BLOCK CHAIN BASED E-VOTING SYSTEM WITH FACE RECOGNITION

A PROJECT REPORT

Submitted by

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ABSTRACT

A widespread mistrust towards the traditional voting system has made democratic voting in any country very critical. People have seen their fundamental rights being violated. Other digital voting systems have been challenged due to a lack of transparency. Most voting systems are not transparent enough; this makes it very difficult for the government to gain voters' trust. The reason behind the failure of the traditional and current digital voting system is that it can be easily exploited. The primary objective is to resolve problems of the traditional and digital voting system, which include any kind of mishap or injustice during the process of voting. Blockchain technology can be used in the voting system to have a fair election and reduce injustice. This appraises the need for a solution to secure the democratic rights of the people. This article presents a platform based on modern technology blockchain that provides maximum transparency and reliability of the system to build a trustful relationship between voters and election authorities. The proposed platform provides a framework that can be implemented to conduct voting activity digitally through blockchain without involving any physical polling stations. Our proposed framework supports a scalable blockchain, by using _exible consensus algorithms. Smart contracts providea secure connection between the user and the network while executing a transaction in the chain. The security of the blockchain-based voting system has also been discussed Furthermore, the methodology for carrying out blockchain transactions during the process of voting has been elaborated using Blockchain Finally, the performance evaluation of the proposed system shows that the system can be implemented in a large-scale population.

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LIST OF ABBREVIATIONS

S.NO	ABBREVIATION	EXPANSION
1.	JDK	Java Development ToolKit
2.	XAMPP	Platform-Apache, MySQL,PHP, and Perl
3.	SHA-256	Secure Hash Algorithm 256-bit
4.	HTTP	HyperText Transfer Protocol
5.	KNN	K-Nearest Neighbour

1. INTRODUCTION

1.1 OVERVIEW

Blockchain-based e-voting with face verification is a digital voting system that makes use of facial recognition technology and blockchain technology to guarantee safe, open, and uncorruptible voting. Inthis system, votes are submitted online through a platform that is based on the blockchain network, which keeps track of all transactions and makes sure they can't be tampered with or changed.Each voter can only submit one ballot because facial recognition technology is used to confirm their identity.Voters are only permitted to submit ballots after their faces are successfully matched with those in a database of registered voters. By offering a decentralised and transparent system, the use of blockchain technology guarantees the validity of the voting process. Each vote is registered on the blockchain network, and once registered, a vote cannot be amended or removed. This makes it impossible for a third entity to rig the results.Overall, blockchain-based electronic voting with facial verification has thepotential to boost voter turnout while also enhancing the validity and transparency of the voting process. The security and safety of voters' personal information, as well as issues with the accuracy and dependability of facial recognition technology, remain some of the challenges that must be resolved.

1.2 PROBLEM DEFINITION

Create and implement a trustworthy, secure, and blockchain-based electronic voting system that uses face recognition technology to verify the voter's identify and thwart any voting fraud.The electronic voting system must be impenetrable to hacking efforts and shield voting data from any unauthorised access. The voting data's availability, confidentiality, and accuracy must all be guaranteed by the system.The system must ensure that the voter is who they say they are and that they are the same person registered to vote. visage recognition technology will be used to compare the voter's visage to an image that has been stored in the system. Transparency is essential to the electronic voting process in order to guarantee that all votes are correctly recorded and tallied. To do this, a transparent, immutable document of every vote can be created using blockchain technology.Every eligible voter must be able to use and access the electronic voting method. This can be accomplished by offering a user-friendly user interface and making sure the system is compatible with a variety of systems and devices. The e-voting method needs to be trustworthy in order to guarantee that all votes are accurately recorded, counted, and the outcomes are credible. Using a strong system architecture, redundancy, and backup mechanisms, along with other measures to stop data loss and guarantee system availability, can help accomplish this.By tackling these issues, the suggested e-voting system can deliver a safe, dependable, and transparent platform for holding elections, preserving the integrity of the voting process, and fostering public confidence in the electoral system.

2. LITERATURE SURVEY

1.PROJECT TITLE An improved face recognition algorithm and its application in attendance management system

AUTHOR NAME Serign Modou Bah, Fang Ming

YEAR OF PUBLISH **2020**

DESCRIPTION Face Recognition is a computer application that is capable of detecting, tracking, identifying or verifying human faces from an image or video captured using a digital camera. Although lot of progress has been made in domain of face detection and recognition for security, identification and attendance purpose, but still there are issues hindering the progress to reach or surpass human level accuracy. These issues are variations in human facial appearance such as; varying lighting condition, noise in face images, scale, pose etc. This research paper presents a new method using Local Binary Pattern (LBP) algorithm combined with advanced image processing techniques such as Contrast Adjustment, Bilateral Filter, Histogram Equalization and Image Blending to address some of the issues hampering face recognition accuracy so as to improve the LBP codes, thus improve the accuracy of the overall face recognition system. Our experiment results show that our method is very accurate, reliable and robust for face recognition system that can be practically implemented in real-life environment as an automatic attendance management system.

2. PROJECT TITLE Ensemble of texture descriptors for face recognition obtained by varying feature transforms and preprocessing approaches

AUTHOR NAME Loris Nanni1 Alessandra Lumini2 Sheryl Brahnam3

YEAR OF PUBLISH **2017**

DESCRIPTION This paper presents a novel ensemble of descriptors for face recognition derived from the base Patterns of the Oriented Edge Magnitudes (POEM) descriptor. Starting from different texture descriptors recently proposed in the literature, namely, the base patterns of POEM and the Monogenic Binary Coding (MBC), we develop different ensembles by varying the preprocessing techniques, the subspace projections, and some parameters of the system. Our approach is tested on the FERET datasets and the Labeled Faces in the Wild (LFW) dataset. Our system performs well on both datasets, obtaining, to the best of our knowledge, one of the highest performance rates published in the literature on the FERET datasets with an average accuracy of 97.3%. We want to stress that our ensemble obtains outstanding results in both datasets without any supervised approach or transform. The main findings of our proposed system include the following: 1) significant improvement in performance can be obtained by simply varying the parameters of stand-alone descriptors; and 2) performance can be improved by combining different enhancement and feature transform techniques.

3. PROJECT TITLE Face Recognition Algorithms:A Review

AUTHOR NAME Sneh Prabha1, Rahul Bulchandani1*, Rajiv Mishra2, Sarthak Agarwal3, Shreya Chauhan

YEAR OF PUBLISH **2021**

DESCRIPTION Due to its applicability in different domains of life face recognition is a very fast growing area of research. In daily life, to receive information and interpret it and to identify familiar faces, face recognition is used. It is prevalent due to its simplicity and performance. In the last few years tremendous research has been carried out but still there are many challenges related to face recognition. In covid time it becomes challenging to identify a mask wearing face. This paper aims to provide an overview of some of the well known facial recognition algorithms and techniques used in research. Initially face recognition was implemented using Principal Component Analysis, Linear Discriminant Analysis, Support Vector Machine, Adaboost but nowadays to improve the quality deep learning is used.

4. PROJECT TITLE Face Recognition Method for Online Exams

AUTHOR NAME Arief Agus Sukmandhani, Indrajani Sutedja

YEAR OF PUBLISH **2020**

DESCRIPTION In the development of this technology, biometric systems are highly developed for use in various applications. Biometric systems are usually used to identify and analyze the characteristics of the human body such as fingerprints, retina, sound patterns, facial patterns and other body structures that can be used for system authentication. As well as facial recognition technology more and more used and developed for various applications including security systems, attendance systems or other things. As well as attendance system that is a recurring transaction because it is associated with controlling the presence of a person in activity. in the field of education, the attendance system is very important because the presence of students is part of a good assessment for teaching and learning. This research is to develop a prototype of face-based online exam application using the Eigenface method to detect student attendance

5. PROJECT TITLE FaceForensics: A Large-scale Video Dataset for Forgery Detection in Human Faces

AUTHOR NAME Andreas R¨ossler Davide Cozzolino Luisa Verdoliva Christian Riess Justus Thies Matthias Nießner

YEAR OF PUBLISH **2018**

DESCRIPTION With recent advances in computer vision and graphics, it is now possible to generate videos with extremely realistic synthetic faces, even in real time. Countless applications are possible, some of which raise a legitimate alarm, calling for reliable detectors of fake videos. In fact, distinguishing between original and manipulated video can be a challenge for humans and computers alike, especially when the videos are compressed or have low resolution, as it often happens on social networks. Research on the detection of face manipulations has been seriously hampered by the lack of adequate datasets. To this end, we introduce a novel face manipulation dataset of about half a million edited images (from over 1000 videos). The manipulations have been generated with a state-of-the-art face editing approach. It exceeds all existing video manipulation datasets by at least an order of magnitude. Using our new dataset, we introduce benchmarks for classical image forensic tasks, including classification and segmentation, considering videos compressed at various quality levels. In addition, we introduce a benchmark evaluation for creating indistinguishable forgeries with known ground truth; for instance with generative refinement models.

3. SYSTEM ANALYSIS

3.1 EXISTING SYSTEM

This is the current voting system used in India. In this system vote is cast using electronics ballet. In this we cast our vote in an electronics machine. This is a group of some counter and registers. This voting system is quite easy, simple. It has advantage like mobility, secure, flexibility for election commission. But in today world all people are so much busy that they don't have time to vote. This paper presents a perspective in the electronic voting process. That includes but not limited to identifying the polling process, The polling process the actual voting process used on the polling day.

Disadvantage

The problems of the existing manual system of voting include among others the following:

- **Expensive and Time consuming** The process of collecting data and entering this data into the database takes too much time and is expensive to conduct, for example, time and money is spent in printing data capture forms, in preparing registration stations together with human resources, and there after advertising the days set for registration process including sensitizing voters on the need for registration, as well as time spent on entering this data to the database.
- **Too much paper work** The process involves too much paper work and paper storage which is difficult as papers become bulky with the population size.

- **Short time provided to view the voter register** This is a very big problem since not all people have free time during the given short period of time to check and update the voter register.

3.2 PROPOSED SYSTEM

The proposed system is the face Verified online voting system with Face Verification using Block chain Address. It determines the particular voter by his/her Block chain Address whether he/she is a valid voter or not. It allows particular voter to cast the vote online. The polling process continues until the voting time ends and update the database in the server. Face Verification online voting system uses Block chain Address to retrieve the complete details about the voter. And the votes are stored in a block chain server and viewed to the public this ensure a trustworthy environment.

Advantage

- Voter can cast their votes from anywhere in the country without visiting to voting booths, in highly secured way.
- This will increase the voting percentage in India and reduces the cost of voting process.
- By using Face Verification it provides enough security which reduces the false votes.
- The collection of the results is done from the stored data on the blocks through the significant organization of the nodes in the block chain.

3.3. FEASIBILITY STUDY

Evaluating the system's technical, financial, and operational elements is part of a feasibility study for a blockchain-based face-recognition e-voting system. Several crucial factors are listed below:

3.3.1 Technical Feasibility

The first thing to think about is whether blockchain technology can offer the e-voting system the protection and transparency it needs.The accuracy with which the facial recognition system can confirm voters' identities and guard against fraud is the second factor to be taken into account. The third factor is whether the system's hardware requirements, such as cameras and processing power, are readily and affordably accessible.The ease of use and accessibility of the user interface for all users, including those with disabilities, is the fourth factor to be taken into account.

3.3.2 Economic Feasibility

The expense of developing and deploying the system should be the first factor to be taken into account.The system's advantages, such as improved security and openness, are the second factor to be taken into account.The third factor to take into account is the system's ability to obtain funding, either from public or private sources.

3.3.3 Operational Feasibility

The first factor to take into account is whether the electronic voting system conforms with all applicable legal and regulatory requirements.The ability to protect the system from cyberattacks and other security risks is the second factor to be taken into account.The third factor is whether or not all parties involved, such as voters, poll officials, and political parties, can have confidence in the system.The system's capacity to scale up to manage larger elections with millions of voters is the fourth factor to take into account.

3.4 HARDWARE REQUIREMENTS

Hard Disk	:	80GB and Above
RAM	:	4GB and Above
Processor	:	P IV and Above

3.5 SOFTWARE REQUIREMENTS

- Windows 10 and above
- JDK 1.8
- Python 3.6.3
- XAMPP
- GanaChe

3.6 JAVA

Java can be used to create smart contracts that operate on blockchains. These smart contracts can be used to handle vote counts, implement voting rules, and maintain voting process integrity.Java can be used to create the front-end program for the blockchain-based electronic voting system (DApp). Both voters and election officials can use this DApp to submit ballots and count and verify the results. Java is a language that can be used to build a face recognition system. The system can take pictures of the participants using the JavaCV library and identify them using the OpenCV library. The face detection system's user interface can also be made using the JavaFX library.To guarantee the security of the e-voting system, Java has built-in security features that can be used. Java, for instance, can be used to create secure user-to-user data transmission and to encrypt voter-to-blockchain network communication. In conclusion, a face-detection blockchain-based electronic voting system can be created using Java as the programming language.

3.7 BLOCKCHAIN

The e-voting method is based on a decentralized blockchain network, in which there is no single entity in charge of the network. This makes sure that no one party can influence the election process. Intelligent Contracts The voting regulations are upheld and the vote tallies are managed by smart contracts. These contracts are immutable, which means that once they are deployed, they cannot be altered, and they are stored on the blockchain.The blockchain is an immutable and open distributed database. This implies that every vote made on the blockchain is tracked and verifiable by any network user. A decision that has already been cast cannot be changed or revoked.Along with using blockchain technology, face recognition is used to confirm the participants' identities. The system takes pictures of the voters and compares them to a database of people who are enrolled to vote. By doing so, fraud is deterred and only eligible voters are permitted to submit ballots.The e-voting method is highly secure thanks to blockchain technology. It is practically impossible for anyone to tamper with the votes because they are encrypted and stored on the blockchain. The use of smart contracts also makes sure that the voting procedures are observed and that the vote totals are correct.

4. SYSTEM DESIGN

4.1 E-R DIAGRAM

The relationship between the Voter and Vote entities is shown in the ERD. The Voter ID attribute, which functions as a foreign key, links the Vote entity to the Voter entity. Each vote is matched with the appropriate voter thanks to this relationship.

