SMART VOTING SYSTEM THROUGH FACE RECOGNITION USING FACENET ALGORITHM

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Abstract: A smart voting system using face recognition is a technique to overcome the traditional voting and EVM i.e Electronic Voting Machines. The system uses an Androidbased application to cast their votes from anywhere in the world. The face recognition technology increase the accuracy and security of the voting process. The proposed system would work as follows: voters should install the Android-based voting software and register themselves with their personal details and facial images. On the day of the election, voters should log in to the Android-based voting software and use their registered facial images for verification. Once verified, the voter can cast his vote. The proposed system uses facial recognition technology to reduce the fraud votes. The system also eliminates the manual verification of voters, it decreases the risk of human error and increasing the speed of the voting process.

Keywords: Deep learning, CNN, FaceNet Algorithm, Face Recognition, Smart online voting System.

## 1.	INTRODUCTION

The traditional voting system has the limitations like long queues, manual counting, and the potential for fraud. As technology improves, there is a chance to create a smarter and more efficient voting system. Smart voting system using face recognition technology is one among them. The use of face recognition technology in voting process increase the accuracy and security. By verifying the voter's identity through their facial image, the likelihood of fraudulent voting is reduced. Additionally, the proposed system would eliminate the need for manual verification, which can be time-consuming and prone to human error.The smart voting system would be Android-based, allowing voters to cast their vote from anywhere in the world. This would increase accessibility and allow more people to participate in the election. The proposed system's use of facial recognition technology would ensure that each vote is unique to an individual, improving the overall integrity of the voting process.However, the use of facial recognition technology raises concerns over privacy and surveillance. The proposed system would require robust security measures to prevent hacking, data breaches, or any other potential vulnerabilities. It is essential to carefully analyze the potential risks and benefits of this proposed solution before its implementation.In conclusion, a smart voting system using face recognition technology has the potential to improve the voting process's accuracy, speed, and accessibility. However, it is crucial to consider the potential risks and benefits carefully and implement appropriate security measures to ensure the privacy and integrity of the system.

## 2.	RELATED WORK

[1] Swapnil Singh, Krunal Patil proposed the " Smart voting System using Face recognition" where the people can vote by online mode instead of the Manual voting. First step ,Where they created login mechanism with unique_id to to cast their vote using using CNN and Haar cascade to algorithm to train the dataset. In the second step Face detection mechanism by through c++ toolkit and labeled faces.Finally Face Recognition can be done through a person can vote in safest way without any illegal issues.[2] Hemanth Kumar T, Sowmya B P proposed the " Smart Online Voting System through Facial Recognition Using Haar Cascade Algorithm" where haar can compare the angular pixel of the each faces and detecting the edge nodes in pixels to recognise the features of the face.Then person can registered in the portal then verification through the E_ID and vote to candidates.[3] Mr.D. Sreekanth,Dharbastu Nishith proposed the "E-VOTING SYSTEM USING FACIAL RECOGNITION" The population increases so that EVM and Ballot paper and manual work at election portal may require human work that increases the cost for election committee.Using Block chain technology to store the dataset and maintain security and illegal actions at the voting area.Also by using Open-CV method foe face recognition and getting authorize by using the block chain technology and OTP verification method enable secured voting in online.[4] L.Vetrivendan,Dr.R.Viswanathan, J.AngelinBlessy, "Smart Voting System Support through Face Recognition" This system works in 3 level security checking first election Id and User identity number issued by the

government then face recognition of a person to select the candidate.For Face recognition they using Eigen Face Algorithm where it can collecting pictures of person then train the data Using PCA projections and fallows the clustering of the images then provide face recognition .[5] Ganesh Prabhu S, Prabu.S, R.R.Thirrunavukkarasu The system proposes "Smart online voting System" The system works on Aurdino UNO,LCD Display,PUSH Button.In AudinoUno RIFD used to store the database of the user And he/she can vote in the election in online mode but it require Some hardware components.

3.   EXISTING SYSTEM

India once used hand-counted paper ballots for elections. Elections are being conducted using electronic voting machines (EVMs). Two units are used in its design. Control unit and ballot unit are what they are. A cable connects each of these components. The polling officer or presiding officer will continue to have control of the EVM. Voters can still cast their ballots within the voting compartment using the balloting apparatus that is still there. The device will show a blue button and a list of candidates' names or symbols. A button that the voter can press to express their selection is located next to the candidate's name.

