

Android Mobile Based Voting System through Facial Recognition

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Abstract

Due to the increase in population, identification of fake voting is getting more complicated. The only proof of identification is just a voter id. Due to this there has been difficulty in identifying fake voters. To overcome this issue, an approach based on facial recognition system using android mobile is proposed. This system consists of three phases. In first phase the details of voter like name, adhaar number and email id will be verified. In the second phase, user login through android phone where mobile application captures the voter's face and will be sent to the server where the facial recognition takes place, if the match is found then the OTP (One Time Password) will be sent to the users email address. In the third phase, the user has to enter the OTP and if the OTP is correct, voter will be allowed to vote. This proposed system will be secure and eliminate any fake voters. Voters can also avoid standing in the queue in order to vote. Lot of benefits can be achieved by using this proposed system.

Keywords: Voting system, Facial recognition, Machine learning, Android mobile.

1. Introduction

Generally, in all world countries, integrity of democracy plays an important role for developing its civilization, where the citizens choose and replace the government by doing the elections. The traditional mechanism of this operation has several limitations such as the difficulty of long-distance voting and non-accessibility for disabled and elderly people. So this whole process needs lots of man power and resources too. Existing systems contain certain drawbacks as chances of the violence, damage of machineries, dummy votes etc. Election provides a chance to the people to choose leader, therefore it must be accurate and transparent. In order to overcome weaknesses of traditional voting system, this system is proposed. The main advantages of using Android Mobile based Voting System through Facial Recognition is that the violence during the voting procedure will be avoided completely and identity of the voters can be protected against fraudster, resource and man power is reduced

significantly. The proposed system will definitely protect the identity and credentials of the voters and it also encourages everyone to vote to their favorite candidate. This system will also increase the number of votes and give better and accurate results compared to the traditional voting system. With the advancement in the field of technology like computers and smart phones, the technology involved in the traditional voting system can be replaced with the proposed system. Since the government is encouraging towards digitalization the development of a mobile based voting system will not be far from deployment. In this system people can vote their favorite candidate at the comfort of their home. This will significantly reduce the resource and manpower that is required to set up the voting booth.

2. Literature Survey

Garish H S et al.,[1] proposed a system which uses fingerprint as an authentication for the voters [7], [8]. Before voting, users have to first register at a nearest office where they have

to register their fingerprint and give out their personal details. At the time of voting the user has to place their finger at the fingerprint reader, the read data will be sent to the server using a web application via serial port. Once the fingerprint data matches with the server, the system will allow the user to vote. Narayanan et al., [2] proposed design of highly secured biometric voting system which uses both fingerprint authentication and OTP (One Time Password) to prevent any fake voting. At the time of the voter registration, user's fingerprint will be scanned and stored in the database. During voting process, when the user scans their fingerprint, the data is compared with the database and if the match is found then one time password will be sent to the registered mobile number. If the user receives the number then that number has to be entered into the system in order to proceed with the voting. Himanshu Agarwal et al.,[3] proposed a model which focuses on security. During the process of vote submission the voter has to login to the system using the credential given to the user at the time of voter registration. Using this credential the user has to login to the system at the time of voting. After entering the login credentials the entered details will be compared with the database, if the entered details are correct then the system will show the next screen. After the login page the system will show the candidate details page. Voters can choose any one of the candidates from the list of candidates. S.M. Jambhulkar et al., [4] proposed a solution which focuses on providing security and integrity to the registered votes. To prevent the issue of both passive intruder and active intruder, they proposed a solution which involves cryptography and digital signature. To prevent passive intruder a cryptography technology is used at both voting terminal and server and to prevent unauthorized access by the active intruder digital signature is used [5]. S.M. Jambhulkar et al., [6] proposed a solution which makes use of both face recognition technology and fingerprint. At the time of voter registration, the user has to provide both facial images and their

fingerprints. At the time of voting the voter's fingerprint will be scanned and if the fingerprint matches with the database then the system will allow the voter to vote. In order to give another security layer a facial recognition system will be used, where the system captures the user's facial image and compares with the server database. So, this system will be more secure and prevents any fraud or fake votes. Srivatsan Sridharan [9] proposed system uses a unique Universal Identification Number for every eligible citizen. This system consists of 3 phases. The first process is the user registration and if the user is not registered then the user has to register first. The second process is counting of votes casted by the user and the third process is the declaration of the result. During the voter registration a secret password will be given to the user and at the time of voting, the user has to use this password along with the biometric to cast the vote.

