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Smart Voting System with Face Recognition

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Abstract:- India holds the title of the largest democracy in the world. Therefore, it is essential to ensure that the governing body is chosen through a fair electoral process. Currently, India employs an offline voting system, which proves to be ineffective and inefficient due to the involvement of a large number of individuals and the lengthy time required to process and announce results. Consequently, to enhance the effectiveness of the system, a reform that addresses these limitations is necessary. The proposed method eliminates the need for individuals to vote in person, simplifying the process. It aims for a system that permits users to cast their votes remotely from any location using a computer or mobile device, thereby removing the necessity to travel to a polling location. Voters will need to register with their voter ID, name, and Aadhar number. A facial scanning technology will be implemented to capture images of voters prior to the election, which will be beneficial during the voting process. During the voting, a facial recognition system will compare the voters' facial data with stored data; if the two match, the vote will be counted, otherwise, the vote will be deemed invalid.

I. INTRODUCTION

Elections hold significant importance in a vast democratic nation like India, where leadership is decided by the populace. Elections uphold the state's integrity by enabling citizens to select their own government. Consequently, the electoral process should be transparent and fair. Every individual in a democratic society has the right to elect their preferred candidate. A key challenge within the conventional democratic model is the substantial labor and resources it demands. Some individuals might also have concerns regarding the illegal circulation of materials at various points during the election or its planning stages. The traditional voting procedure in our country presents certain disadvantages, such as machine malfunctions, the potential for violence, excessive time consumption, and resource usage, among others. Many individuals were unable to cast their votes due to the need to travel to polling stations or because they reside far from their original voting districts. To overcome these issues, a new initiative called the Online Voting System has been introduced, offering benefits such as accuracy, security, flexibility, and mobility. This online voting system will function as a web-based application integral to the electoral process. Initially, the voting procedure relied on ballot papers. Subsequently, Electronic Voting Machines emerged, which facilitate data management and storage more efficiently. These machines are more secure compared to paper ballots and allow for quicker voting. A new system utilizing biometric verification is now available to enhance voting security and expedite the voting process. Voters can utilize this system to confirm their choice for their favored candidate through authentication methods. It employs facial recognition technology to verify a citizen's identity. As voters access the system, a web camera captures an image, which is then compared with an existing image in the database. If the images match, the voter is permitted to cast their vote.

II. EXISTING SYSTEM

The current system is inefficient. There are currently two types of voting methods:
A. Voting by Ballot
B. Electronic Voting Machines (EVM)

A. Voting by Ballot :

A ballot is a device used to cast votes in an election, and it can also be a piece of paper used for secret voting. The voter is given a piece of paper with all of the party symbols and representative names on it. People come to the polling station, take the ballot paper, and vote by stamping the desired party symbol. The ballot paper is then folded and placed in the ballot box. Finally, the Election Commission officers count the votes.

B. EVM (Electronic Voting Machine) :

Voting An electronic voting machine (EVM) is a voting device. This machine is made up of party symbols, the representative's name, and a button at the end for each party name. Voters approach the EVM machine after completing their verification at theearlylevel voting. After verification, the voter approaches the EVM and votes by pressing the button. The procedures outlined above are not entirely accurate, as there is the possibility of false/false voting. The ballot papers may be lost during the counting process, affecting the results of the specific area, or people may miscount the number of votes, putting authority in the wrong hands.

III. PROPOSED SYSTEM

This initiative focuses on developing an online voting system that employs facial recognition for voter registration during elections, enabling individuals to cast their votes from any location. The architecture of the system is mainly categorized into two parts: registering voters with facial data and the actual voting process. Voters will register in the system by providing their voter ID, name, and Aadhar number, after which facial images of the individual will be captured and linked to their registration information. Once the facial data collection is completed, the images will undergo training. For the facial recognition process, OpenCV is utilized as the relevant library.

Local Binary Pattern Histogram (LBPH) :

The facial recognition algorithm will search for facial data that corresponds with existing records. The LBPH algorithm is employed for face recognition purposes. The Local Binary Pattern Histogram (LBPH) algorithm utilizes a local binary operator to identify both profile and frontal views of a person's face. Nevertheless, the recognition accuracy of the LBPH algorithm can be affected by factors such as variations in facial expressions, misalignment of the face, or changes in lighting conditions. Voting is restricted to authorized users only. Various image processing techniques can be applied to identify faces effectively.