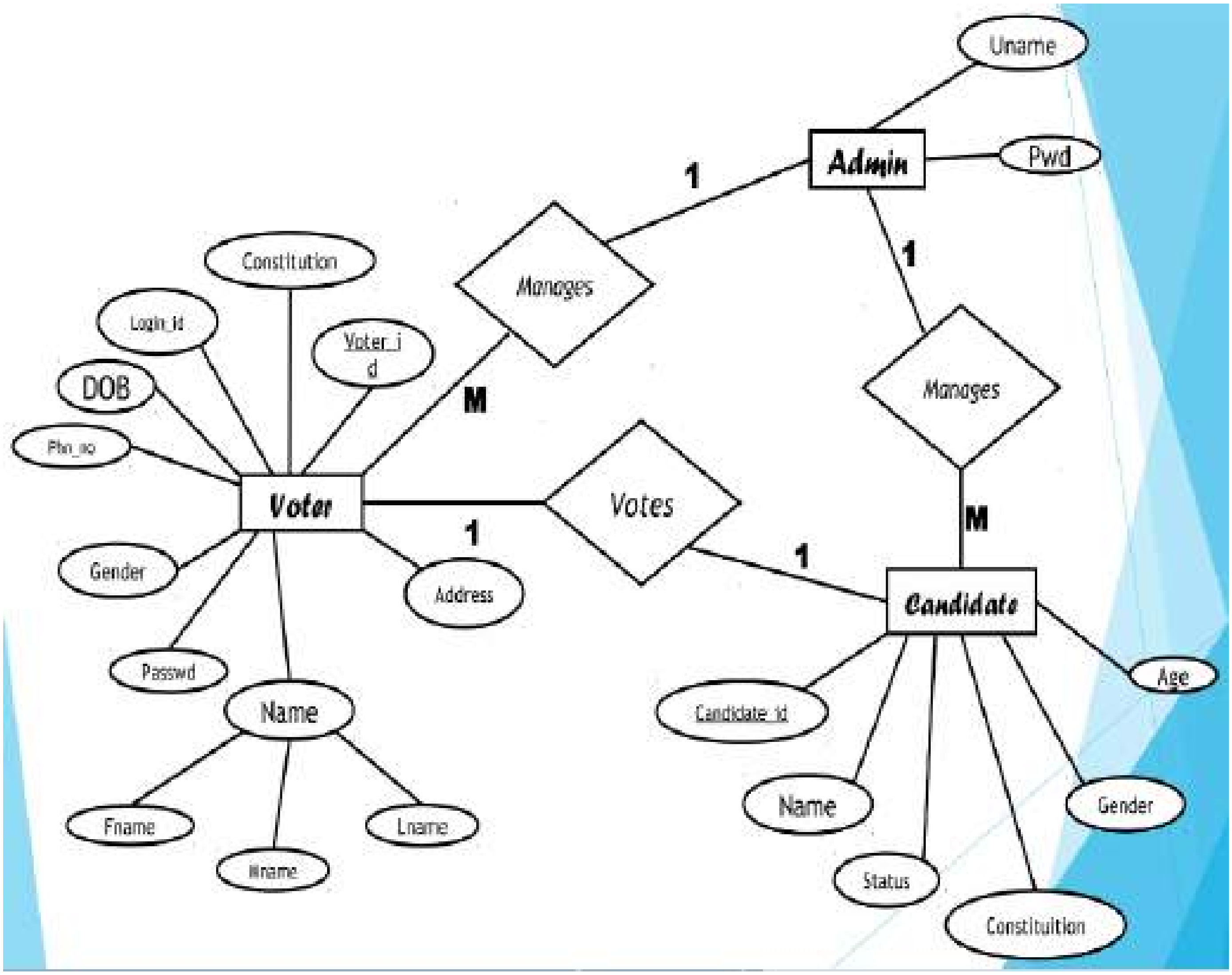


FIG 4.1 E-R DIAGRAM FOR BLOCKCHAIN BASED E-VOTING SYSTEM

4.2 DATA DICTIONARY

VOTER

ATTRIBUTE NAME	DATATYPE	DESCRIPTION
voter_id	int	unique identifier for each voter
name	varchar	name of the voter
address	varchar	address of the voter
date_of_birth	date	date of birth of the voter
voter_public_key	blob	public key of the voter for digital signatures
voter_private_key	blob	private key of the voter for digital signatures

FIG 4.2.1 VOTER ENTITY TABLE

CANDIDATE

ATTRIBUTE NAME	DATATYPE	DESCRIPTION
candidate_id	int	unique identifier for each candidate
name	varchar	name of the candidate
party	text	political party of the candidate
campaign	varchar	description of the candidate's campaign platform
candidate_public_key	blob	public key of the candidate for digital signatures
candidate_private_key	blob	private key of the candidate for digital signatures

FIG 4.2.2 CANDIDATE DATA ENTITY TABLE

BALLOT

ATTRIBUTE NAME	DATATYPE	DESCRIPTION
ballot_id	int	unique identifier for each ballot
voter_id	int	ID of the voter who cast the ballot
timestamp	date/time	date and time when the ballot was cast
vote	int	ID of the candidate voted for
signature	binary	digital signature of the voter using their private key

FIG 4.2.3 BALLOT ENTITY TABLE

BLOCK

ATTRIBUTE NAME	DATATYPE	DESCRIPTION
block_id	binary	unique identifier for each block in the blockchain
previous_block_hash	byte array	hash of the previous block in the blockchain
timestamp	date/time	date and time when the block was added to the blockchain
ballots	bigint	list of ballots included in the block
block_hash	varbinary	hash of the current block, including its own data and the hash of the previous block

FIG 4.2.4 BLOCK ENTITY TABLE

4.3 TABLE NORMALIZATION

Voters

This table might include columns such as voter_id, name, address, and voter_public_key. It could be normalized by creating a separate table for the name and address information and establishing a relationship between the two tables using the voter_id as a foreign key.

Candidates

This table might include columns such as candidate_id, name, party, and candidate_public_key. It could be normalized by creating a separate table for the party information and establishing a relationship between the two tables using the party_id as a foreign key.

Votes

This table might include columns such as vote_id, voter_id, candidate_id, timestamp, and signature. It could be normalized by creating separate tables for the voter, candidate, and timestamp information and establishing relationships between the tables using the voter_id, candidate_id, and timestamp_id as foreign keys.

Normalization should be performed carefully, as over-normalization can lead to complex and inefficient database designs. It's important to strike a balance between normalization and simplicity, and to consider the specific needs and constraints of the e-voting system when designing the database schema.

TABLE:VOTER
voter_id
voter_name
voter_address
Voter_photo

FIG 4.3.1 VOTER TABLE

TABLE:VOTER_PHOTOS
photo_id
photos

FIG 4.3.2 VOTER_PHOTOS TABLE

TABLE:CANDIDATES
candidate_id
candidate_name
candidate_party

FIG 4.3.3 CANDIDATES TABLE

TABLE:BLOCK
block_id
previous_block_hash
block_hash
timestamp

FIG 4.3.4 BLOCK TABLE

TABLE:VOTES
vote_id
voter_id
candidate_id
block_id
vote_timestamp
Vote_face_id

FIG 4.3.5 VOTES TABLE

4.4 DATA FLOW DIAGRAM

A Data Flow Diagram (DFD) is a graphical representation of the “flow” of data through an information system, modeling its aspects. It is a preliminary step used to create an overview of the system which can later be elaborated DFDs can also be used for visualization of data processing.

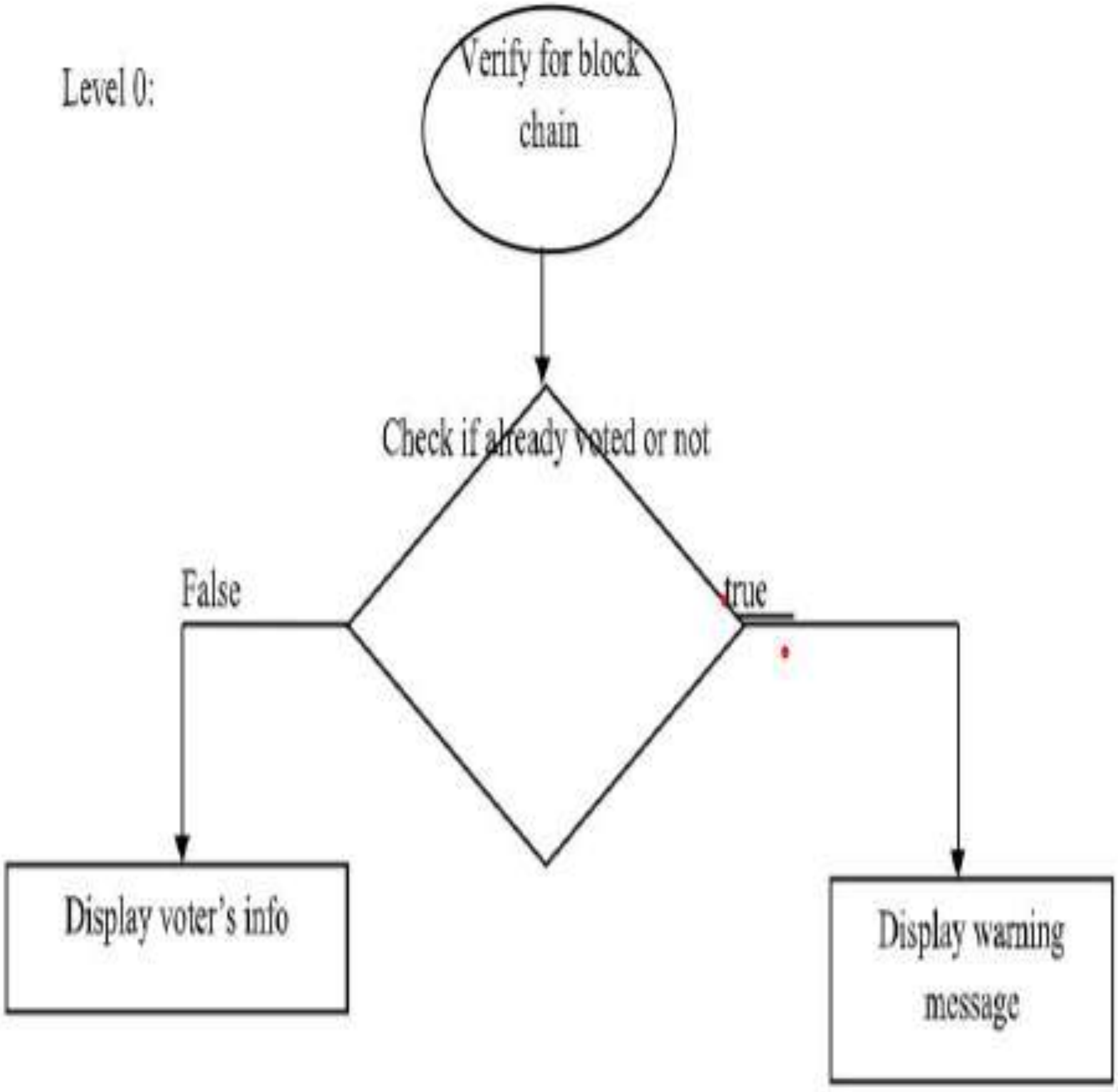


FIG 4.4.1 LEVEL 0 DFD

Level 1:

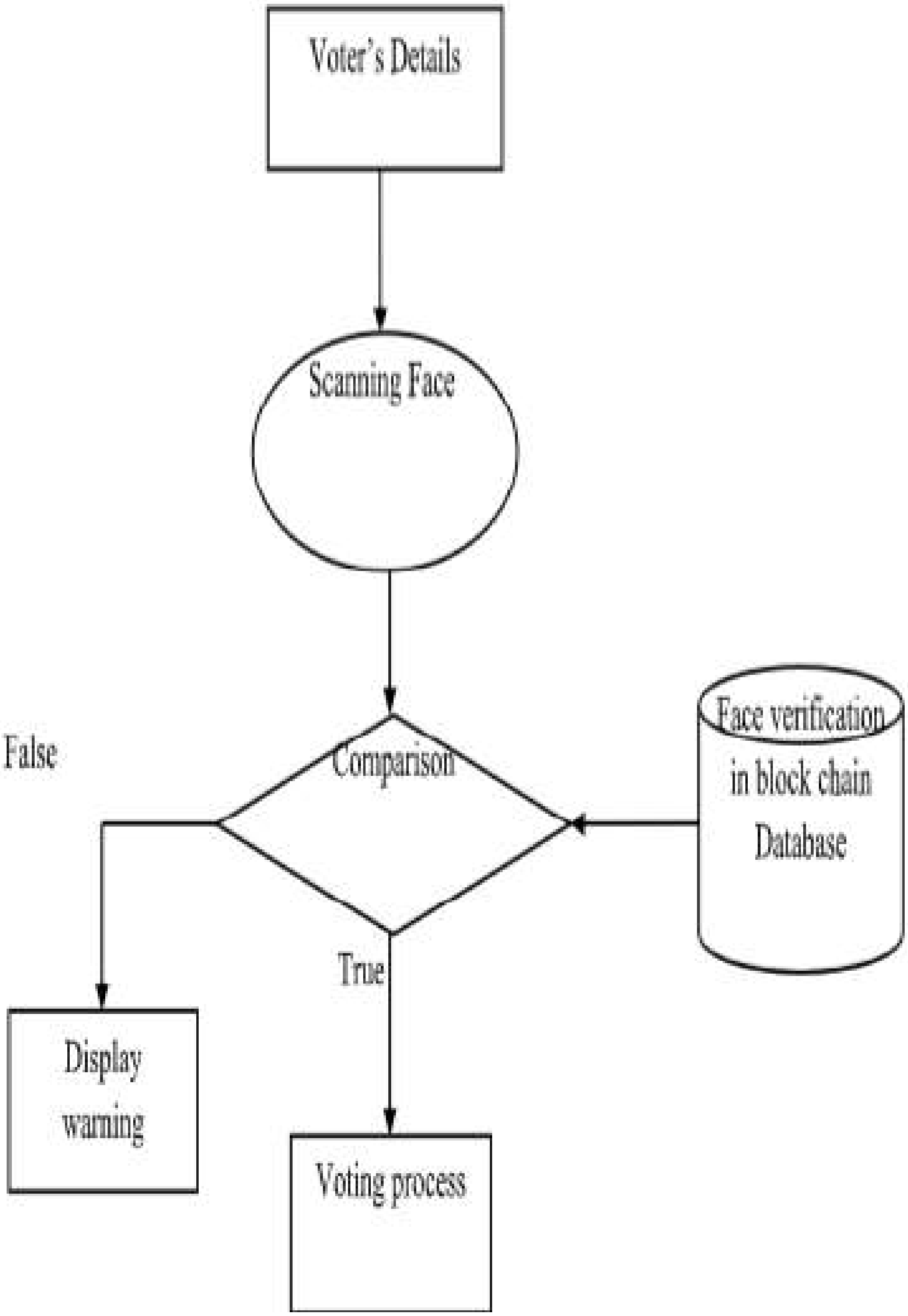


FIG 4.4.2 LEVEL 1 DFD

Level 2:

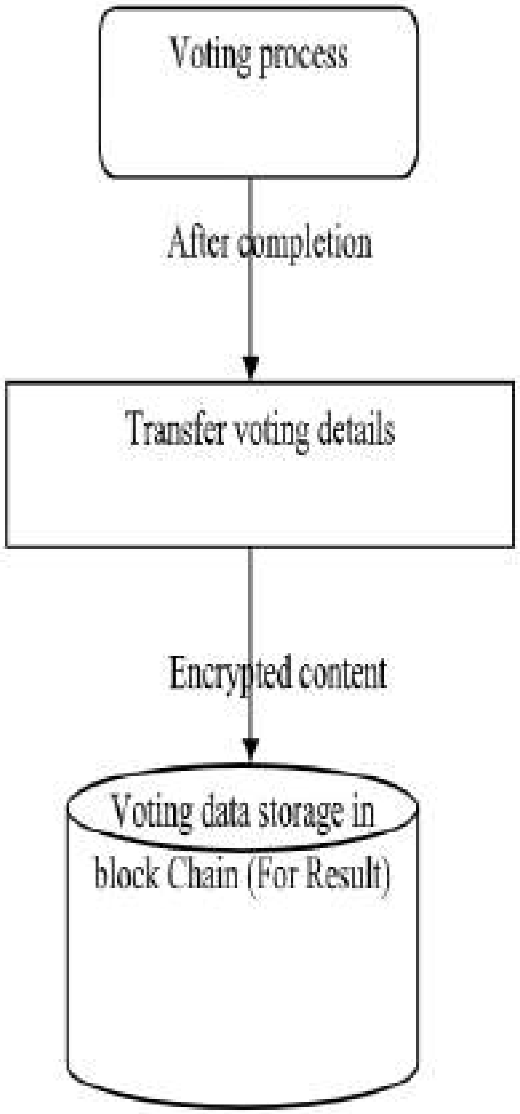


FIG 4.4.3 LEVEL 2 DFD

Level 3:

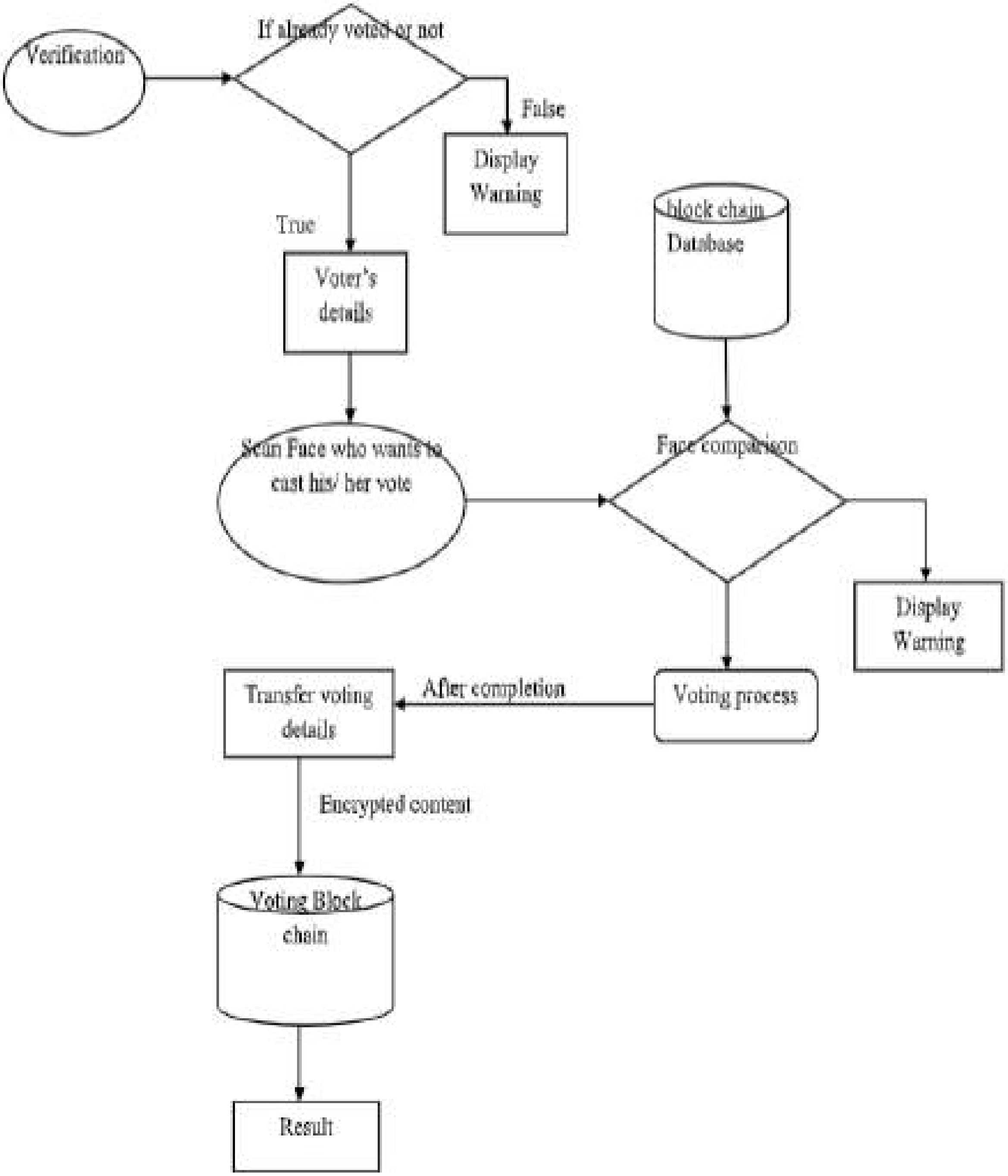


FIG 4.4.4 LEVEL 3 DFD

4.5 UML DIAGRAMS

Unified Modeling Language (UML) is a standardized general-purpose modeling language in the field of software engineering. The standard is managed and was created by the Object Management Group. UML includes a set of graphic notation techniques to create visual models of software-intensive systems. This language is used to specify, visualize, modify, construct, and document the artifacts of an object-oriented software-intensive system under development.

4.5.1 USE CASE DIAGRAM

A use case diagram is a graphic depiction of how a system (or software programme interacts with its users or other external entities. It displays the various situations or use cases in which the system may be put to use, the players who engage with the system, and the connections between them.

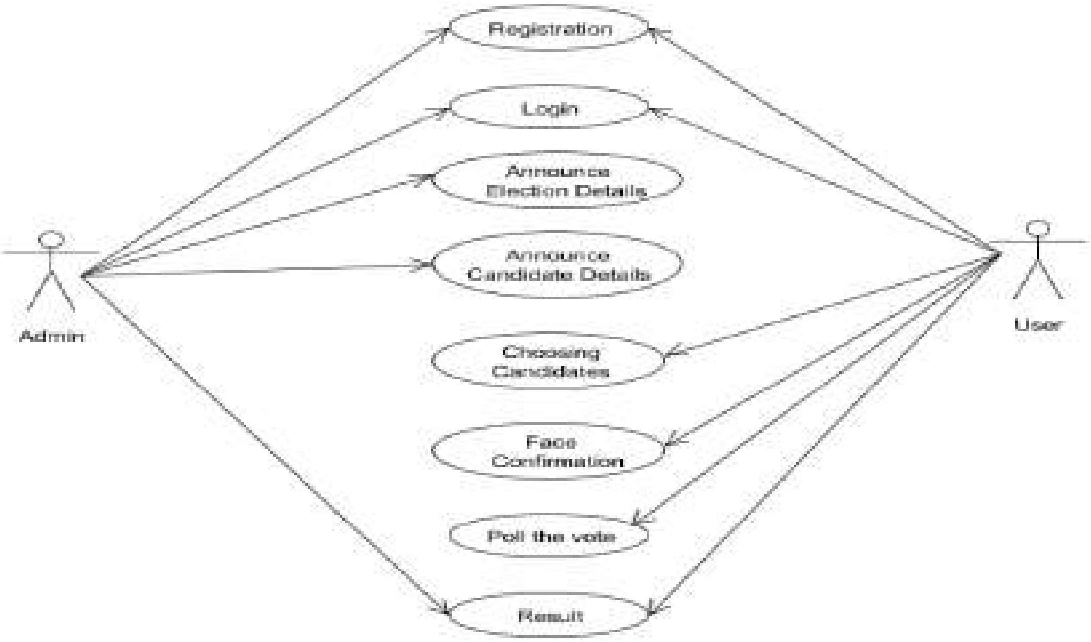


FIG 4.5.1 USECASE DIAGRAM

4.5.2 ACTIVITY DIAGRAM

A system or software programme can model a process or the flow of activities using an activity diagram. It is a picture of the actions necessary to finish a certain job or reach a particular

objective.

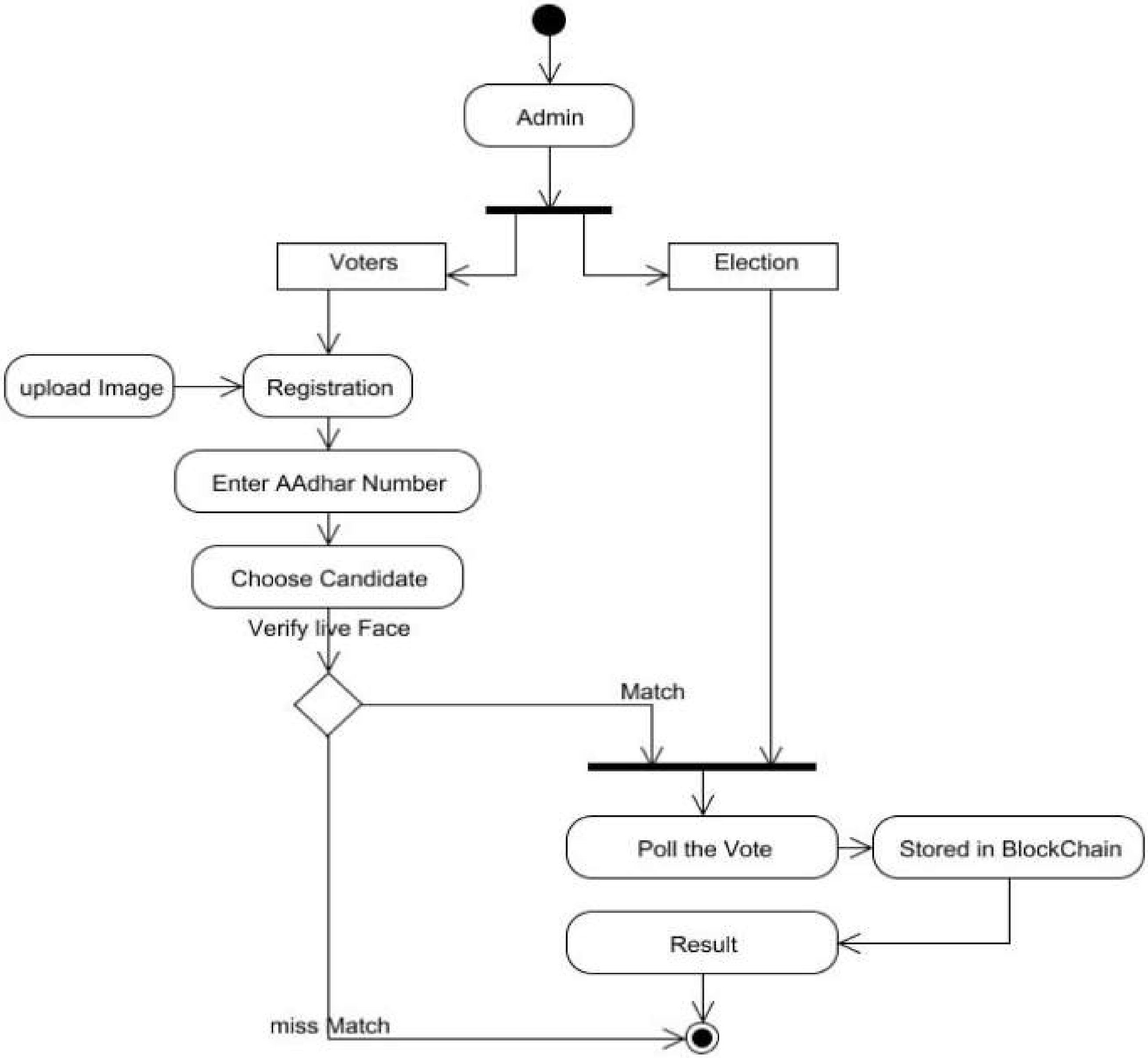


FIG 4.5.2 ACTIVITY DIAGRAM

4.5.3 SEQUENCE DIAGRAM

A diagram that depicts the interactions between items or components in a system or software application is known as a sequence diagram. It depicts the order in which these messages are transmitted and received between the various objects or components.

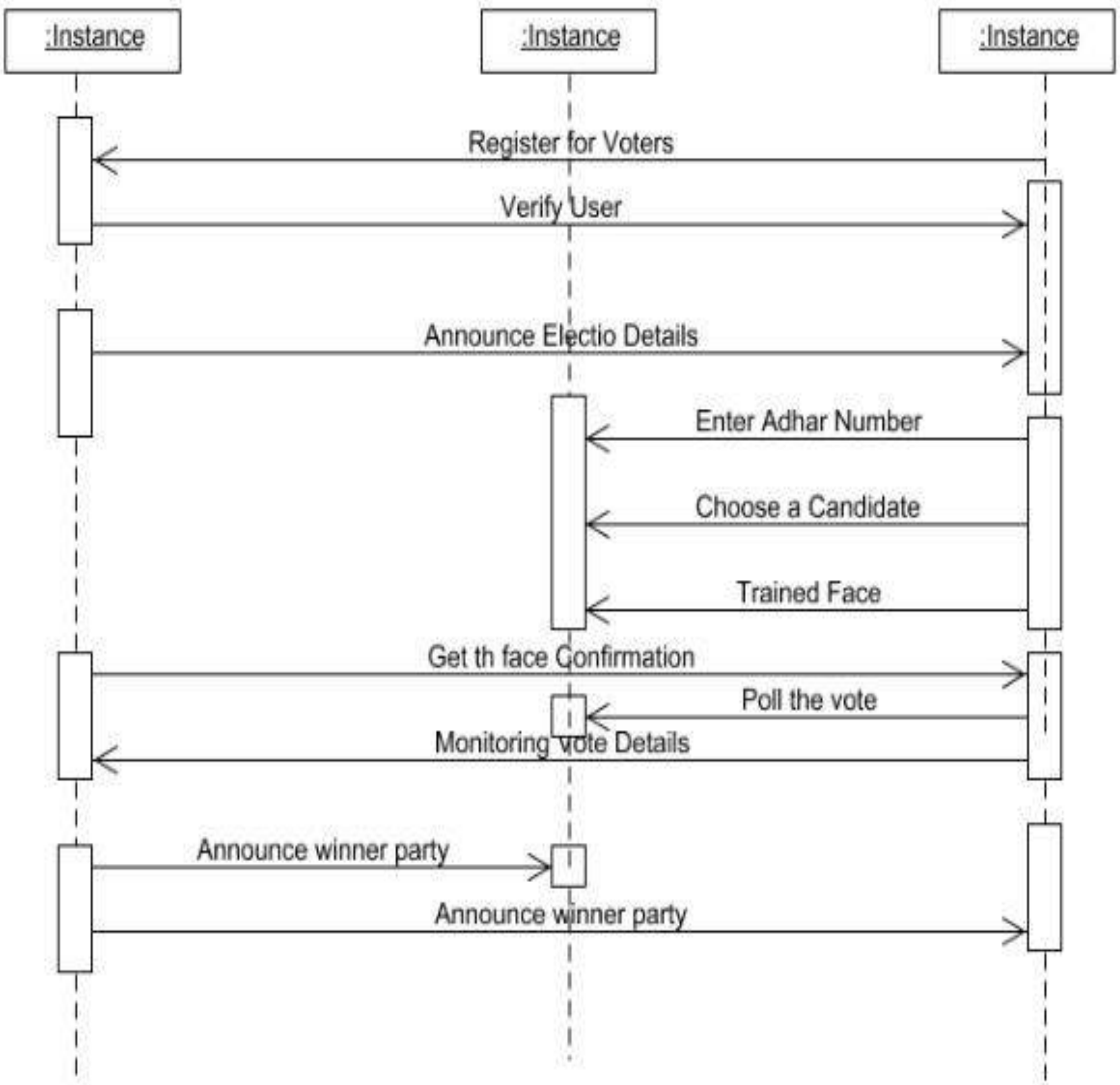


FIG 4.5.3 SEQUENCE DIAGRAM

4.5.4 COLLABORATION DIAGRAM

A collaboration diagram, sometimes referred to as a communication diagram, that displays how various elements of a software programme or system communicate with one another. It displays the elements and the connections between them, as well as the communications that take place.