3. Methodology

The system architecture of the proposed system is shown in figure 1 which consists of overall architecture of Android Mobile based Voting System through Facial Recognition. The proposed system mainly depends on the internet which means an active internet connection is required.

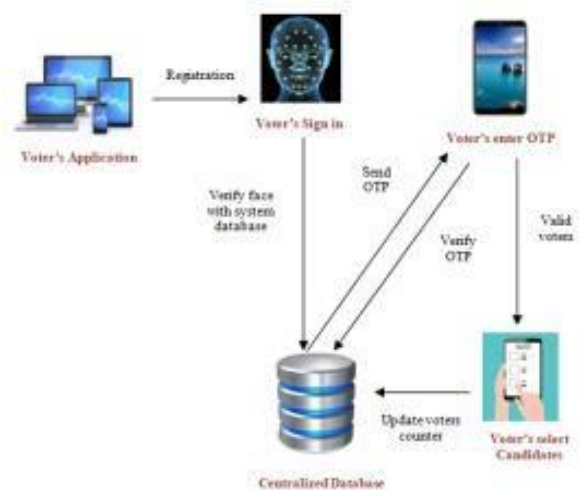


Figure 1: Proposed system architecture

Since this is a mobile based voting system, users are required to have an android based

smart phone to install and run a voting application.

The Proposed System consists of following processes:

- Registration
- Facial Recognition and Generation of OTP
- Voting

3.1 Registration

Before voting the user has to register at the nearest voter registration office, where the user has to provide the details like name, email address, password and adhaar card number as shown in figure 2. In this step, the officer will verify the details of the person by using his/her original adhaar card.

id	name	email	password	aadhar	otp	status
1	Amar	Amar12@gmail.com	5rfdsl*	123456789012		
2	Bharath	barathshmg@gmail.com	yt67#48@	678543456723		
3	Chetha	chethanbd@gmail.com	rt562Weh@	786543678965		
4	Dinesh	dinesh12@gmail.com	7ytgS# @1	876549834267		
5	Eshwar	eshwarysore@gmail.com	9uyhg555	765432897645		
6	Farin	farin1234@gmail.com	67yghbv*	783214537651		
7	Gagan	gaganshmj@gmail.com	875rtb@@	764325467893		
8	Harish	harsha78@gmail.com	rfg@t@tg	129083467654		
9	Impana	impanabnglr@gmail.com	asdfvb2!	432785463218		
10	Jack	jack8@gmail.com	3edfghtw	897654678532		
11	kerlin	kerolin7@gmail.com	67rfgae@56	234567832165		
12	Lohith	lohithshmg@gmail.com	6545fvytr@!	654784321654		
13	Manish	manish99@gmail.com	68876@#5%dx	983421112345		
14	Namitha	namitha67@gmail.com	45678IUYDXI@#5	765489765665		
15	Preeksha	preeksha56@gmail.com	d@#5%thg	435678324567		
16	anay	anay@gmail.com	anay	123456789015		
17	varshitha	varshitha@gmail.com	12grfvj8*@	657845367287		

Figure 2: Voter Registration

Once the detail of the voter is verified, it will be stored in the database. After the detail of the user is stored, the officer will capture the user’s face and store them in the database as shown in figure 3.

