology, this project seeks to address major issues in contemporary electoral systems and improve voting's accessibility and legitimacy. Through the detailed breakdown of project modules, including User Registration, Facial Recognition Algorithm, Voting Process, Security Measures, Results Compilation, and User Training and Support, we have outlined a comprehensive approach to developing a robust and reliable voting system is made up of different parts, and all is important for the same to work well and be successful. Together, they make sure the everything runs smoothly and effectively that voters can confidently and securely participate in the election.

It ultimately aims to provide the democratic process by providing voters with a secure, efficient, and transparent platform. It reduces the likelihood of fraud and increases voter confidence by ensuring that each voter's identity is accurately verified.

In conclusion, the project helps modernization of electoral processes, promoting a more inclusive, secure, and trustworthy voting environment. By embracing cutting- edge technology and adhering to rigorous testing and validation standards, we can pave the way for a future where voting is more accessible, secure, and reliable for all.

Fig 6: Voting page

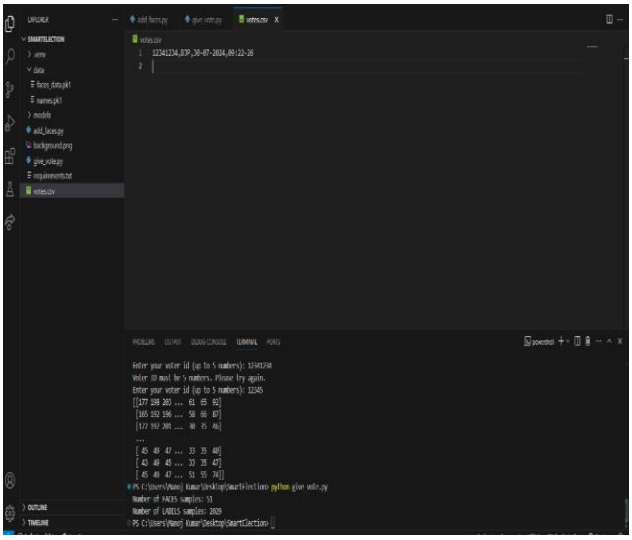
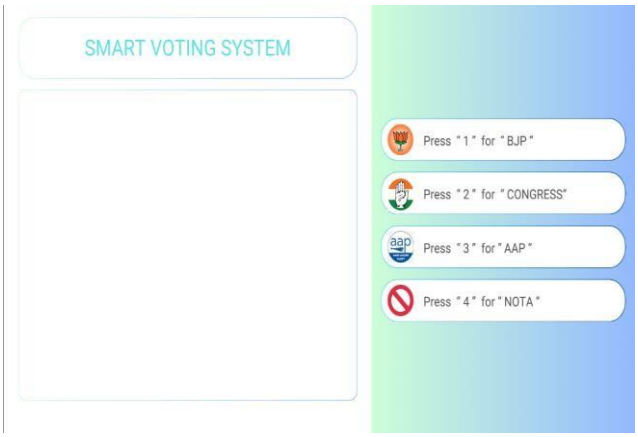


Fig 7: Voting page



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