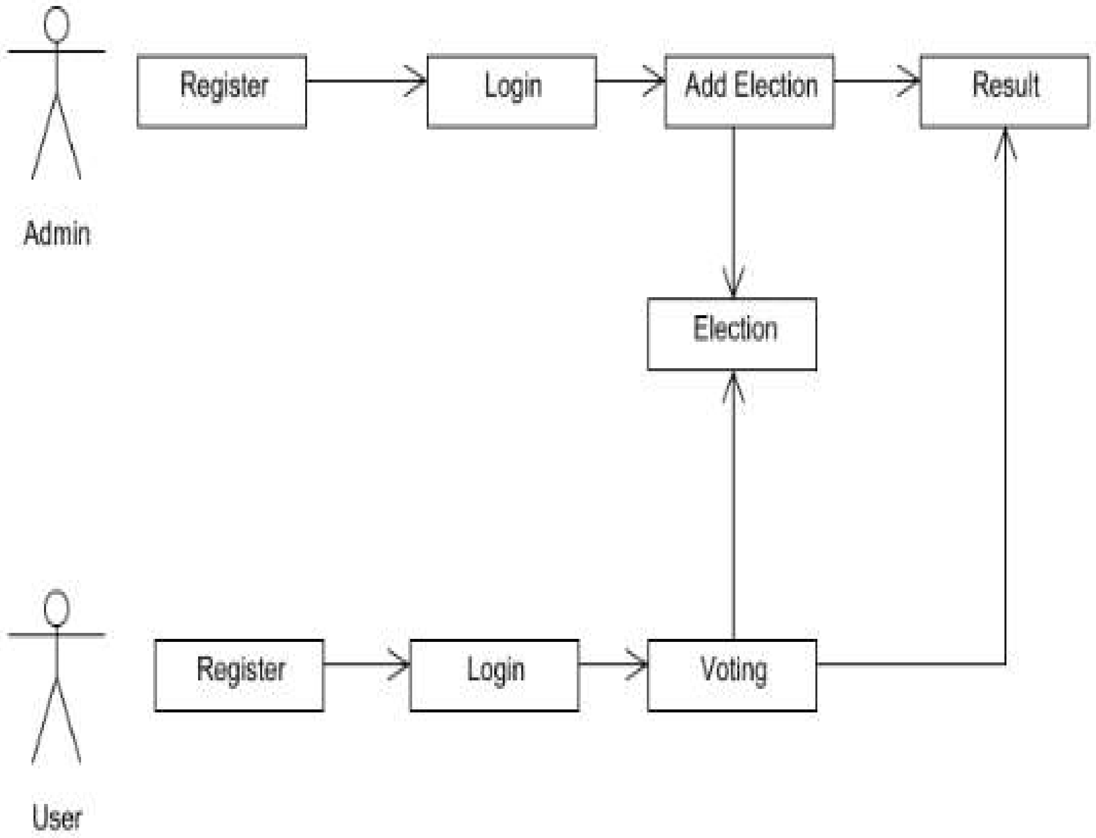


FIG 4.5.4 COLLABORATION DIAGRAM

5. SYSTEM ARCHITECTURE

5.1 ARCHITECTURE

Voters will interact with this interface, which is called the front-end. Voters can securely and effectively cast their ballots using a web or mobile application. Additionally, it acts as a conduit for information between the voters and the rest of the system.

Identity Verification Using government-issued ID cards or other methods, this component is in charge of confirming the voter's identity. It will make sure that only legitimate voters can cast ballots.

Face Recognition This part will use facial recognition technology to verify the voter's identification and help stop fraud.

Blockchain At the centre of the system, this is where all voting-related information would be kept. The integrity of the election is ensured by the blockchain, which offers a secure, transparent, and tamper-proof method of recording votes.

The back end is in charge of running the blockchain and handling all data processing and archiving. Additionally, it will be in charge of producing the election's final outcome.

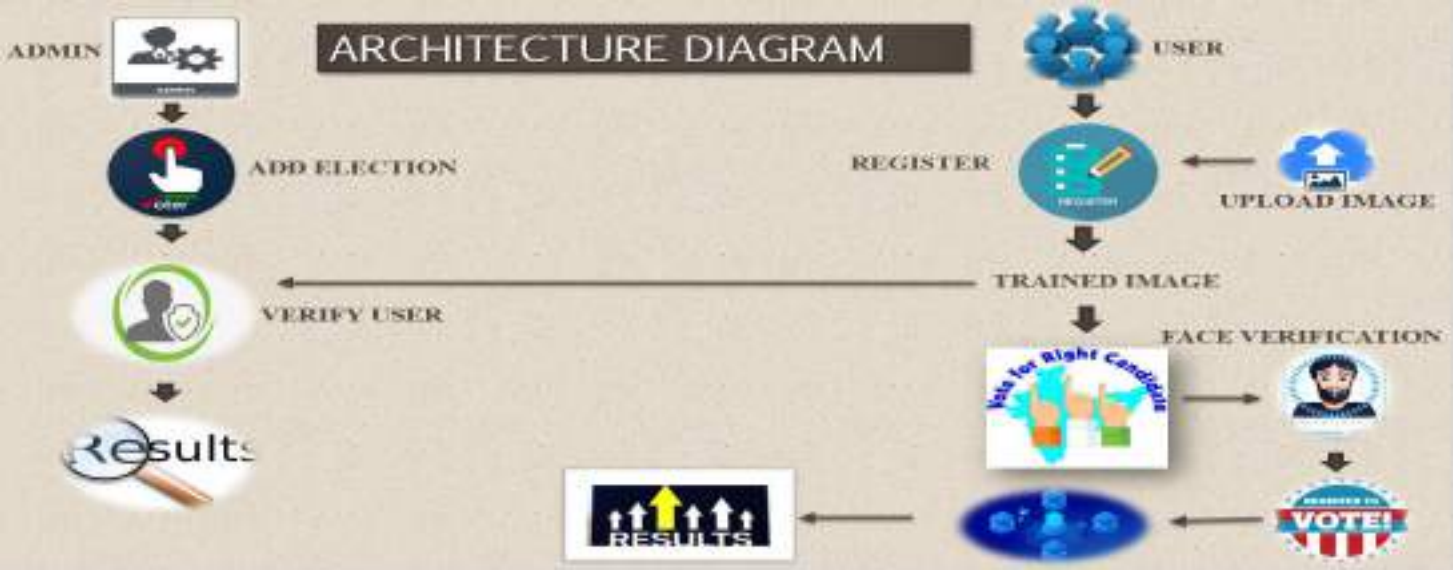


FIG 5.1 ARCHITECTURE DIAGRAM OF BLOCKCHAIN-BASED E-VOTING SYSTEM

5.2 MODULE DESIGN SPECIFICATION

MODULES LIST

- User Registration & Trained Voter Face
- Create Election
- Voting
- Publish Result

5.2.1 USER REGISTRATION & TRAINED VOTER FACE:

User should register in our website *(User Voting Page Way)* Block chain as an initial step with their mobile name, email, aadhar id, Voter id , image Area, Block chain Address contact number to which an unique *USER-ID* register. Users who are all registered in this portal are also considered as voter. The voter image convert to trained image After registering successfully the admin verify the voter details, after user can login into their profile using their *USER-ID* and their registered password.

5.2.1.1 ADMIN

Admin Login page with default user name and password. Admin can accept or reject an voter request by verifying the user detail and also admin can register another admin. User has to scan his aadhar card for verification process. After scanning he should enter his detail and send an request to the admin if the account get rejected due to some reason he will be intimated to register again by admin.

5.2.2 CREATE ELECTION

The Admin can create an election with election type and election constituency. All the election gets triggered at the given date and time. And Verified user has to login and scan his Block chain Address if election and user constituency matches user can view Election details. And Block chain Address. To create Nominated account in block chain.

5.2.3 VOTING

Voters must have access to any web browser to take part in voting. The voter's interface would be provided in English language to make it easy to use for all users. The proposed system can contain a large number of voters at the time of voting. A decentralized block chain system enables a voter to vote from any part of the world. A person can take part in voting from anywhere, even if he is in a foreign country, in this way his/her computerized National ID is verified from the national database so he can cast the vote. User has to face his registered finger during his registration process. In voting page voter has to scan his face if the User Face matches with registered Face , voter can cast his or her vote to the right candidate Source KNN an algorithm for recognition of human face is used to compare two Face. Voting transactions are sent to a pool from which miners analyze them and remove the malicious request by taking the consensus from the other nodes before adding it to the chain. The votes are fully secured using a cryptographic hash. Each vote cast adds a new block in the chain. When the transaction completes and a node is successfully added to Vote Chain, the voter of that particular voting transaction is notified through an SMS to his registered email. The voter has provided with a unique transaction hash by which he can verify his vote through a web portal and upon successfully completion of transaction the vote has been counted in the whole voting activity.

5.2.4 PUBLISH RESULT

Smart contracts are providing a secure connection between the user and the network while executing a transaction in the chain. These are the rules that are implemented on the entire Blockchain and cannot be neglected under any condition. All the nodes have to follow the smart contracts to save the vote in the system successfully. When a user completes his or her voting process votes are stored in Blockchain. So the voter can trust his votes stored in blockchain cannot be changed. Users can view his or her vote in a pie chart retrieved from blockchain.SHA256 algorithm has been used to hash the data. Admin Can publish the result of each constituency after the election process is fully completed.

5.3 SHA-256 ALGORITHM

SHA-256 is mainly used for encrypting votes and validating the blockchain in a blockchain-based electronic voting system with face recognition.A voter's choice is encrypted with SHA-256 before being recorded on the blockchain. In order to do this, a special hash for the vote must be created. This hash is then used to encode the vote. After that, the hash and the encrypted ballot are both written to the blockchain.The facial recognition information for each voter is also encrypted with SHA-256 and kept on the blockchain. The encrypted data kept on the blockchain is compared to the face recognition data of the voter when they try to cast a ballot. The voter is verified and given permission to vote if the data agree. SHA-256 is also used to confirm the accuracy of each block's data. Any tampering with one block will be immediately detected by the system because each block includes a hash of the previous block in the chain. The system rejects a block if its hash differs from the preceding block's hash. Digital Each ballot is digitally signed using the SHA-256 algorithm. In doing so, the system is able to confirm that each vote was submitted by a legitimate voter and was not tampered with. The ballot is encrypted with SHA-256 and the voter's private key to produce the digital signature.In general, SHA-256 is essential to a blockchain-based face-recognition e-voting system. It ensures that the blockchain is functioning as designed and offers a high level of security and encryption for votes. The system can offer a safe and transparent voting process by using SHA-256 to encrypt votes and facial recognition data.

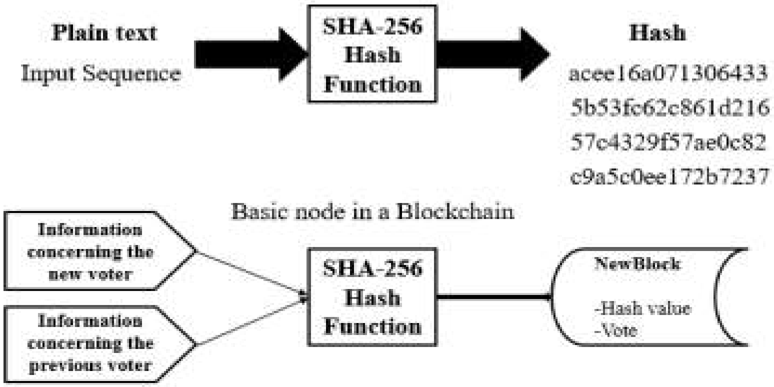


FIG 5.4.1 WORKING OF SH-A256 ALGORITHM

5.4 K-NEAREST NEIGHBOURS(KNN) ALGORITHM

Using face recognition for voter authentication, blockchain-based electronic voting systems can use the KNN (K-Nearest Neighbors) algorithm, a form of machine learning algorithm.Voter registration involves the collection and database storage of each voter's facial recognition information. This information might consist of particulars like the separation between the eyes, the facial structure, and other distinguishing traits.Using the KNN algorithm, a voter's face recognition data is compared with the data stored in the database when they try to cast a ballot. In order to find the k-nearest neighbours of the new data, the method measures the distance between the new data and the data already present in the database. The voter is regarded as authenticated and qualified to cast their vote if the difference between the new data and the existing data is within a predetermined threshold. The system may refuse the vote and rule it invalid if it is too far from any of the k-nearest neighbours.Overall, KNN can be used in a blockchain-based electronic voting system with facial recognition to authenticate voters and guarantee that only qualified voters are able to cast their ballots. The system can use the KNN algorithm to precisely determine whether a voter is who they say they are by comparing the voter's facial recognition data to the data kept in the database.

The KNN algorithm work

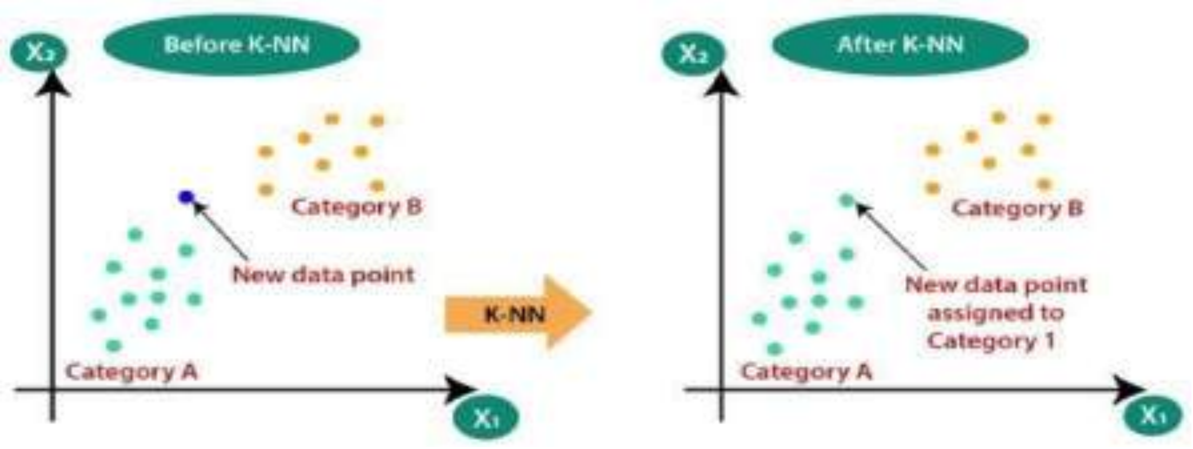


FIG 5.2.2 WORKING OF KNN ALGORITHM

The Euclidean distance formula is the primary formula utilised by the KNN algorithm to determine the distance between a new face (the face given by the voter) and the known faces. (digital identities of the registered voters). The following is the algorithm for the Euclidean distance:

d(x, y) = sqrt((x1 - y1)2, (x2 - y2)2,... + (xn - yn)2) where d is the distance between a new face (x) and

a known face (y), x1, x2,..., xn are the features of the new face, and y1, y2,..., yn are the characteristics of the known face.

The KNN algorithm calculates the distance between the new face and each of the existing features inorder to categorise it. The class label of the new face is then decided by taking the majority class label of these K-nearest neighbors, where K is the number of neighbors, and N is the number of known faces. The KNN algorithm would use the Euclidean distance formula in the context of the blockchain- based electronic voting system with facial recognition technology to match the voter's face with their registered digital identity on the blockchain. The algorithm would identify the K-nearest digital identities to the presented face, categorise the face, and use this data to verify the voter's identity. The amount of neighbours K that are used in the classification process determines how accurate the KNN algorithm is. In general, the classification is more accurate the greater the value of K. A very high number of K, however, might lead to overgeneralization and reduced accuracy. The KNN algorithm's precision is essential in the context of the e-voting system to guarantee that only eligible voters are permitted to submit their votes.

