Smart Online Voting System Using Facial Recognition Based On IoT and Image Processing

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Abstract.
All through the course of an election, the electoral commission faces a variety of difficulties. The electoral commission's most common problem is improper confirmation of the order of casting ballots, as well as duplicate or illegal voting. To improve the present voting system, a new and secure voting system is being designed in this paper. The suggested approach creates an automated voting mechanism that does not require human intervention. This system comprises a camera for photographing voters, and the photographs are saved in a database for analysis. On the database, data analysis will take place. All of the label pictures are trained using a convolutional neural network to anticipate the output by categorizing the photos in this technique. The vote will be counted immediately, making the voting process efficient, quick, and secure. As a result, the number of proxies used in the election or voting method can be reduced, allowing the correct candidates to be elected as rulers. Through IOT, all of the details were updated to email.

Keywords. Convolutional Neural Network, Feature Extraction, Voting System, IoT, Image recognition

1. INTRODUCTION

For a democratic nation, elections are the backbone. Elections are carried out from the ancient times, where the king is elected by the people in several ways like raising hands, taking a colored stick and so on. As the elections evolved, the loopholes also evolved in it, and also in the name of election the resources are being exploited. In the name of election the resources are being spend like water, For keeping the voter machine after voted needs a high level protection and it requires a lot of money, army people are being used to safeguard the voting machine. The loopholes like faking the count, making a fake vote using other voter id, and so on. These are all the problems which are being seen in the existing method, to overcome these problems we are proposing a new system.

Democracy is intended to allow people to vote freely, and every citizen of a democratic country has the right to vote. The democratic government is dependent on the election results. Over the last several decades, the voting system has seen numerous significant modifications, from traditional paper ballot voting to electronic voting, and now to internet voting. Every system seeks to close the gaps left by the preceding one. This paper's main purpose is to compare and contrast the traditional voting method with the recently proposed voting systems. We take voter photos as input and train a facial recognition model using this dataset to ensure the security of the voting system. Voters' faces are recognized by the trained model, which ensures that they only vote once. The primary goal of this system is to guarantee that elections are conducted in an ethical way.

2. RELATED WORKS

In every democratic country, the voting system is used to determine the government. Democracy is intended to allow people to vote freely, and voting is a right that every citizen of a democratic society has. The democratic government is dependent on the election results. Many different types of voting systems have been utilized all throughout the world. In early days, paper ballot voting system was used. It is an ancient and insecure voting technology that allows several votes from the same individual to be cast. It rushes to cast a ballot using a ballot paper and a stamp. Over the last few decades, the voting system has seen many successful modifications, from conventional paper ballot voting to computerized voting and now to internet voting [3]. Every system attempts to close the loopholes left by the preceding method. In [4,] the voting system includes three levels of security. There are three stages to the verification process: face recognition, Election ID (EID) verification, and One-Time-Password (OTP) confirmation utlizing the registered mobile phone number of the user. An electronic voting system based on facial recognition has been presented in [5]. Image classification relies on both Local Binary Pattern (LBP) and chi-square distribution for facial feature characterisation in texture format. Face learning and verification modules are being developed in tandem in two systems based on mobile and web apps. Person ID is used first, followed by face verification as a second layer of protection in the system under consideration. This solution has been tested with two open-source databases. Using a Convolutional Neural Network (CNN) as a voting mechanism has been suggested in [6]. Because it relies on human operations, this system is time intensive and difficult to keep up with. It contains a camera for recording photos of electors, which would be stored in the database for further analysis. The database will be analysed for data. In [7], a blockchain-based decentralised national e-voting system was created. It has an admin interface that allows you to schedule voting, manage candidates, and announce the results. You may vote by entering in your Aadhar card ID (text input) and your picture at the moment you cast your ballot through the web app. The voter's eligibility would be verified when they provide their Aadhar card number. The One Time Password will be used to verify the phone numbers of all eligible voters (OTP). Individual voters will be deemed eligible to vote once their identities have been verified by an independent third-party agency. A webcam/front camera will be used to keep tabs on voters as they vote. Because the votes will be kept on a block-chain, any tampering with them will be obvious. On-line voting system [8-11] has been built to make the voting process as simple as possible. In this paper also, online voting system using voter id and CNN has been proposed.