Figure 1.   E-Voting Machine

To overcome it's disadvantages ,voting through face recognition is introduced. Several algorithms were used to recognize faces. They are Haar Cascade, Eigen Face and Fisher-net.
1.Haar Cascade
Using this algorithm, objects in a photo or video can be located. Using a large number of both positive and negative photos, the system is trained to identify faces. Firstly, the picture is transformed into a Grey-scale, and then it find out Haar features-sequence of square-shaped functions. Then it uses classifiers to detect the face (1) and not a face (0). It involves four steps They are Detecting Haar Features,Integral Images, Ada-boost and Cascade classification but its accuracy in the face recognition very less as compared to modern tools.
2.Eigen Face
It uses a look-based approach to recognise faces. The Eigen face will calculate the image weight and edges between the image pixels. Firstly compute the Eigen faces and calculate the weight and checking image of a person if its load pattern is well known then verification of the face is done by Eigen Face.
3. FisherFace
In Fisher Face method both Principal component analysis (PCA) and linear discriminant analysis (LDA) are also used to recognize the face in voting system. Initially Datasets given for training then extracting the features of the face and classify the faces using Fisher algorithm.

4.   PROPOSED SYSTEM

This project aims to build an app based voting system using face recognition. Initially data about the users will be stored in the database. If he is a new user he has to register his data. These details will get store in database. If the user is already registered then, it will directly go to Voter login page. In user login page the user should login by using username and password. After entering the voter-id, face image will be captured. Captured face image will be compared with the database, if the face recognized matches, it will move to voting page. In voting page there will be candidate's details in which user can vote any one candidate. Then the vote is stored. The user gets logged out automatically. For facial recognition, we've used the FaceNet algorithm. To find features in a facial image, a deep neural network called FaceNet is used. The input is a picture. The result is a vector of 128 numbers that represent the key facial traits. This vector is called an embedding because it includes all the crucial information from an image.

Workflow of the algorithm: It is possible to use a facial image's embeddings to map it in the coordinate system. One technique for locating an unidentified image of a person is to calculate the embedding of that person, or the distances to photos of known individuals. If the face embedding is near to the person A embeddings, we can say that a picture contains a person A's face .2D picture plotting to determine whether a face is close enough to one of the recognised faces.Facenet generates random vectors for each image, ensuring that the images are spread randomly when plotted. The FaceNet uses 2 types of CNN for face recognition a) Inception Model b) Zeiler & Fergus architecture
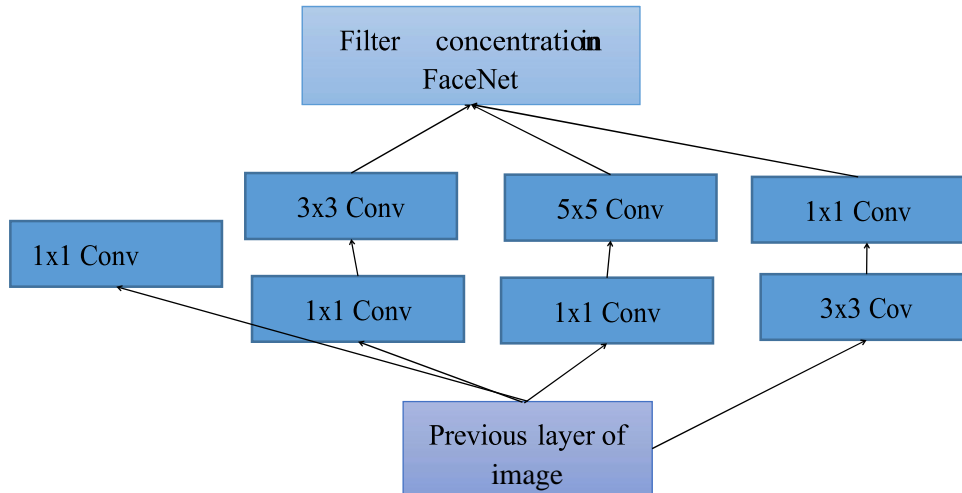

Figure 2. Inception Model for Dimension Reduction

The figure 2 will explains about the how 11 filter Convolutions (Conv) filtered with dimension reduction to increase the architecture computation possible. The Inception model used in FaceNet , there is some optimized to run on android. So its comparatively less parameters and filter. In Zeiler & Fergus architecture technique introduce insight function to intermediate layers and then it classify the images in the architecture .

How Face-Net works is as follows:
1.   We need to pick a random anchor image first.
2.   Next, select a random image of the same person to act as the anchor image. (A nice illustration.
3.   Select a negative rendition of the anchor image of a human in a similar manner.
4.   Adjusts the FaceNet network settings so the advantageous example is situated nearer the anchorthan the disadvantageous example.