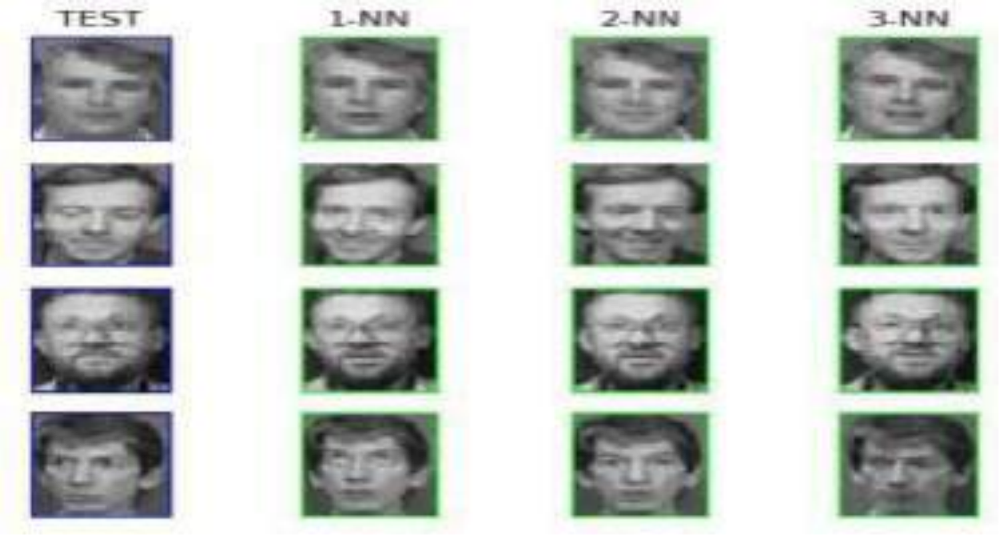


FIG 5.2.3 ASSESSING THE KNN ALGORITHM ACCURACY

The amount of training data points and the number of data dimensions affect the KNN algorithm's computational time. An rise in the number of registered voters would result in a longer computational time for the algorithm used for face identification. The training error rate and the validation error rate are two parameters we need toaccess on different K-value. Following is the curve for the training error rate with varying value of K:

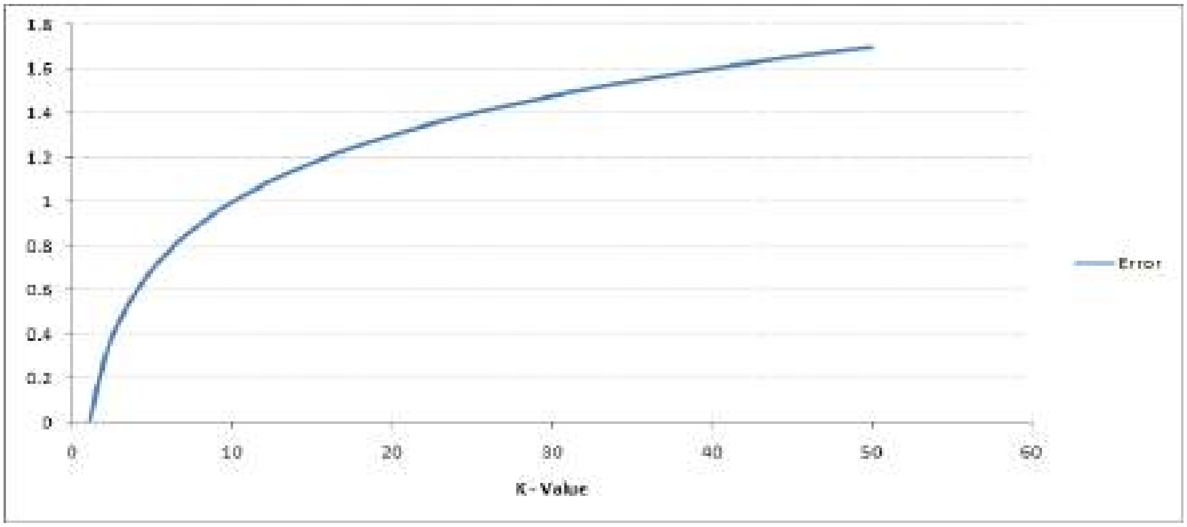


FIG 5.2.4 RELATIONSHIP BETWEEN TRAINING RATE WITH K-VALUE

As you can see, the error rate at K=1 is always zero for the training sample. This is because the closest point to any training data point is itself. Hence the prediction is always accurate with K=1. If validation error curve would have been similar, our choice of K would have been 1. Following is the validation error curve with varying value of K:

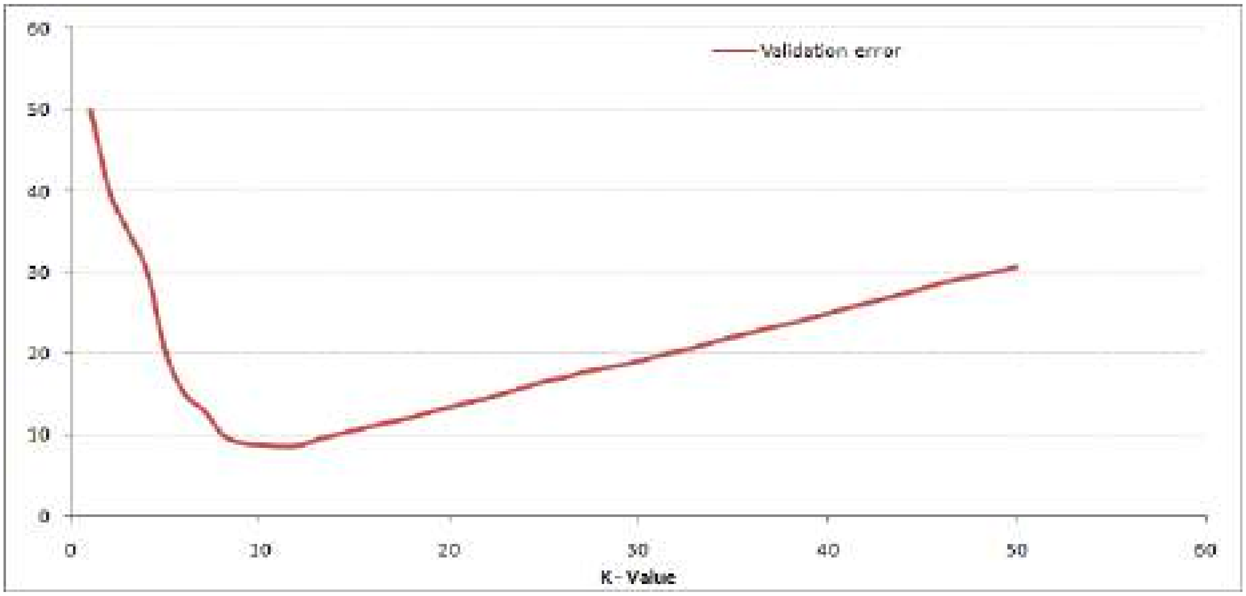


FIG 5.2.5 RELATIONSHIP BETWEEN VALIDATION ERROR WITH K-VALUE

At K=1, we were over fitting the boundaries. Hence, error rate initially decreases and reaches a minimal.After the minima point, it then increases with increasing K. To get the optimal value of K, you can segregate the training and validation from the initial dataset. Now plot the validation error curve to get the optimal value of K. This value of K should be used for all predictions. KNN algorithm is one of the simplest classification algorithms. Even with such simplicity, it can give highly competitive results. KNN algorithm can also be used for regression problems. The only difference from the discussed methodology will be using averages of nearest neighbors rather than voting from nearest neighbors.

6 SYSTEM IMPLEMENTATION

6.1 CODING

```
<?PHP
require "util.php";
//session_start();


/*
$image;
$aadhar;
$name;
$mobile;
$dob;
$check;
$number;
$status="Pending";
$password;
$error = Array();
if(isset($_POST['submit'])){
   //$image=$_POST['vimage'];
          $img = $_POST['image'];
   $aadhar=$_POST['vaadhar'];
   $name=$_POST['vname'];
   $id=$_POST['vid'];
   $dob=$_POST['dob'];
   //$fpstr=$_POST['b64img'];
   $area=$_POST['area'];
        $password = $_POST['password'];
        //$email = $_POST['email'];
   $check = strlen($aadhar);
        $ids = strlen($id);
        $baddress = $_POST['baddress'];


//    echo "SASDASD ";
  // echo "image".$img;
   //echo $name==="";
   if(!isset($img) || $img==''){
    //   echo "Says";
      $error['image']='Please Upload an image';
   }
   if(!isset($aadhar) || $aadhar=='' ){
      $error['aadhar']='Please Enter the Aadhar Id';
   }
         if(!isset($password) || $password=='' ){
      $error['password']='Please Enter the pssword';
   }
        $email = $_POST["email"];
        if (!filter_var($email, FILTER_VALIDATE_EMAIL)) {
        $emailErr = "Invalid email format";
        }
         if($check<12 || $check>12 || !is_numeric($aadhar)){
```

```
        $error['aadhar']='Please Enter valid 12 Digit Aadhar Id';

    }

          if($ids>10 || $ids<10 || !is_numeric($id)){

                    $error['id']='Plese Enter valid 10 Digit Voter Id';

          }

    if(!isset($name) || $name==" ){

        $error['name']='Please Enter the name';

    }

      if(!isset($id) || $id==" ){

        $error['id']='Please Enter the Voter ID';

    }

    if($dob<18)

    {

     $error['dob']='18 plus aged people are only eligible for elections';


    }

           if(!isset($baddress) || $baddress==" ){

        $error['id']='Please Enter the Blockchain Address';

    }


/**********************************/


 /*   $folderPath = "voterImages/";


    $image_parts = explode(";base64,", $img);
    $image_type_aux = explode("image/", $image_parts[0]);


    $image_type = $image_type_aux[1];


    $image_base64 = base64_decode($image_parts[1]);


    $fileName = uniqid() . '.png';


    $file = $folderPath . $fileName;


    file_put_contents($file, $image_base64);


    if(sizeof($error)==0)
    {
                $fingerimage="d16e7d9f1e1c68c49b30c9364d3e0b23.png";


        $sql="insert into voterinfo
(vimage,vaadhar,vname,password,email,vid,dob,area,status,finger,baddress)"
            .
"values('".$fileName."','".$aadhar."','".$name."','".$password."','".$email."','".$id."','".$dob."','$are
a','".$status."','".$fingerimage."','".$baddress."')";
                        header('Location: '.'./voters.php');


      if($db->query($sql)){
                $success="Voter Added Successfully ...Waiting for Approval";
```

```
         }
      else{
          $er = $db->error;
          //echo $er;
           unlink($fpath);
          unlink( $target_path);
          if(strpos($er, 'key 3') !== false){
              $error['ER_EM']='Voter id already registered';
          }
          elseif ((strpos($er, 'key 2') !== false)) {
           $error['ER_EM']='Aadhar id already registered';
      }
      else{
          $error['ER_EM']=$er;;
      }


       }
    }
    }
    else{
        $error=[];
    }
*/
?>
<!DOCTYPE HTML>
```

```
<html>
<head>
<title>Election a Society and People Category </title>
<!-- for-mobile-apps -->
<meta name="viewport" content="width=device-width, initial-scale=1">
<meta http-equiv="Content-Type" content="text/html; charset=utf-8" />
<script src="https://ajax.googleapis.com/ajax/libs/jquery/2.1.1/jquery.min.js"></script>
<script type="application/x-javascript"> addEventListener("load", function() {
setTimeout(hideURLbar, 0); }, false);
function hideURLbar(){ window.scrollTo(0,1); } </script>
<!-- //for-mobile-apps -->
<link href="assets/css/bootstrap.css" rel='stylesheet' type='text/css' />
<!--<link
href='//fonts.googleapis.com/css?family=Raleway:400,100,200,300,500,600,700,800,900'
rel='stylesheet' type='text/css'>-->
<!--<link
href='//fonts.googleapis.com/css?family=Open+Sans:400,300,300italic,400italic,600,600italic,70
0,700italic,800,800italic' rel='stylesheet' type='text/css'>-->
<link rel="stylesheet" type="text/css" href="assets/css/style.css">
<!---strat-slider---->
<!--script type="text/javascript" src="assets/js/jquery-1.11.1.min.js"></script-->
<script src="https://code.jquery.com/jquery-2.2.4.min.js" integrity="sha256-
BbhdlvQf/xTY9gja0Dq3HiwQF8LaCRTXxZKRutelT44=" crossorigin="anonymous"></script>
<!---//-slider---->
<!--script type="text/javascript" src="assets/js/adapter.min.js"></script>
<script type="text/javascript" src="assets/js/vue.min.js"></script>
<script type="text/javascript" src="assets/js/instascan.min.js"></script-->
```

```
<script src="https://cdnjs.cloudflare.com/ajax/libs/webcamjs/1.0.25/webcam.min.js"></script>


<script src="https://cdnjs.cloudflare.com/ajax/libs/web3/1.8.1/web3.min.js"></script>

<script src="https://cdn.jsdelivr.net/npm/truffle-contract@4.0.16/dist/truffle-contract.js"></script>


<script src="mfs100-9.0.2.6.js"></script>

<script type="text/javascript" src="config.js"></script>



<script language="javascript" type="text/javascript">

var datauri="";

    function processResult(str){

    //alert(str);

    $xmlDoc = $.parseXML( str );


  uid = $xmlDoc.children[0].getAttribute('uid');

  $("#aid").val(uid);

  uid = $xmlDoc.children[0].getAttribute('name');

  $("#vname").val(uid);

  uid = $xmlDoc.children[0].getAttribute('dob');

  var parts =uid.split('/');

  var mydate = new Date(parts[2], parts[1] - 1, parts[0]);

  $("#dob").val(mydate);

  }
```

```
 </script>

<script>
   var _MS_PER_DAY = 1000 * 60 * 60 * 24;
function chkForm(){
   var a    = new Date();
   dateStr = document.getElementById("dob").value;

   b =new Date(dateStr);
   //alert(b);
//var b    = new Date("2017-07-25");
var remainingDays    = dateDiffInDays(b, a);
if(remainingDays<6570){
   alert("Age should be above 18 yrs");
   return false;
}
return true;
}

function dateDiffInDays(a, b) {
  // Discard the time and time-zone information.
  var utc1 = Date.UTC(a.getFullYear(), a.getMonth(), a.getDate());
  var utc2 = Date.UTC(b.getFullYear(), b.getMonth(), b.getDate());

  return Math.floor((utc2 - utc1) / _MS_PER_DAY);
}
</script>


</head>
<body>
<!-- header -->
    <div class="header_bg">
        <div class="container">
            <!-----start-header----->
            <div class="header">
                <div class="logo">
                <!--    <a href="#"><img src="images/logo.png" alt=" " /></a> -->
                </div>
                <nav class="navbar navbar-default">
                    <!-- Brand and toggle get grouped for better mobile display -->
                    <div class="navbar-header">
                      <button type="button" class="navbar-toggle collapsed" data-toggle="collapse" data-target="#bs-example-navbar-collapse-1">
                        <span class="sr-only">Toggle navigation</span>
                        <span class="icon-bar"></span>
                        <span class="icon-bar"></span>
                        <span class="icon-bar"></span>
                      </button>
                    </div>
```

```
                        <!-- Collect the nav links, forms, and other content for
toggling -->
                    <div class="collapse navbar-collapse nav-wil" id="bs-example-
navbar-collapse-1">
                        <ul class="nav navbar-nav">

                      <li ><a href="index.php">Home</a></li>
                      <!--<li><a href="admin.php">Login</a></li>-->
                      <li><a href="voting.php">Voting</a></li>
                                                                                    <li><a
href="user.php">User Login</a></li>
                                                                                    <li
class="act"><a href="voters.php">User Register</a></li>
                      <li><a href="results.php">Results</a></li>


                        </ul>
                    </div><!-- /.navbar-collapse -->


                </nav>
            </div>
        </div>
    </div>
    <div class="header_bottom">
    </div>
<!-- //end-header -->
<!-- banner1 -->
```

```
<!-- //banner1 -->

<!--typography-page -->

        <div class="typo">

        <form action="#" method="post" id="myform" onsubmit="return chkForm();"
enctype="multipart/form-data">

                <div class="container">

                        <h3 class="title">Welcome for Online Voting</h3>

                        <p class="nihil">Vote For Real Government.</p>

                        <div class="grid_3 grid_4">

                                <h3 class="hdg">Voter Citizen Details</h3>

                                <div id="response" class="alert alert-danger collapse" role="alert">

                                </div>

                                <div id="success" class="alert alert-success collapse" role="alert">

                                </div>

                                <div class="bs-example" style="width:50%;float:left">


                                        <table class="table">




                                                <tbody>

                                        <tr>

                                          <td>

                                            <!--?php

                                            foreach ($error as $value) {

                                              echo "<span style='color:red'>$value</span><br/>";
```

```
                                                }

                                                ?>

<!--?php

                                                foreach ($success as $value) {

                                                   echo "<span style='color:green'>$value</span><br/>";

                                                }

                                                ?-->

                                             </td>

                                            </tr>

                                                 <tr>

                                         <td><h4 id="h4.-bootstrap-heading"><b>Voter
Image</b></h4><br/><input type="file" name="vimage" onchange="previewFile()"
style="border: none; border-bottom: 2px solid steelblue;width: 80%;height:50px" /></td>


                                            </tr>



                                                         <tr>

                                                <td><h4 id="h4.-bootstrap-heading"><b>Voter Adhar
Number</b></h4><input type="text" name="vaadhar" id="aid" style="border: none; border-
bottom: 2px solid steelblue;width: 80%;height:50px" value="<?php echo  isset($aadhar) ?
$aadhar:"" ?>"/></td>

                                                         </tr>

                                                         <tr>

                                                <td><h4 id="h4.-bootstrap-heading"><b>Voter
Name</b></h4><input type="text" name="vname"  id="vname" style="border: none; border-
bottom: 2px solid steelblue;width: 80%;height:50px"  value="<?php echo isset($name)? $name :
"" ?>"/></td>
```

```
                            </tr>
                                <tr>
                        <td><h4 id="h4.-bootstrap-heading"><b>Voter Password</b></h4><input type="password" name="password"  id="passwrd" style="border: none; border-bottom: 2px solid steelblue;width: 80%;height:50px"  value="<?php echo isset($password)? $password : "" ?>"/></td>
                            </tr>
                            <tr>
                        <td><h4 id="h4.-bootstrap-heading"><b>Voter Email</b></h4><input type="text" name="email"  id="email" style="border: none; border-bottom: 2px solid steelblue;width: 80%;height:50px"  value="<?php echo isset($email)? $email : "" ?>"/></td>
                            </tr>
                            <tr>
                        <td><h4 id="h4.-bootstrap-heading"><b>Voter Id</b></h4><input type="text" name="vid" style="border: none; border-bottom: 2px solid steelblue;width: 80%;height:50px" value="<?php echo isset($id)?$id:"" ?>"/></td>
                            </tr>
                            <tr>
                        <td><h4 id="h4.-bootstrap-heading"><b>Area</b></h4>
                        <select name="area" id="subtype" style="border: none; border-bottom: 2px solid steelblue;width: 80%;height:50px" required>
                            <option>-------CHOOSE HERE-------</option>
                      <?php


$sql="select distinct area from constituency";
$ret = $db->query($sql);
//echo $sql;
```

```
while($row = $ret->fetch_assoc()) {
echo  "<option value=\"".$row['area']."\">".$row['area']."</option>";
}
                                  ?>
                                        <!--option value="Alandur">By Election</option-->
                                            </select>
                 </td>
                                            </tr>
                                            <tr>
                 <td><h4 id="h4.-bootstrap-heading"><b>Voter Date Of Birth</h4><input
type="date" name="dob"  id="dob" data-date-inline-picker="true" style="border: none; border-
bottom: 2px solid steelblue;width: 80%;height:50px"  value="<?php echo isset($dob)?$dob:""
?>"/></td>
                                            </tr>
                                            <tr>
                 <td><h4 id="h4.-bootstrap-heading"><b>Blockchain Address</b></h4><input
type="text" name="baddress" style="border: none; border-bottom: 2px solid steelblue;width:
80%;height:50px" value="<?php echo isset($baddress)? $baddress : "" ?>"/></td>
                                            </tr>


                                     </tbody>
                               </table>
                         </div>
                   <div lass="grid_3 grid_5" style="width:40%;float:right" tyle="margin-left:
770px;float: left;margin-top: -260px">
       <div id="app" style="width:100px">
       <section class="cameras">
```

```
                 <h3>Cameras</h3>
                     <div id="my_camera"></div>
                     <div id="container">
                          <!--video width="200" height="200" autoplay="true" id="video">
                          </video-->
                          <!--input type=button value="Take Snapshot"
onClick="take_snapshot()"-->
                          <input type="button" id="btnCapture" value="Capture" class="
capturebuttonpadding btn btn-primary btn-lg submit_buttom_padding"
onClick="take_snapshot()" style="margin-top:20px"/>
                          <input type="hidden" name="image" class="image-tag">
                          </div>
                          <br> </br>
                          <img id="blah" alt="your photo here" src="assets/images/no-
image.webp" width="250" height="250" /><br/><br/>


    </section>


    </div>
          </div>
    </div>




    <p class="one"><input type="button" id="submit" name="submit" value=" ADD VOTER
DETAILS" style="background-color:steelblue;color:white ;height: 50px;width: 100%;border: 2px
solid steelblue;"></p>
```

```
                </div>
                </form>                                     <!-- /.row -->

                </div>

<!-- footer -->



<!-- //footer -->
                <!-- scroll_top_btn -->
                <script type="text/javascript" src="assets/js/move-top.js"></script>
                <script type="text/javascript" src="assets/js/easing.js"></script>
            <script type="text/javascript">
                        $(document).ready(function() {
                                //$("#success").toggleClass("hidden");
                                //$("#response").toggleClass("hidden");
                                var defaults = {
                                        containerID: 'toTop', // fading element id
                                        containerHoverID: 'toTopHover', // fading element hover id
                                        scrollSpeed: 1200,
                                        easingType: 'linear'
                                };

                                $().UItoTop({ easingType: 'easeOutQuart' });
                        });
</script>
<script>

$('#submit').click(function(event){
        //$("#success").toggleClass("hidden");
        //$("#response").toggleClass("hidden");
        event.preventDefault();
      var myFormData = new FormData($(this).parents('form')[0]);

                 $("response").empty();
                jQuery('#response').html(");
                $.ajax({
      url: 'addvoter.php',
      type: 'POST',
      processData: false, // important
      contentType: false, // important
                datatype : "application/json",
                //contentType: "text/plain"
      data: myFormData,success: function(result)
      {

           res = $.parseJSON(result);
                          console.log(res);
console.log(res['stat']);
 //$("response").empty();
if (res['stat']==true)
{
        Addvoterface();
        console.log("inside true");
        //  $("#success").toggleClass("hidden");
              // $("#response").toggleClass("hidden");

              $('#response').hide();
              $('#success').show();

      //var element = document.getElementById("response");
      //element.style.color = "#008000";

      for (var i in res) {
        if (i !='stat')
        {
              $("#success").append(res[i]+ " "+"<br/>");
        }
              }
      $('#myform')[0].reset();
      //$(this).closest('myform').find("input[type=text], textarea").val("");

}
```

```
            else{
                  /*if ($("success").is(":hidden")) {}
                      else{
                   $("#success").toggleClass("hidden");
                  }*/
                  //if ($("response").is(":hidden")) {

                  // $("#response").toggleClass("hidden");
                  //}
                   $('#response').show();
                      $('#success').hide();
                      //var element = document.getElementById("response");
                      //element.style.color = "#FF0000";
            for (var i in res) {
                  if (i !='stat')
                  {
                      //$("#response").append(i+ ":" + res[i]+ " "+"<br/>");
                      $("#response").append(res[i]+ " "+"<br/>");
                  }


                }


                }


}
```

```
        });

});

function Addvoterface()
{

                    var vname=document.getElementById("vname").value;
                    var email=document.getElementById("email").value;

                    var form = new FormData();
                    //var blob = dataURItoBlob(datauri)
                    file = dataURLtoFile(datauri, "verify.png");
                    form.append("name", vname);
                    form.append("email", email);
                    form.append("file", file);

                var settings = {
                            "url": "http://localhost:5001/register",
                            "method": "POST",
                            "timeout": 0,
                            "processData": false,
                            "mimeType": "multipart/form-data",
                            "contentType": false,
                            "data": form
                    };


                    $.ajax(settings).done(function(response) {
                        console.log("---py-res---"+response);


                    });
}


    function dataURLtoFile(dataurl, filename) {


        var arr = dataurl.split(','), mime = arr[0].match(/:(.*?);/)[1], bstr = atob(arr[1]), n =
bstr.length, u8arr = new Uint8Array(
                    n);


        while (n--) {
            u8arr[n] = bstr.charCodeAt(n);
        }


        return new File([ u8arr ], filename, {
            type : mime
        });
    }
</script>
<script>
```

```
}



    Webcam.set({

        width: 250,

        height: 250,

        image_format: 'jpeg',

        jpeg_quality: 90

    });

    Webcam.attach( '#my_camera' );

          function take_snapshot() {

        Webcam.snap( function(data_uri) {


            $(".image-tag").val(data_uri);
            datauri=data_uri;
                               document.getElementById('blah').src=data_uri;
        } );
}
```

```
//load file input image as base64 to img for preview
function previewFile() {
  const preview = document.querySelector('img');
  const file = document.querySelector('input[type=file]').files[0];
  const reader = new FileReader();

  reader.addEventListener("load", () => {
    // convert image file to base64 string
    preview.src = reader.result;
          $(".image-tag").val(reader.result);
          datauri=reader.result;
  }, false);
   if (file) {
    reader.readAsDataURL(file);
  }
}
</script>
                     <a href="#" id="toTop" style="display: block;"><span id="toTopHover"
style="opacity: 1;"></span></a>
                    <!--end scroll_top_btn -->
<!-- for bootstrap working -->
           <script type="text/javascript" src="assets/js/bootstrap-3.1.1.min.js"></script>
<!-- //for bootstrap working -->
</body>
 </html>
```

