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User Authentication for Online Voting System by Using Machine Learning Techniques

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Abstract— User Authentication for Online voting system is an Android application used to securely conducting votes and elections. As a digital platform, they eliminate the need to cast your votes using paper or having to gather in person. It also helps to protect the integrity of vote by preventing voters from being able to vote many times. This application make the use of Firebase as backend, for login, registration and for storage purpose which make our system highly secured and reliable. It also uses Firebase, ML for face detection which allows us to vote, one person at a time. This application helps in the verification of biometrics through finger print sensor.

Keywords— Online voting system, Firebase, ML, Face detection, Biometrics.

INTRODUCTION

User Authentication for online voting system by using machine learning techniques allows user to give vote without going to anywhere. It provides effective and user friendly voting that is secure and convenient as well. This application provides create account feature using phone number that will be used for login purpose when user will login, also an OTP will be sent on that phone number and after authentication the account will be created. This application also ensures that only those persons are allowed to vote who are eligible for vote, this task will be ensured by allowing only those registered users that are stored in a database. It helps in the provision of improved voting system for the voters through rapid, timely and appropriate voting. This system will help in the reduction of cost incurred by the election conductor during voting and the cost of management will also reduce. Check to ensure that the members who are registered are the only ones to vote. Online voting system will require being very precise or cost cutting to produce an effective election management system. Increased number of voters as individual will find it easier and more convenient to vote, especially those abroad. It is focused on studying the existing system of voting and to make sure that STUDY the peoples vote is counts, for fairness in the elective positions. This online voting system can be used for giving votes during the elections held in colleges, etc. In this system the voter do not have to go to the polling booth to cast their vote. They can use their personal mobile phones or any android device to give their votes. There is a database which holds all the names of the voters as well as their complete information which is used for verification purpose. The administrator of the system registers the voters by simply filling a registration form to register the voters. After successful registration, the voter is provided with a secret voter ID with which he/she can use to login to the system and cast his/her vote. One of the biggest advantage of using online voting is that voters can give votes according to their preferred time which leads in the reduction of overcrowd. It also reduces the inaccuracy in vote counts. The vote of every individual is submitted in a database

which can be inquired to find out the aspirant having given the highest number of votes.

LITERATURE REVIEW

To make the voting process very easy and efficient wireless and web technologies are used for authentication. The authentication of online voting system has the possibility of secure, easy and safe way to capture and count the votes in the election.

The author in [1] "Success factors of Geneva's e-voting system" uses e-cards and encryption for internet but the main problem resides in this system is that of authentication, the authentication technique used is not that efficient as biometric is not used.

The author in [2] "Security Analysis of Estonian Internet Voting System" finds state-level attacker, sophisticated criminal, or dishonest insider could defeat both the technological and procedural controls in order to manipulate election outcome but there is no cryptography or any other encryptions.

The author in [3] "E-voting system with physical verification using OTP algorithm" uses verification of voter through OTP but there is less security due to absence of proper authentication.

The author in [4] "Mobile Voting Using Finger Print Authentication" uses finger authentication using fingerprint but there is still the problem remains same about encryption and threats from cyber-attacks.

The author in [5] "Android voting system using facial recognition" uses machine learning algorithms that can be used to verify voters but problem of fake face remains as someone can use photo of voter to cast fake vote.

The author in [6] "Student online voting system" uses web portal and password credential approach is followed but there is security issues due to lack of biometric authentication.

The author in [7] "Virtual Voting System" uses finger print authentication to verify users but maintaining the personal data safe from hacker attack is an issue.

METHODOLOGY

To have a secured and fair e-voting process, there exists the need for multiple authentications. The proposed methodology follows the implementation of Face recognition and fingerprint recognition. The recent trends of development in machine learning techniques have solved various problems. Various complex tasks are now efficiently managed by the machines. We are utilizing the concepts of machine learning to perform the facial recognition as well as the fingerprint recognition.

The Idea behind the implementation of a fluid e-voting process is the use of android applications. The rapid expansion of Smartphone users around the globe have provided with a very high coverage. Having the comfort of giving vote by just few clicks can put a major impact on society. The Application first Logs in the user through OTP Login, the OTP is sent on the registered contact number, after verifying the credentials, user is allowed to access the application. To vote, user need to choose the option he is going to vote for out of all the election options. Before loading the voting portal, the two factor authentication takes place. On the portal the voter can opt for the candidate he wants to vote.

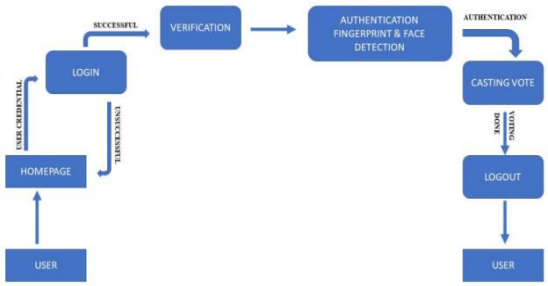

Fig. 1 Application work flow

The two factor authentication which consists of Face recognition and fingerprint recognition is performed using trained models. Deep Learning which is a part of machine learning deals with the neural network architectures. One of the most popular technique in deep learning is Convolutional Neural Networks. They prove to be very effective in processing images and complex data. An artificial neural network is a group of connections that represents a model of data which processes information and is similar in structure to the synaptic connections of neurons in the brain. Neural network consists of neurons and the output of the previous neuron can be used as

the input of the next neuron. The formula to represent this structure is as follows

$$h_{W,b}(x) = f\left(W^T x\right) = f\left(\sum_{i=1}^{3} W_i x_i + b\right)$$

This model is also known as the Logistic regression model. When various neurons are connected together to each other and when they are layered, the structure we obtain is what we call a neural network model. Figure 2 shows a neural network with hidden layers. Every node have there own individual weight(w) parameters which are used to determine the nodes of next layer.