We continue doing these until there are no more adjustments to be made.
•   The faces of the same person will alternately be close to and far from one another. A learning approach called triplet loss makes use of an anchor, positive examples, and negative ones. FaceNet represents faces as vectors, making sure that like faces will have like vectors and other faces won't.
•   FaceNet must identify the distinctive features of a person's face in order to make these vectors equal.
•   A face embedding is used as the final step in classifying a person using a Softmax classifier.
This algorithm recognise faces, and the voting process continues after that.
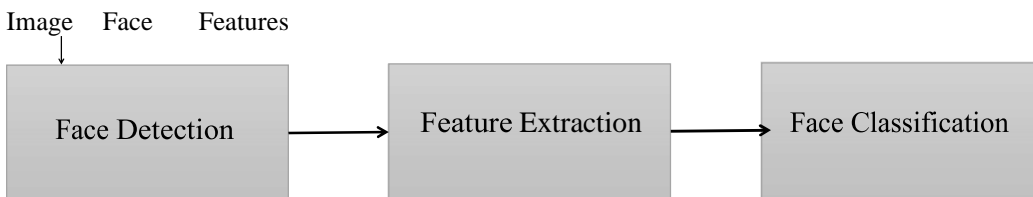
Image   Face   Features

Figure 3. Face Recognition process

Here Figure 3 shows how face recognition pipeline. There are various ways to implementing the steps of facial recognition. In that face detection can be done by MTCNN (Multi task Cascaded Convolution Neural Network) and feature extraction by FaceNet finally classification through Softmax.

5. RESULTAND DISCUSSION

FaceNet algorithm which gives 100% accuracy. But Haar cascade algorithm gives 90.02% accuracy. Therefore, comparing to Haar cascade algorithm, FaceNet gives more accuracy.Smart Voting is a very good alternative voting system which can be introduced in India. In this, face recognition algorithm accuracy plays an important role. Working of system in 2 step verification stages one by Email and password and secondly OTP verification step then only user can allow to cast their vote .
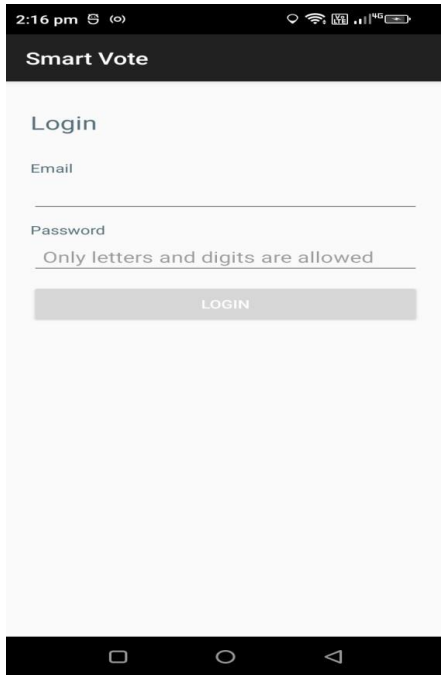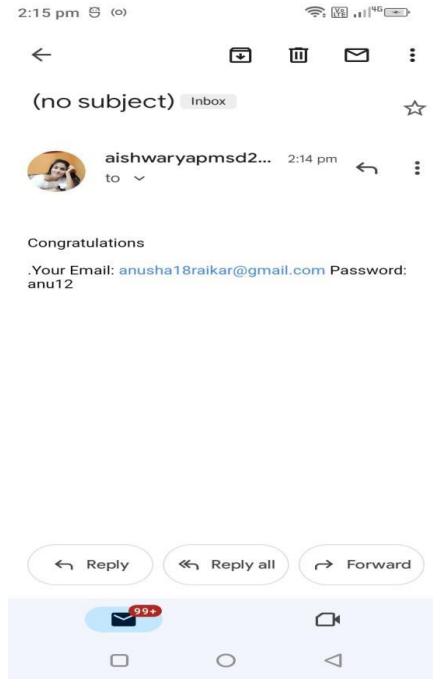

Figure 4. User Login Page

Figure 5. Authentication step for user

The smart voting system will secured and easy way to vote from anywhere you are so that he/she can vote in election by their android phone using email address and password which is entered in election registration portal as shown in Figure 4 and the authentication done in the server side to check the correct user to login to the voting poll that `shown in Figure 5.

Figure 6. OTP Verification step

As shown in Figure 6, The voter can vote only once at time by entering required information asked by the server in that process OTP Verification make the system more secure and reliable to authenticate the User. After OTP verification the can can capture the live image and upload to the server. In server side face recognition can be checked then after verification then only User allowed to cast their vote in Election.

6.   CONCLUSION

Smart Voting is a very good alternative voting system which can be introduced in India. Nowadays increasing the overall voting rate has become a major issue. The existing methods for voting involves lot of human work and also security. The Deep Learning techniques and OpenCV based Face Net Algorithm are used to recognize person's face and check whether voter is valid or not. In this smart voting system through face recognition project , the user who wants to vote has to login using user-id and password. In the next step person's face image will be detected. Next face verification is done by comparing the image with existing images in database. This is done to check whether a user is valid or not. If the user is valid then user will be logged in to the portal. Then after successful login ,user can vote to any candidate of his choice. After submitting the vote user will be logged out automatically. Thus fake votes can also be avoided.

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