7. SYSTEM TESTING

7.1 UNIT TESTING

Unit testing is conducted to verify the functional performance of each modular component of the software. Unit testing focuses on the smallest unit of the software design (i.e.), the module. The white-box testing techniques were heavily employed for unit testing.

7.1.1 FUNCTIONAL TEST

Functional test cases involved exercising the code with nominal input values for which the expected results are known, as well as boundary values and special values, such as logically related inputs, files of identical elements, and empty files.

Three types of tests in Functional test:

- Performance Test
- Stress Test
- Structure Test

7.1.2 PERFORMANCE TEST

It determines the amount of execution time spent in various parts of the unit, program throughput, and response time and device utilization by the program unit.

7.1.3 STRESS TEST

Stress Test is those test designed to intentionally break the unit. A Great deal can be learned about the strength and limitations of a program by examining the manner in which a programmer in which a program unit breaks.

7.1.4 STRUCTURED TEST

Structure Tests are concerned with exercising the internal logic of a program and traversing particular execution paths. The way in which White-Box test strategy was employed to ensure that the test cases could Guarantee that all independent paths within a module have been have been exercised at least once.

- Exercise all logical decisions on their true or false sides.
- Execute all loops at their boundaries and within their operational bounds.
- Exercise internal data structures to assure their validity.
- Checking attributes for their correctness.
- Handling end of file condition, I/O errors, buffer problems and textual errors in output information

7.1.5 INTEGRATION TESTING

Integration testing is a systematic technique for construction the program structure while at the same time conducting tests to uncover errors associated with interfacing. i.e., integration testing is the complete testing of the set of modules which makes up the product. The objective is to take untested modules and build a program structure tester should identify critical modules. Critical modules should be tested as early as possible. One approach is to wait until all the units have passed testing, and then combine them and then tested. This approach is evolved from unstructured testing of small programs. Another strategy is to construct the product in increments of tested units. A small set of modules are integrated together and tested, to which another module is added and tested in combination. And so on. The advantages of this approach are that, interface dispenses can be easily found and corrected.The major error that was faced during the project is linking error. When all the modules are combined the link is not set properly with all support files. Then we checked out for interconnection and the links. Errors are localized to the new module and its intercommunications. The product development can be staged, and modules integrated in as they complete unit testing. Testing is completed when the last module is integrated and tested.

7.2 TESTING TECHNIQUES / TESTING STRATEGIES

7.2.1 TESTING

Testing is a process of executing a program with the intent of finding an error. A good test case is one that has a high probability of finding an as-yet –undiscovered error. A successful test is one that uncovers an as-yet-undiscovered error. System testing is the stage of implementation, which is aimed at ensuring that the system works accurately and efficiently as expected before live operation commences. It verifies that the whole set of programs hang together. System testing requires a test consists of several key activities and steps for run program, string, system and is important in adopting a successful new system. This is the last chance to detect and correct errors before the system is installed for user acceptance testing.The software testing process commences once the program is created and the documentation and related data structures are designed. Software testing is essential for correcting errors. Otherwise the program or the project is not said to be complete. Software testing is the critical element of software quality assurance and represents the ultimate the review of specification design and coding. Testing is the process of executing the program with the intent of finding the error. A good test case design is one that as a probability of finding an yet undiscovered error. A successful test is one that uncovers an yet undiscovered error. Any engineering product can be tested in one of the two ways:

7.2.1.1 WHITE BOX TESTING

This testing is also called as Glass box testing. In this testing, by knowing the specific functions that a product has been design to perform test can be conducted that demonstrate each function is fully operational at the same time searching for errors in each function. It is a test case design method that uses the control structure of the procedural design to derive test cases. Basis path testing is a white box testing.

Basis path testing:

- Flow graph notation
- Cyclometric complexity
- Deriving test cases
- Graph matrices Control

7.2.1.2 BLACK BOX TESTING

In this testing by knowing the internal operation of a product, test can be conducted to ensure that “all gears mesh”, that is the internal operation performs according to specification and all internal components have been adequately exercised. It fundamentally focuses on the functional requirements of the software.

The steps involved in black box test case design are:

- Graph based testing methods
- Equivalence partitioning
- Boundary value analysis

- Comparison testing

7.2.2 SOFTWARE TESTING STRATEGIES:

A software testing strategy provides a road map for the software developer. Testing is a set activity that can be planned in advance and conducted systematically. For this reason a template for software testing a set of steps into which we can place specific test case design methods should be strategy should have the following characteristics:

- Testing begins at the module level and works “outward” toward the integration of the entire computer based system.
- Different testing techniques are appropriate at different points in time.
- The developer of the software and an independent test group conducts testing.
- Testing and Debugging are different activities but debugging must be accommodated in any testing strategy.

7.2.2.2 PROGRAM TESTING:

The logical and syntax errors have been pointed out by program testing. A syntax error is an error in a program statement that in violates one or more rules of the language in which it is written. An improperly defined field dimension or omitted keywords are common syntax error. These errors are shown through error messages generated by the computer. A logic error on the other hand deals with the incorrect data fields, out-off-range items and invalid combinations. Since the compiler s will not deduct logical error, the programmer must examine the output. Condition testing exercises the logical conditions contained in a module. The possible types of elements in a condition include a Boolean operator, Boolean variable, a pair of Boolean parentheses A relational operator or on arithmetic expression. Condition testing method focuses on testing each condition in the program the purpose of condition test is to deduct not only errors in the condition of a program but also other a errors in the program.

7.2.2.3 SECURITY TESTING

Security testing attempts to verify the protection mechanisms built in to a system well, in fact, protect it from improper penetration. The system security must be tested for invulnerability from frontal attack must also be tested for invulnerability from rear attack. During security, the tester places the role of individual who desires to penetrate system.

7.2.2.4 VALIDATION TESTING

At the culmination of integration testing, software is completely assembled as a package. Interfacing errors have been uncovered and corrected and a final series of software test-validation testing begins. Validation testing can be defined in many ways, but a simple definition is that validation succeeds when the software functions in manner that is reasonably expected by the customer. Software validation is achieved through a series of black box tests that demonstrate conformity with requirement. After validation test has been conducted, one of two conditions exists.

* The function or performance characteristics confirm to specifications and are accepted.
* A validation from specification is uncovered and a deficiency created.

Deviation or errors discovered at this step in this project is corrected prior to completion of the project with the help of the user by negotiating to establish a method for resolving deficiencies. Thus the proposed system under consideration has been tested by using validation testing and found to be working satisfactorily. Though there were deficiencies in the system they were not catastrophic

7.2.2.5 USER ACCEPTANCE TESTING

User acceptance of the system is key factor for the success of any system. The system under consideration is tested for user acceptance by constantly keeping in touch with prospective system and user at the time of developing and making changes whenever required. This is done in regarding to the following points.

- Input screen design.
- Output screen design.