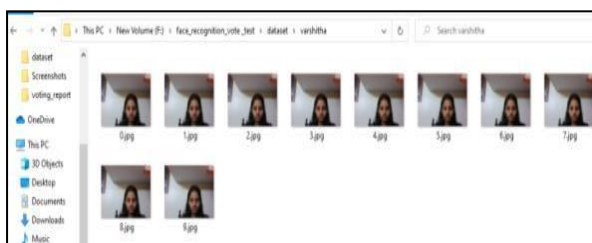


Figure 3. Faces of one voter stored in the database

3.2 Facial Recognition and Generation of OTP

After registration is successful the user will receive login credentials to their email address. Users have to use this login credentials at the time of sign in. The login credentials contain user email address and password that he/she gave during registration process. After entering the login credentials, the user has to capture their face image and upload this image to the server using the upload button. During the upload process the image will be uploaded to the server. At the server, the received image will be compared with the trained model with the help of face recognition program using machine learning technology. In order to do this, one need to build a pipeline where face recognition steps can be solved separately and can pass the result of current step to the next step. They are as follows:

1. Finding face in image
2. Analyse facial features.
3. Make a prediction of Human face.

Step 1: Finding Face in an Image

The proposed system uses a method Histogram of Oriented Gradients (HOG) to find faces in an image. Histogram of Oriented Gradients method converts the color image into a binary image. Figure 4 shows sample HOG binary image. (Input color image converted into binary image)



Figure 4: HOG binary image

The main goal of HOG is to figure out how dark the current pixel is compared to the pixels directly surrounding it. This process is repeated for every single pixel. Finally original image turns into a very simple representation

that captures the basic structure of a face in a simple way as shown in figure 5.

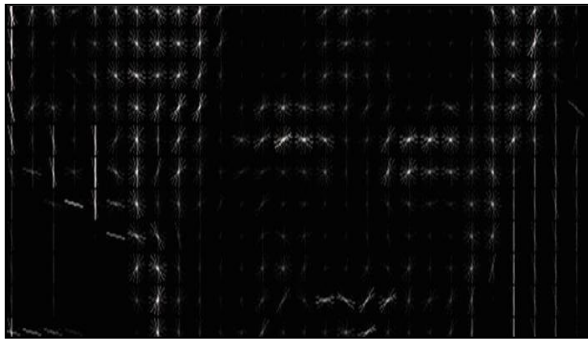


Figure 5: HOG image representation

The original image is turned into a HOG representation that captures the major features of the image regardless of image brightness. To find faces in this HOG image, it will find the part of an image that looks most similar to a known HOG pattern that was extracted from a bunch of other training faces as shown in figure 6.

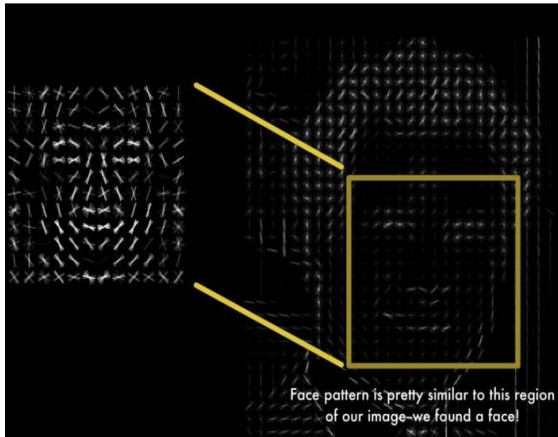


Figure 6: HOG matched image

Step 2. Analyze Facial Features

All the face images of the voter which are stored in the database will be trained using convolutional neural network. Once the network has been trained, it can generate measurements for each trained face image. The main problem is that faces turned in different directions looks totally different to a computer. To overcome this problem, proposed system

uses face landmark estimation as shown in figure 7. The face landmark includes 68 specific points that exist on every face - the top of the chin, the outside edge of each eye, the inner edge of each eyebrow, etc.

It will then train an image to find all these 68 specific points (Features) on any face.