3. PROPOSED SYSTEM

The block diagram of the proposed system is given in figure 3.1. In this system, individuals above the age of 18 will have their information obtained from the Aadhar. Before the voting procedure, voters will be provided an Id and password via the registered email address in the first phase. The second part involves confirming the user using facial data and once validated, the person will be able to vote. As part of the third phase, the information will be removed after casting, removing the opportunity to vote again.

In this suggested method, we are giving the voters an opportunity to vote using their smart phones, personal computers, tablets, laptops and so on. The database is maintained in the cloud, which comprises the images of the voter along with his voter ID. So thus we are training the image of the voter with his unique voter ID. The high priority is given to the system security. Hence we are storing 1000 unique images (Technically templates) of the voter. Which in turn produces accurate results. The exact match of a voter with the database allows the voter to cast his vote in the next step.

The language used is python with stable version 3.8. While creating the database, the script will use the camera to take a series of 1000 images of the voter. Then it matches the 1000 images of the voter with his unique voter ID. Now the system is trained by the technique known as CNN, which is the class of Artificial Neural Network (ANN). CNN is used for processing the image of the voter. When the voter enters into the website to cast his vote, it prompts the voter to enter his voter ID and takes the live image of the voter to verify, whether the voter is the one valid voter or he/she has already voted. If the voter is a valid voter and hasn't casted his/her vote till now, then he/she is allowed to cast his vote. The casted vote is immediately stored in the cloud. Then the website's current page will disappear after casting the vote of that user. After casting the vote, if the same voter tries for a duplicate vote, the system will identify the voter as already voted and not allow the voter to enter into the final voting page. Hence duplicate votes are prohibited and not allowed in our proposed system.

The input dataset consists of photographs of 30 voters, which was used to gather the data for the portraits. To train the model, the dataset acts as its basis. Using an OpenCV module file and python scripting, create a dataset that includes the name and picture of a certain individual. The dataset for persons is built in this module using OpenCV-python. One thousand images were gathered from all peoples.
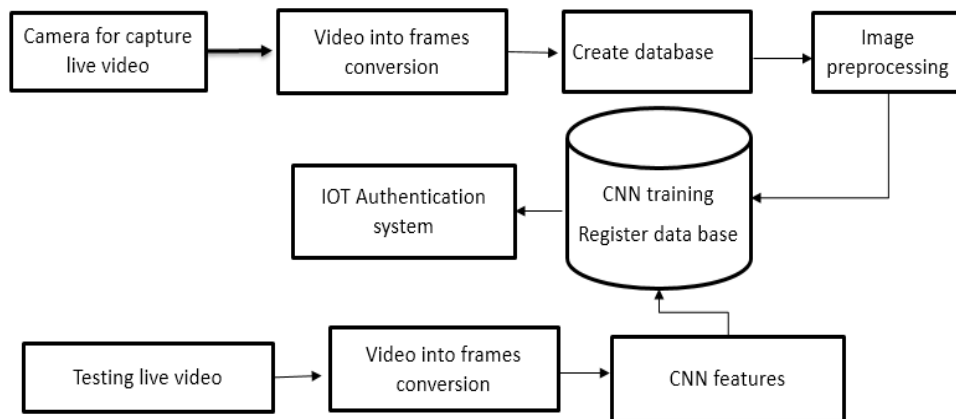

Figure 3.1 Proposed System

Image object recognition is required. This method will most likely begin with noise reduction, followed by feature filtering to detect lines, regions, and textures. Consider these forms as a whole. AI has difficulty seeing an item from different viewpoints or illumination. Image alteration techniques are used. Binary images in two dimensions. Each pixel has one bit (0 or 1). Binary images are often black and white, although they may be any two colours. Image in grayscale - A black-and-white digital picture in which the sole data is intensity and each pixel represents a single sample. The range of strength is 0-255. The lowest value is 0 and the highest is 255. A colour image is a computer picture with red, green, and blue pixel values. The colour intensity scale runs from 0 to 255. Developed model is deployed on the face detection code to monitor the voting. The essential information given to the algorithm to differentiate eligible voters is the voters' facial traits. These duties are frequently performed unconsciously by the human visual system, but for a computer to approach human performance, extremely skillful programming and a wide spectrum of processing capacity are required.