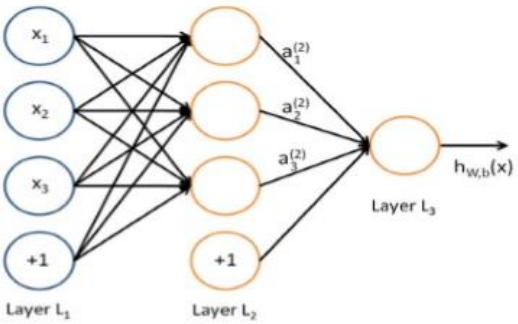

Fig.2 Neural Networks

In the above neural network, X1, X2, X3 are the input of the neural network and +1 is the intercept term. The leftmost nodes of the neural network in above figure is the input layer of the network and, the rightmost node of the neural network is the output layer of the network. The middle layer of the network model is a hidden layer, which is fully connected between the input layer and the output layer. There can be various hidden layers in a neural network model. The values of all the nodes in the network model cannot be seen in the training sample set. As per the neural network in the figure 2, we can see that the model contains a total of 3 input units and 1 input layer, 3 hidden units and 1 hidden layer, 1 output unit and 1 output layer.

A CNN (Convolutional neural network), is a network architecture for deep learning which learns directly from the data and, eliminating the need for manual feature extraction. CNNs are particularly useful for finding patterns in images to recognize objects, faces, and scenes. CNNs are also quite effective with some other complex data and some of the example are classifying non-image data such as audio, time series, and signal data.

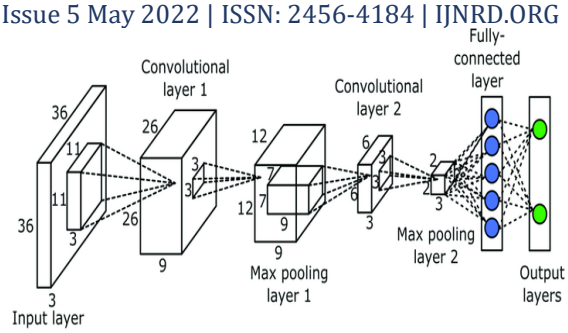

Fig. 3 Convolutional Neural Network

CNNs primarily focus on the basis that the input will be comprised of images. This focuses the architecture to be set up in way to best suit the need for dealing with the specific type of data.

CNNs are comprised of three types of layers. These are convolutional layers, pooling layers and fully-connected layers. When these layers are stacked together, the structure we obtain is called a CNN architecture. The convolutional layer plays an impotant role in how the architecture operates. The layers parameters focus around the use of learnable kernels. These kernels are usually small in spatial dimensionality, but spreads along the entirety of the depth of the input. Pooling layers aim to gradually reduce the dimensionality of the representation, which further helps in reducing the number of parameters and breaking down the computational complexity of the model. The fully-connected layer is just like an ANN as it contains neurons, which are directly connected to the neurons in the next two adjacent layers and, without being connected to any layers within them. This is analogous to way that neurons are arranged in traditional forms of ANN.

Image processing practices on convolutional neural networks generally require to gather large number of pictures for the computer to learn. After collecting a lot of images, Image preprocessing like crop irrelevant parts of the face are done. The processed images are passed through set of convolutional layers, pooling layers and normalization layers. The resultant matrix then is classified through fully connected layer. The class with highest value returned by softmax function is the predicted output of CNN.

CONCLUSION

A secure authentication of user in online voting system is the efficient way to promote online voting system because by this voting

authority can take the voter in confidence. The enhanced user validation system is by adding fingerprint and the face recognition embedded together. Which provide higher level of abstraction in authentication. The online voting system practice increase the voting percentage by taking the voter in loop which are away from their native location for employment or due to any other matter.

This Authentication using Online Voting system will manage the Voter's information effectively so that user can login and use his voting rights. Our work is not related to government body, it can be any organisation who want to conduct elections to choose their representative in any aspect like to choose the cultural club president in colleges. The system will incorporate all features of voting system. It provides the tools for maintaining voter's vote. There is a Database which is maintained on platform that is Firebase in which all the names of voter with complete information is stored and image processing is based on CNN. The two factor authentication which consists of Face recognition and fingerprint recognition is performed using trained models. It also verify biometric with the help of finger print sensor. It first logs in the user through OTP Login, the OTP is sent on the registered contact number, after verifying the credentials, user is allowed to access the application and vote to their representatives.

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