7.3 TEST CASES

TEST CODE	TEST CASE	INPUT	STEPS	OUTPUT	PASS/FAIL
1.	Verification of voter identity	Voter's face image and personal information	1. Enter the voter's personal information into the e-voting system. 2. Submit the voter's face image for verification. 3. Check if the voter's identity is confirmed. 4. Verify that only eligible voters are allowed to vote.	Whether the voter is authenticated and eligible to vote	PASS

2.	Casting a vote	Voter's choice of candidate or proposal	1. Display the options available for the voter to choose from 2. Allow the voter to select their preferred candidate or proposal 3 Record the voter's choice on the blockchain 4. Verify that the vote is successfully recorded and cannot be tampered with	The vote is recorded on the blockchain	PASS
3.	Counting votes	The recorded votes on the blockchain	1. Retrieve all the recorded votes from the blockchain. 2. Count the number of votes for each candidate or proposal. 3. Calculate the total number of votes cast in the election. 4. Declare the winner or result based on the counting.	The final election results	PASS
4.	Security and privacy	Various attempts to hack the system or access personal	1. Attempt to hack the e-voting system using various methods (e.g., brute-force attack, injection attack, etc.) 2. Verify that the system remains secure and cannot be breached 3. Attempt to access personal information of voters without proper authorization 4. Verify that the system	The system remains secure and private	PASS

		information	maintains the privacy and confidentiality of voters' personal information.		

FIG 7.3 TEST CASES

8. CONCLUSION

8.1 RESULT & DISCUSSION

If correctly implemented, blockchain voting can increase voter turnout and provide more transparent and accessible elections. After finishing identity verification, voters can simply cast their ballots using personal computers or mobile devices. Vote tallying is conveniently verified in real-time on the network, and voting records are simple to verify. Voting on blockchains saves time, lowers expenses, and paves the way for direct democracy. Blockchain polling is not yet functional, though. Votes submitted using a blockchain-based voting system aren't completely anonymous because participants can provide evidence of their voting behaviour by examining the transaction data. Denial-of-service attacks can prevent voters from casting their ballots in a timely manner by exploiting this form of voting system. Without jeopardising their own anonymity, voters can use the platform's blockchain technology to confirm that their votes are accurately recorded and that they are being properly counted. if you want to make sure the system is secure, you should let independent organisations that watch the voting process check the codes and the vote-counting process. Our suggested architecture may be vulnerable to a 51% attack. The idea behind the attack was that someone could potentially have complete control over the hash rate for digital voting, which would allow them to alter the public ledger. Due to the high cost of purchasing hardware capable of this level of processing, the likelihood of this kind of assault happening is extremely remote.

8.2 CONCLUSION AND FUTURE ENHANCEMENTS

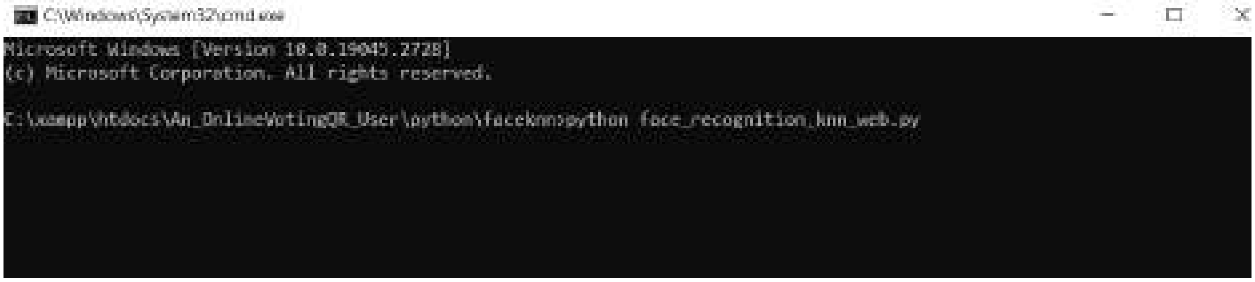
The purpose of proposing a block chain-based solution for the voting system was to build trust between government and voters to make-believe that their voting integrity is kept safe. The blockchain-based voting is also make the voting process transparent and trustworthy. Our proposal enables a voter to cast his/her vote through internet without going to voting booth and additionally registering himself/herself for voting in advance, proxy vote or double voting is not possible, fast to access, highly secure, easy to maintain all information of voting, highly efficient and flexible. Hence, by this voting percentage will increase drastically. The using of online voting has the capability to reduce or remove unwanted human errors. In addition to its reliability, online voting can handle multiple modalities, and provide better scalability for large elections. Online voting is also an excellent mechanism that does not require the geographical proximity of the voters. For example, soldiers abroad can participate in elections by voting online.

By offering a more secure and effective voting process, blockchain-based e-voting systems with face recognition have the potential to revolutionize the way we handle elections. Future research in this field could take a number of different directions, including other biometric tools in your system: Even though facial recognition is an effective method of recognizing voters, it can be made even more effective by combining it with other biometric tools, such as iris scanning or fingerprint recognition. This would improve the system's precision and dependability. Prior to implementing any blockchain-based electronic voting system in real-world settings, it is crucial to rigorously test and validate it. The system may need to undergo intensive testing and verification in the future to guarantee its security, dependability, and resistance to attacks. Any e-voting system's effectiveness is based on how easy it is for users to use. Making blockchain-based electronic voting methods more user-friendly, intuitive, and available to all voters may be a future project.The ability to make electronic voting systems more available to voters with disabilities is one of the major benefits of these systems. The creation of blockchain-based electronic voting platforms that are tailored to meet the requirements of these voters, such as by offering auditory and visual prompts, may be the focus of future work. In the future, work may focus on integrating blockchain-based electronic voting systems with current voting systems, such as paper-based voting systems, to enable a smooth shift to electronic voting. In conclusion, the development of face-recognition e-voting systems based on blockchain is an exciting field of study with many opportunities for future work. We can anticipate seeing more effective and secure e-voting systems that let more people engage in the political process as technology advances.

APPENDICES

A1. SAMPLE SCREENS

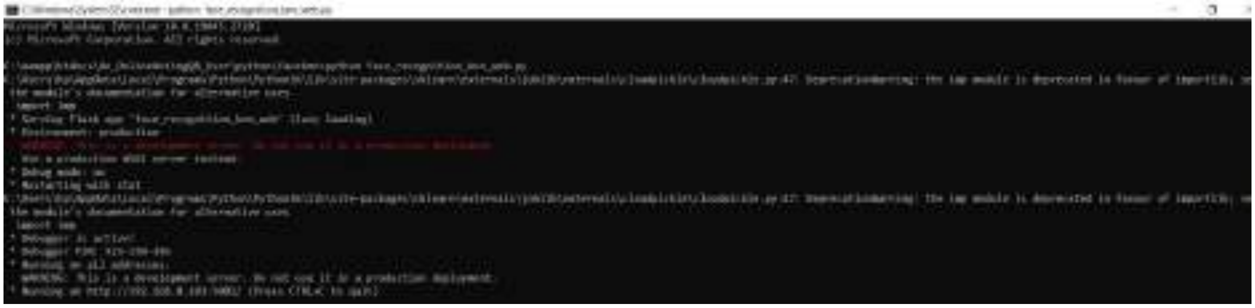
XAMPP→HTDOCS->AN_ONLINEVOTINGQR_USER->PYTHON->FACEKNN



```
Microsoft Windows [Version 10.0.19045.2728]
(c) Microsoft Corporation. All rights reserved.

C:\xampp\htdocs\An_OnlineVotingQR_User\python\faceknn>python face_recognition_knn_web.py
```

FIG A.1.1 ACTIVATION OF PYTHON FACE RECOGNITION KNN WEB



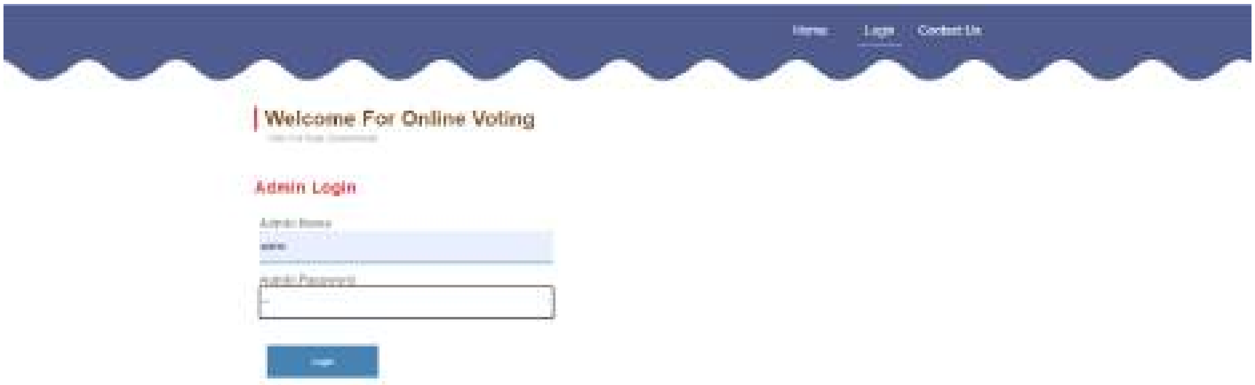
```
Microsoft Windows [Version 10.0.19045.2728]
(c) Microsoft Corporation. All rights reserved.

C:\[illegible]>python face_recognition_[illegible]_web.py
C:\Users\[illegible]\site-packages\[illegible].py:47: DeprecationWarning: the imp module is deprecated in favour of importlib; see
 the module's documentation for alternative uses
  import imp
 * Serving Flask app "face_recognition_[illegible]_web" (lazy loading)
 * Environment: production
   WARNING: This is a development server. Do not use it in a production deployment.
   Use a production WSGI server instead.
 * Debug mode: on
 * Restarting with stat
C:\Users\[illegible]\site-packages\[illegible].py:47: DeprecationWarning: the imp module is deprecated in favour of importlib; see
 the module's documentation for alternative uses
  import imp
 * Debugger is active!
 * Debugger PIN: [illegible]
 * Running on all addresses.
   WARNING: This is a development server. Do not use it in a production deployment.
 * Running on http://192.168.0.[illegible]:5002/ (Press CTRL+C to quit)
```

FIG A.1.2 RUNNING THE FACE RECOGNITION WEB

1.ADMIN:

FIG A.1.3 FRONT PAGE FOR ADMIN



Welcome For Online Voting

Admin Login

Admin Name
admin

Admin Password

FIG A.1.4 ADMIN LOGIN PAGE

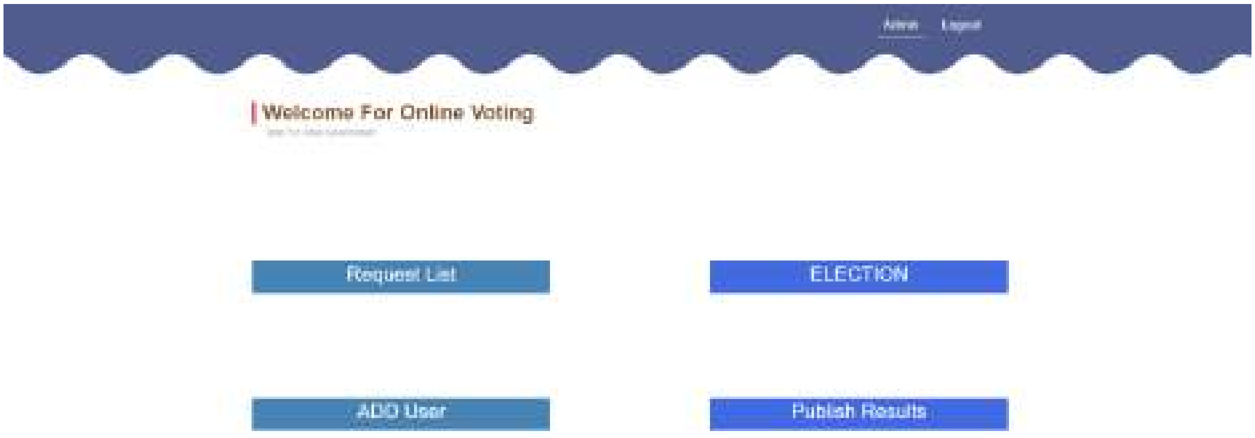


FIG A.1.5 ADMIN PAGE DETAILS

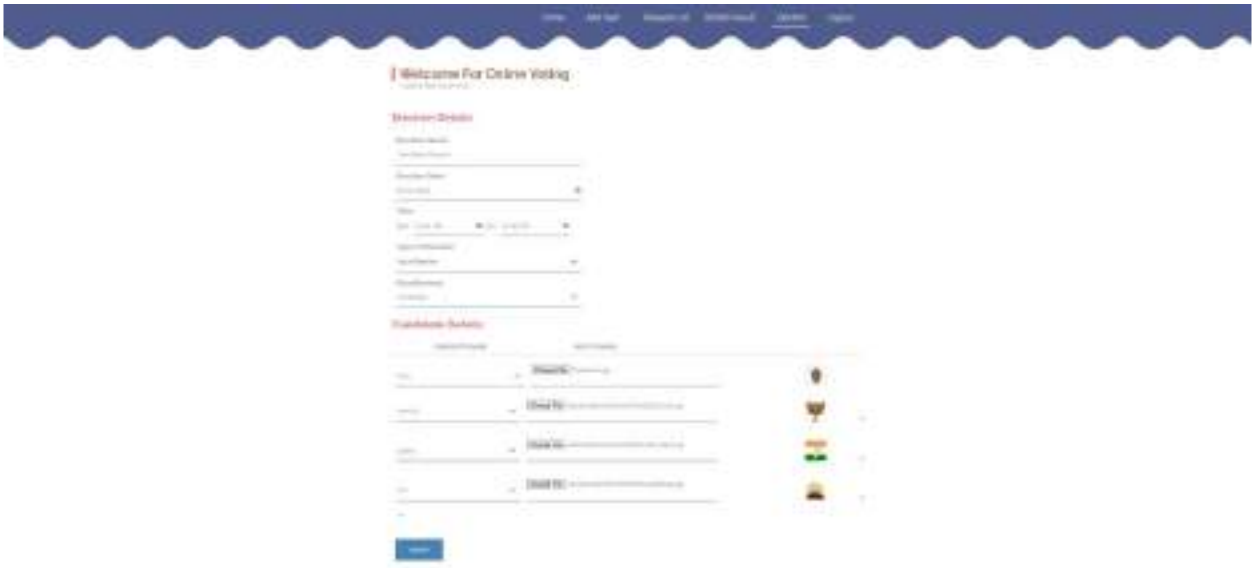
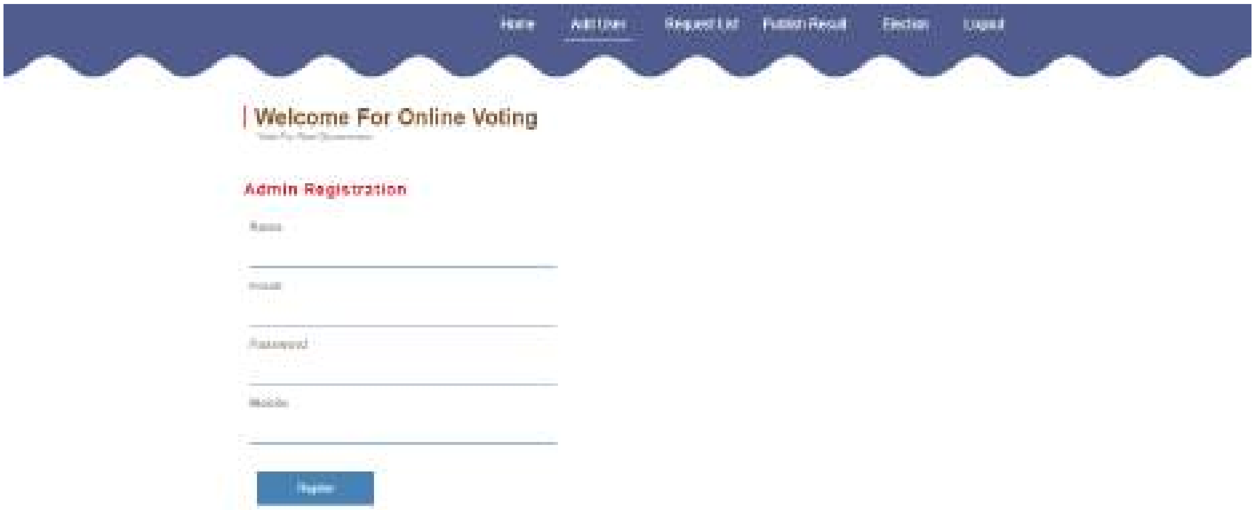