IoT is a network of reticulated computer devices, mechanical and digital equipment with unique IDs that may communicate across a network without requiring human-to-human or human-to-machine contact. Time-series analytics, machine learning, artifact sensors, and embedded systems all came together to form the internet of things notion. The internet of things has evolved thanks for embedded systems, wireless device networks, management systems, animation, and a range of other businesses. The Internet of Things' main security aims are to enable proper identity authentication techniques and to protect information and other associated data.

4.   SIMULATION RESULTS

Developed model is deployed on the face detection code to monitor the voting. The essential information given to the algorithm to differentiate eligible voters is the voters' facial traits. These duties are frequently performed unconsciously by the human visual system, but for a computer to approach human performance, extremely skillful programming and a wide spectrum of processing capacity are required.

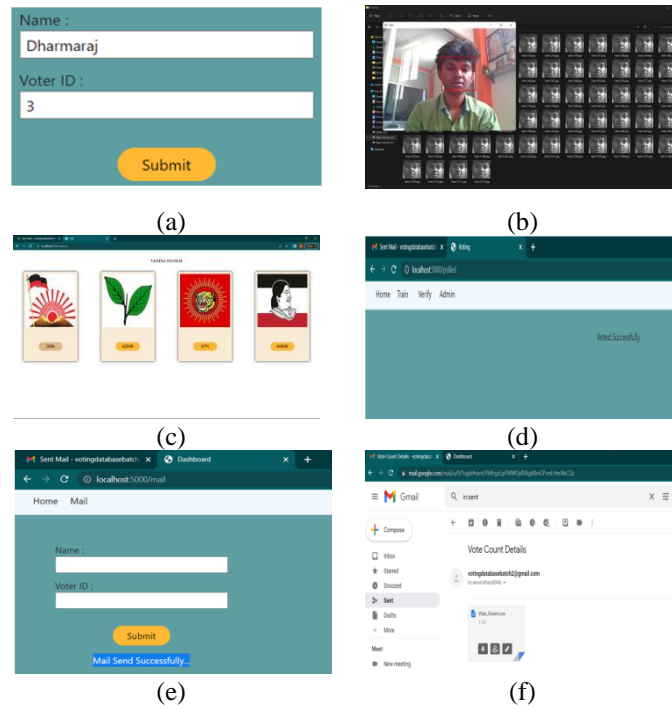(a)   (b)

(c)   (d)

(e)   (f)

Figure 4.1 Simulation Results of Proposed System

The simulation results of proposed system is given in figure 4.1. The proposed method is simulated using python. Initially, the user has to enter into the home screen and they have to login using their name and voter-id, which is given in figure 4.1 (a). Then face verification process is performed as shown in figure 4.1(b). Once the face verification has been done, then the voter is allowed to post their vote. If the face is not verifies with the database, then the voter is not allowed to post his/her vote. In such a way, the security of the voting system is improved. After face verification, voting area where the vote needed to be voted will be displayed (figure 4.1(c))and after making his vote then a message will be thrown that voted successfully, which is shown in figure 4.1(d), figure 4.1(e) and figure 4.1(f). The details about the voter that have been provided by him and these details will not be shown to any one because its back-ended.

The main advantage of the proposed system is, the voting count also performed easily. This system contains the data of voting count but it does not contain any details of voter. In this manner the security of the voting system is improved. In this system, after casting vote, the leader positions are disabled. The votes that made by user that is saved on the excel sheet, and the count is completed after the election. The address for the election is provided on the government forum. When compared to current approach, count for result is relatively simple then task are simple. The suggested method is very secure and which cannot be accessed very easily, it's because it contains some of security system, the system designed is totally based on web, which is relatively economical to current methods; if sufficient robust high security is supplied to the forum, very little staff will be required.

5.   CONCLUSION

Automatic voting using convolutional neural networks reduces the amount of human involvement in the process. The manual voting process would be replaced by this Automated Voting technology. This device creates new data at a rate of one million bytes per minute. To put it another way, it needs less money and personnel. Newly registered voters and deceased voters must be added and removed from the database every year or before an election, respectively. Election officials, paper ballots, and electronic voting machines aren't necessary with this method; all that's needed is a camera.

4

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