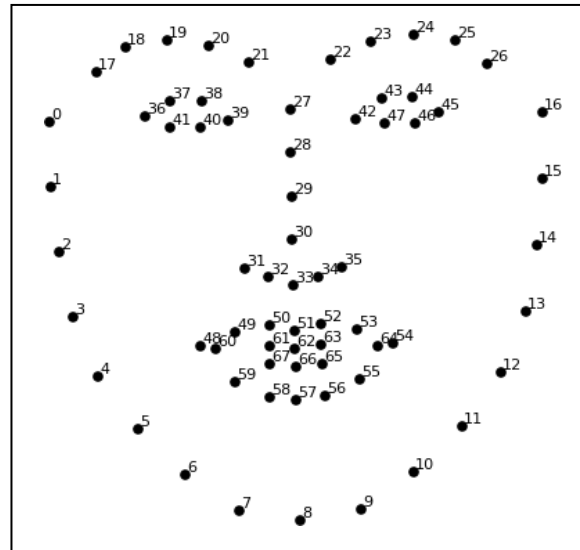


Figure 7: 68 landmarks (Features)

Step 3. Make a Prediction of Human Face

The simplest approach for facial recognition is to directly compare the unknown faces found in Step 2 with all the trained face images which are there in the database. For the input face image, the 68 features which are generated in previous step will be compared with the features of already trained face image. This could be done by using SVM classifier. If the user image matches with the trained model, One Time Password (OTP) will be sent to the registered email address as shown in figure 8. This OTP is a four digit number that voter should enter within 30 seconds. If voter doesn't enter OTP within 30 seconds, time out error will be generated and voter has to login from the beginning for voting.

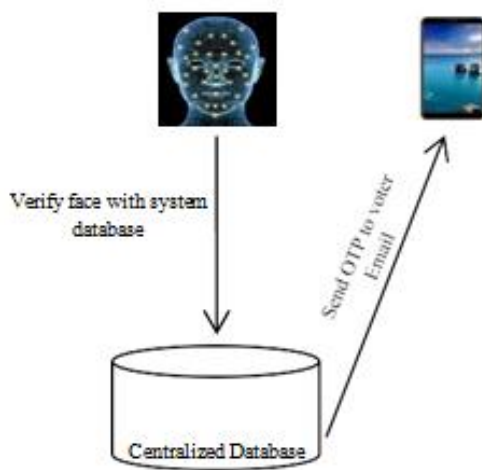


Figure 8. Facial recognition and generation of OTP

3.3 Voting

During the voting phase, the application will show the list of candidates. The user has to select anyone from the list of candidates and press the vote button. After pressing the vote button, vote counter of the selected candidate will be increment as shown in figure 9.

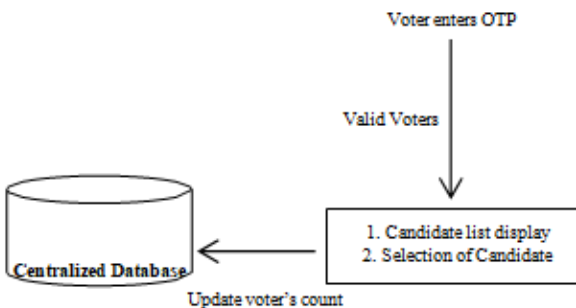


Figure 9. Voting Process

Once the voting is complete, the status of the voter in the database will be stored as ‘yes’. Now if the user tries to login again, it will show an error indicating that user has already voted. This indicates that one voter can vote only once, hence duplication of votes is avoided.

4. Results

The first step in android mobile based voting system through facial recognition system is

registration of the user. Once registration is completed, the voter can login into the application by using android mobile phone. Voter login page is shown is figure 10.

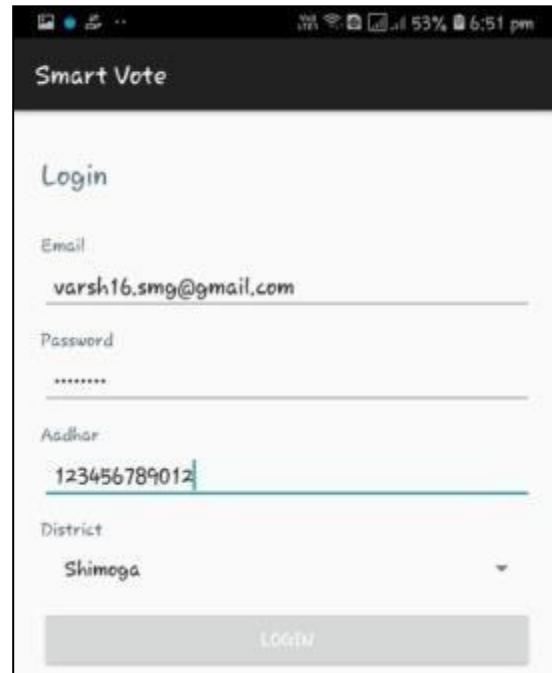


Figure 10: Voter Login Page

Then in the second step, the application will start its process. It first captures the face of the voter using mobile front camera. Figure 11 shows capturing an image of the voter.