FIG A.1.6 ELECTION DETAILS PAGE



Welcome For Online Voting

Admin Registration

Name

Email

Password

Mobile

FIG A.1.7 ADD USER PAGE

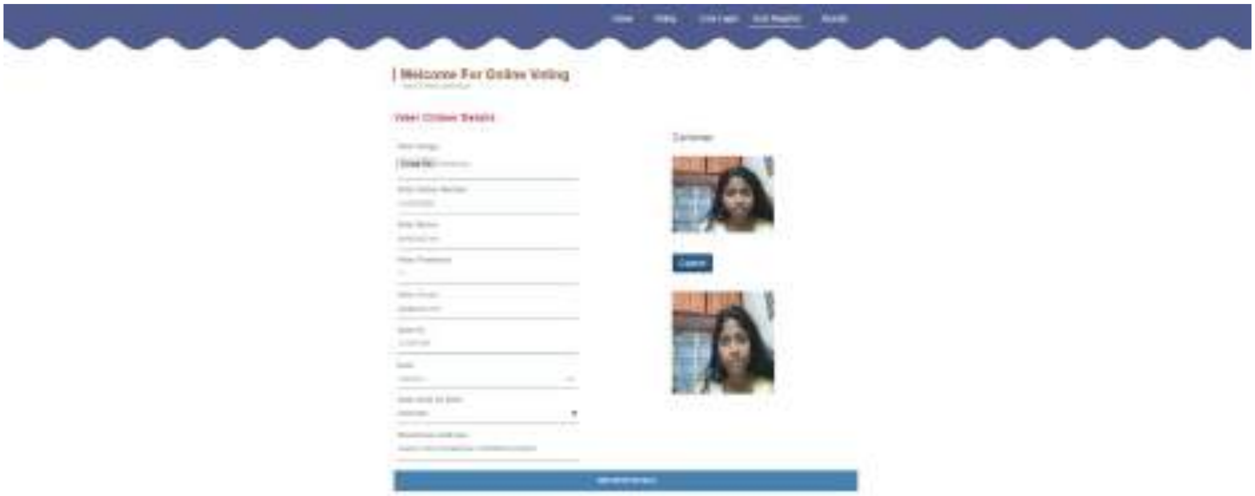
Request Voter List

FIG A.1.8 REQUEST VOTER LIST PAGE

FIG A.1.9 PUBLISH RESULT PAGE

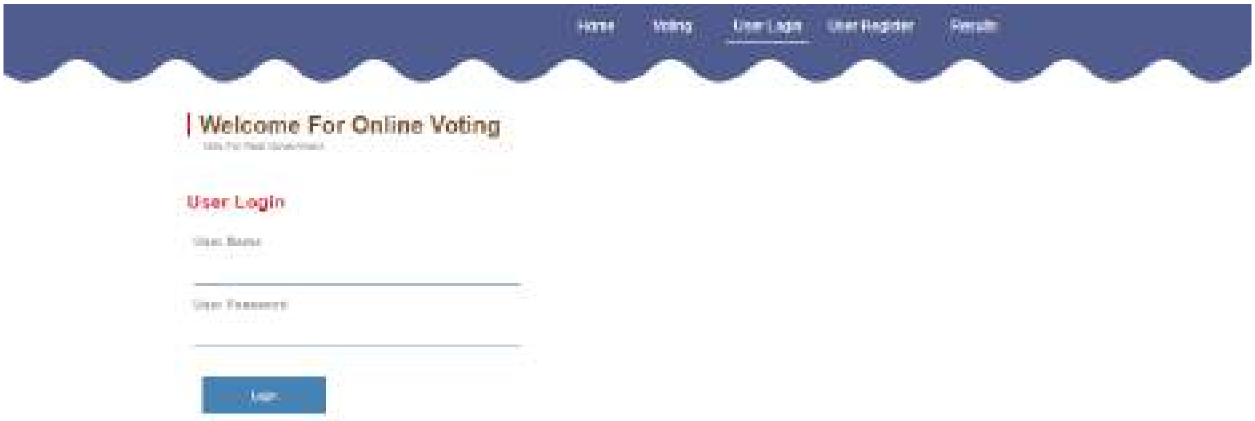
2.USER:

FIG A.1.10 FRONT PAGE FOR USER



Welcome For Online Voting

FIG A.1.11 USER REGISTRATION PAGE



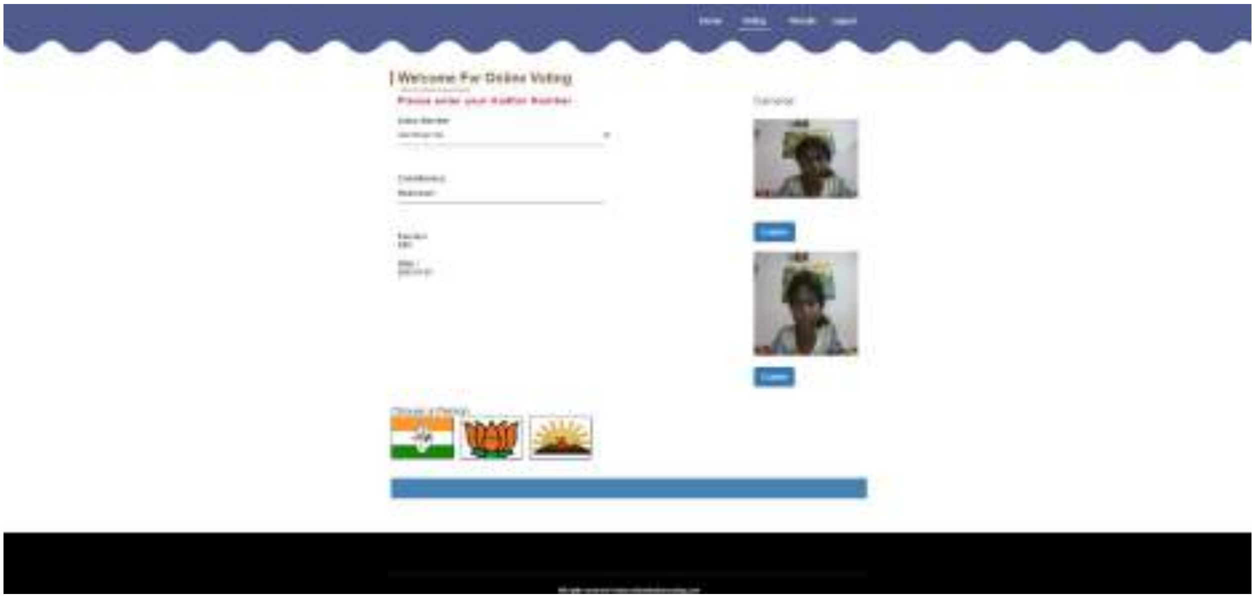
Welcome For Online Voting

User Login

User Name

User Password

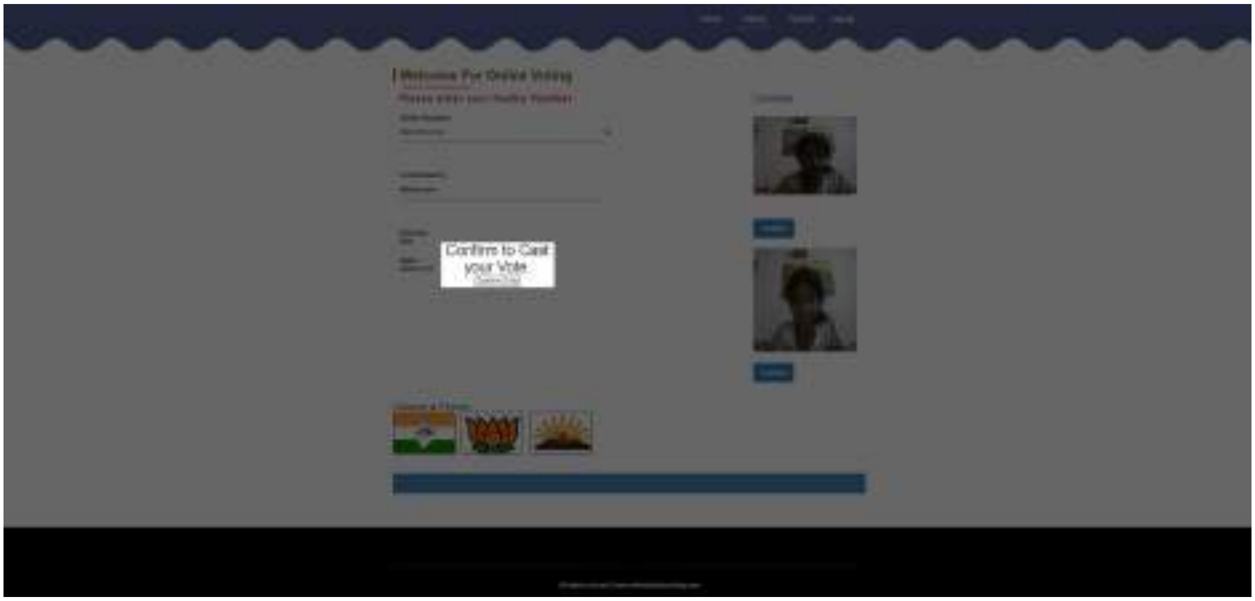
FIG A.1.12 USER LOGIN PAGE



Welcome For Online Voting

Please enter your Aadhar Number

FIG A.1.13 VOTING PAGE

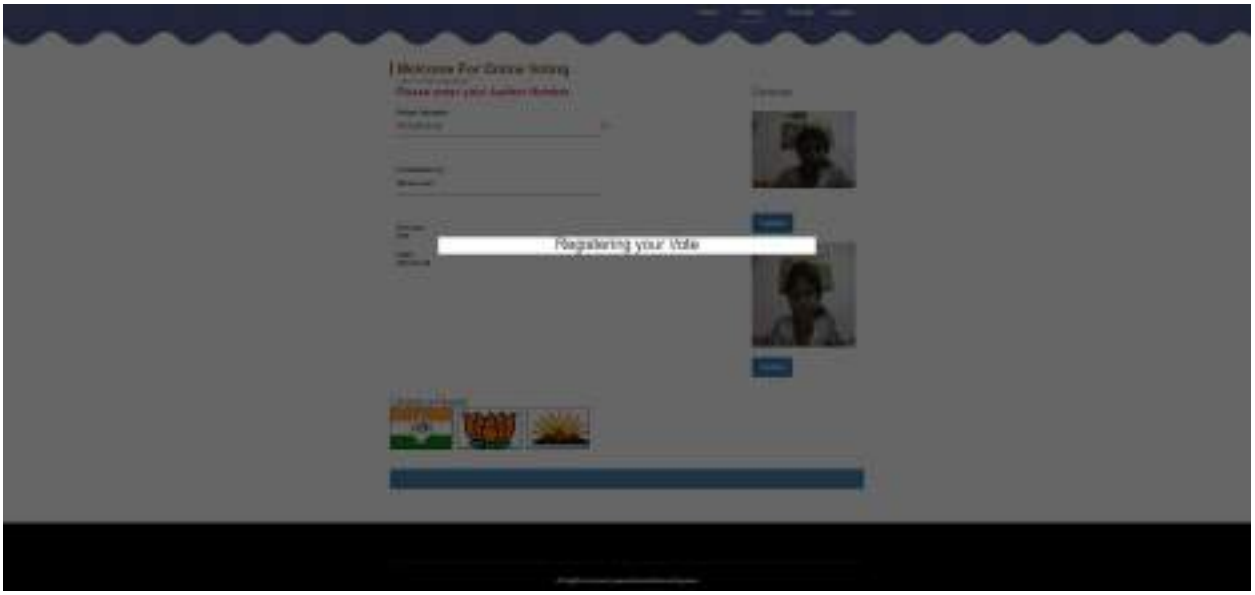


Welcome For Online Voting

Please enter your Aadhar Number

Confirm to Cast your Vote

FIG A.1.14 CONFIRMATION TO CAST THEIR VOTE

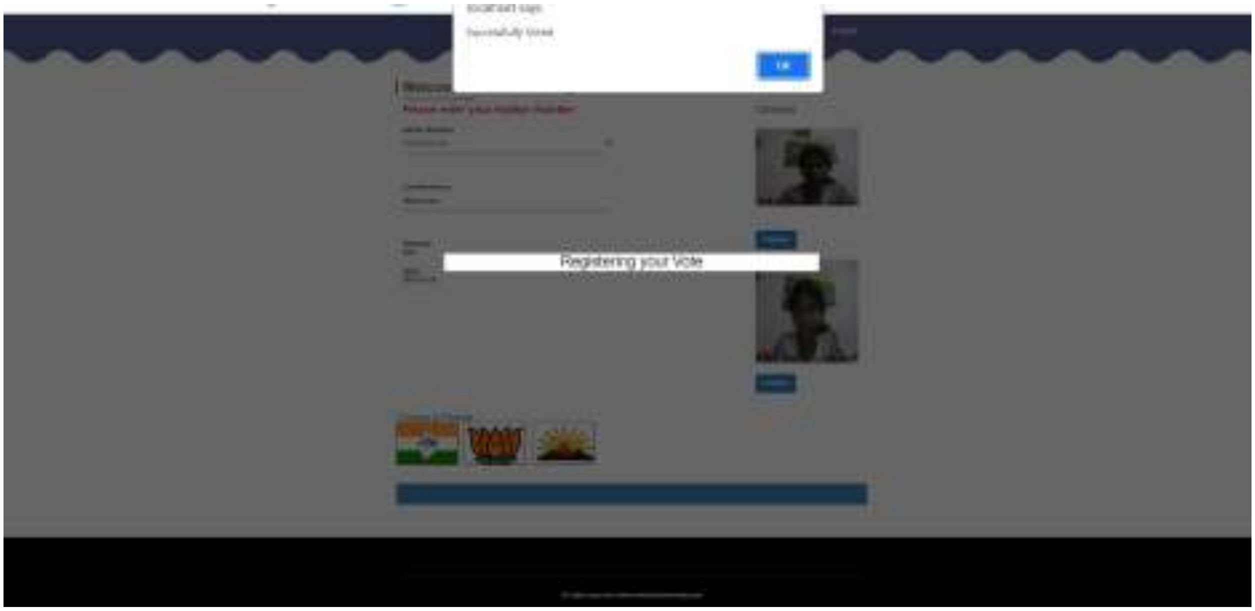


Welcome For Online Voting

Please enter your Aadhar Number

Registering your Vote

FIG A.1.15 REGISTERING VOTE



localhost says

Successfully Voted

Please enter your Aadhar Number

Registering your Vote

FIG A.1.16 REGISTERED VOTE

List Election

Election Result

FIG A.1.17 RESULT PAGE

[1] Mahima Churi, Anmol Bajaj, Gurleen Pannu and Megharani Patil Blockchain-Based E-Voting System-In book: Intelligent Computing and Networking Accessed: March 2023 DOI:10.1007/978-981-99-0071-8_11

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[6] K. Varaprasada Rao and Sandeep Kumar Panda Secure Electronic Voting (E-voting) System Based on Blockchain on Various Platforms In book: Computer Communication, Networking, and IoT Accessed: October 2022 DOI:10.1007/978-981-19-1976-3_18

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[10] G Revathy, K Bhavana Raj, Institute of Public Enterprise, Anil Kumar and Spurthi Adibatti Investigation of E-Voting System using Face Recognition using Convolutional Neural Network (CNN)Theoretical Computer Science Accessed: May 2022 DOI:10.1016/j.tcs.2022.05.005