IV. EXPERMENTAL TOOLS

A. PyCharm

PyCharm is a Python integrated development environment (IDE) that provides a wide range of essential tools for Python developers. These tools are tightly knit together to create a working environment for productive Python, web, and data science development.

B. OpenCV

OpenCV is a massive open-source computer vision, machine learning, and image processing library. OpenCV is compatible with a wide range of programming languages, including Python, C++, and Java. It can analyze images and videos to recognize objects, faces, and even human handwriting. When it is combined with other libraries, such as NumPy, a highly optimized library for numerical operations,thenumber ofweaponsin your arsenalgrows, as any operation that can be done in NumPy can be combined with OpenCV.

C. Tkinter

Tkinter is a Python module for creating graphical user interfaces. Because it is simple and easy to use, it is one of the most commonly used modules for creating GUI applications in Python. You do not need to install the Tkinter module separately because it is included with Python. It provides the Tk GUI toolkit with an object-oriented interface.

D. Pillow

Digital image processing isthe digital processing ofan image using a computer. Image processing allows us to performoperationssuchasimageenhancement,blurring,text extraction from images, and many others. Digital image processing can be done in a variety of ways. The Python Pillowmodulewillbediscussedin thissection. Python Pillow is based on PIL (Python Image Library) and is considered a forkofthelatter,asPILwasdecommissionedin2011.Pillow acceptsavarietyofimagefileformats,includingBMP,PNG, JPEG, and TIFF. By creating new file decoders, the library encourages the addition of support for newer formats.

V. OUTPUT

(Fig.1 User Interface)

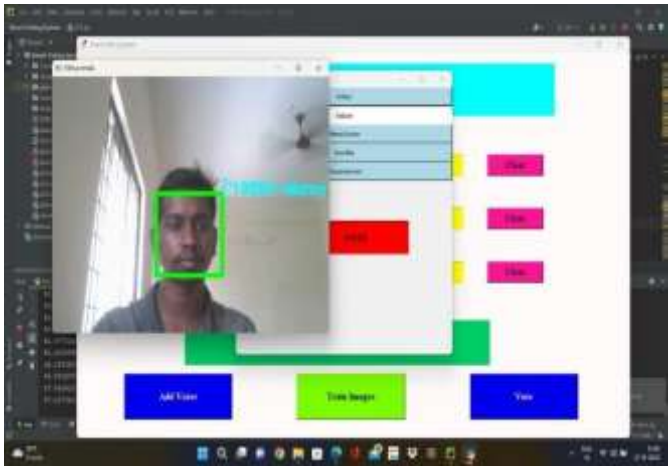
Enrollment of voter details into the database by collecting Voter Id, Name and Aadhar Number. If voter is already registered directly voting can be done.

(Fig.2 Capturing Facial data)

Device camera will open to collect facial data and the collected images are labeled with enrollment details and stored in database.

(Fig.3 Selecting candidate)

List ofcandidates nominated will be shown one person can be selected from it and button VOTE should be clicked for next step that is facial recognition.



(Fig.4 Facial recognition)

Facial data existing in database will be checked for identifying the voter, If data exists then the Voter Id and Name are displayed on the screen.

VI. CONCLUSION

The current voting system is riddled with issues, including a protracted process, excessive time consumption, lack of security, fraudulent voting, and insufficient safeguards; however, we can confidently state that this new approach offers greater utility and security compared to the traditional system. In this proposed solution, false voters can be easily detected thanks to robust security measures. The use of facial recognition technology is particularly effective in pinpointing fraudulent voters, enabling us to eliminate bogus votes during the election process. Voters can cast their ballots from anywhere around the globe by accessing our smart voting platform. The voter's physical location is irrelevant; what matters is the integrity of their vote. With data centralized in a secure repository, it remains available at all times and is eligible for backup. The smart voting system refreshes the results every minute. Additionally, it requires fewer personnel and resources. Each year, or prior to an election, the database needs to be updated to incorporate newly eligible citizens while removing those who have passed away from the voter registry. If applied in actual election scenarios, this system would demonstrate exceptionally high usability. It will certainly offer advantages to individuals wishing to vote, and the procedure will be significantly simplified by utilizing this application.

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