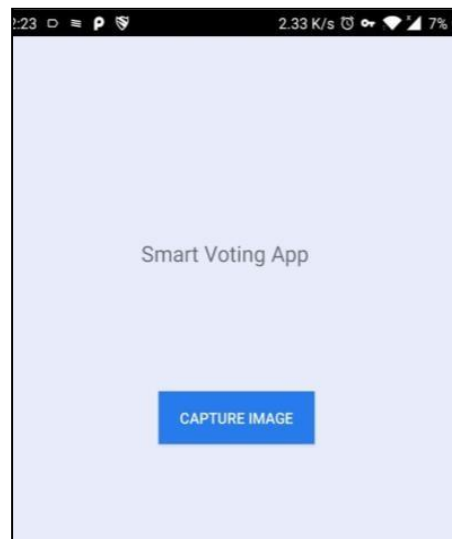


Figure 11: Capturing of voter face image

The captured image will be sent to the server. Then system compares the sent face image of the voter with already stored face images of valid voters in database. Once the image is matched successfully, the server sends the OTP (One-Time Password) to the voter's registered email address. The user has to enter the OTP as shown in figure 12.

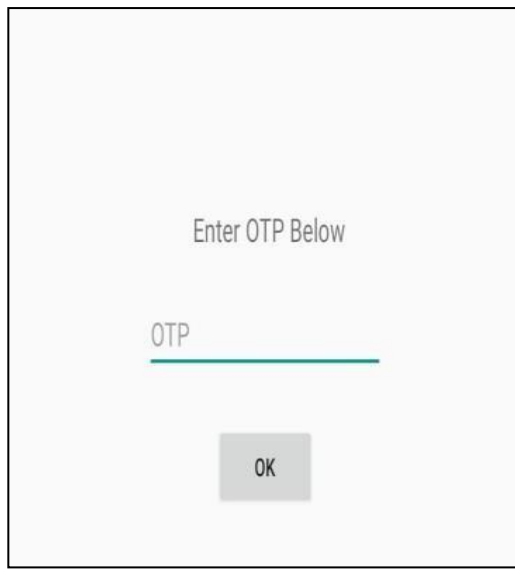


Figure. 12 Figure showing page to enter the OTP

If the user enters wrong OTP, it will show an error message indicating user has entered invalid OTP and voter cannot perform the next activity. Also if the user doesn't enter the correct OTP before 30 sec, session timeout error will occur on the page. If the voter enters the correct OTP, it will verify for the correctness of the OTP. If the OTP is correct, then voter can do the voting by pressing Vote button. At the time of voting, candidates list will be generated and according to that, voter can select particular candidate as shown in figure 13.

After the voting of vote by the voter, vote count will be updated in the database. If the voter tries to vote by logging in again, it will show message like user has already voted as shown in figure 14. Using this proposed system, users can vote using smart phones anywhere which will be time saving when



compared to the traditional system.

Fig. 13: Selection of candidate list

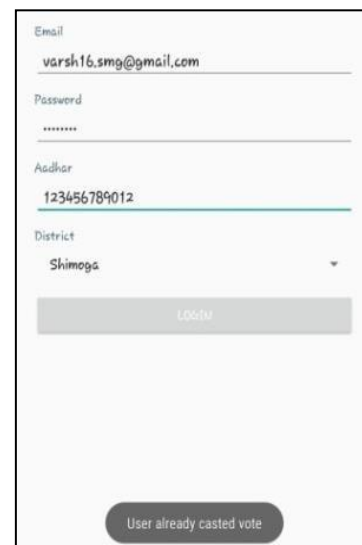


Figure 14: User already voted

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