A Framework to Make Voting System Transparent Using Blockchain Technology

[1]Prof. Satish Manje, [2]Mr. Gaurav V. Jadhav, [3]Mr. Aakash L. Desale, [4]Mr. Nitesh N. Sawardekar.

[1]Asst.Prof.,[2,3,4]UG Student,[1,2,3,4]Computer Engg. Dept. Shivajirao S. Jondhle College of Engineering & Technology, Asangaon, Maharashtra, India.

[1]satishmanje93@gmail.com, [2]gaurav.vjadhav01@gmail.com, [3]akashdesale30@gmail.com, [4]niteshsawardekar1892002@gmail.com

Abstract - The Indian voting system is now inefficient and open to outside interference. Voter ID cards are the only thing that are subject to security checks, and these days, many people can fake them. It is sluggish and can take a time to hand count the votes. Polling booths are taken and most ballots are frequently destroyed in certain remote regions with no security. The main goal is to address issues with both conventional and digital elections, including any form of error or unfairness that may have occurred during the election process. To make sure a fair election and mitigate unfairness, the voting process can employ blockchain technology. To cut down on repetition and inconsistency, electronic voting has gradually replaced paper-based voting. It is possible to introduce a new voting system that acquires login and requires both the candidate's name and a face verification. It's a web application that works with each kind of browser. The name, photo, and other information of eligible voters will be stored in the state or district government database, if deemed appropriate. Thus, only eligible voters will be capable to cast ballots thanks to trained data. Additionally, this program makes sure that voting is anonymous. Each user is assigned a random block chain address after logging in, which is unrelated to their personal information. As a result, it is impossible to determine which user voted for which candidate. Even voters without literacy will benefit from the straightforward, user-friendly interface that is in use[1].

Keywords-e-voting, Blockchain technology, KNN, Face-detection, Transparency, Cryptographic Identity.

I. INTRODUCTION

Counting hands was the first voting method, and it has since been replaced by paper, punch cards, mechanical levers, and optical scan devices. Modern electronic voting systems have a few characteristics that set them apart from more antiquated methods. They also offer better features than those methods, including mobility, accuracy, privacy, ease, adaptability, and verifiability. However, electronic voting methods have several problems, such being time-consuming, requiring a lot of paper labor, not involving senior officials directly, causing machine damage from neglect, preventing users from editing and updating many items at once, and so on. Thus, user can avoid data loss by putting in place a decentralized Blockchain-based server infrastructure. Using blockchain technology to hold a digital election lowers the possibility of voting-related unfairness while simultaneously saving costs. Modern technologies, like as blockchain technology, possess a high degree of security, and offer significant advantages when employed with caution. The implementation of this technology as the potential to enhance the transparency, reliability, and Monitoring of voting systems [1]. A current voting system involves a voting machine connected to a central database. This machine can be interfered with by anyone who has access to it. It may cause a single point failure in the entire voting system network; but an immutable blockchain cannot be altered by an individual traitor in the entire network.[8]

II. AIMS AND OBJECTIVE

a) Aim

Introducing a new electronic voting system with face verification that will address the shortcomings of the country's current voting practices.[1]

b) Objective

The key objectives of the project include: The electoral process ought to be transparent and easily verifiable. The election system has to make sure that the voter's vote was registered. Voting must only be open to those who qualify to do so. Election need to be impenetrable to hackers.[1]

III. LITERATURE SURVEY

Paper 1: Secure E-Voting System using Block-chain technology and authentication via Face recognition and Mobile OTP:

A distributed ledger is used in blockchain which store data, making it an essential part of democracy. Web-based voting systems have evolved, making them available to all citizens, including those in rural areas. Voting ensures that each citizen has a say in a country's legislation, while decentralized systems such as blockchain ensure that transactions are linked to previous ones. A proposed solution is to store voting-related information on the blockchain and monitor users throughout the vote-taking process, with a Face Recognition System to ensure they are verified and eligible to vote.[2]

Paper 2: Blockchain-Based E-Voting System

Creating a secure electronic voting system that combines the transparency and adaptability of digital platforms with the impartiality and confidentiality of traditional voting methods has been a persistent challenge. Examine a blockchain service application for the implementation of distributed electronic voting systems in this work-in-progress article. In order to build a blockchain-based e-voting system, the study assesses many well-liked blockchain frameworks and An innovative electronic voting system that addresses several deficiencies in current systems. The article evaluates the prospective of distributed ledger technologies through the presentation of a case study. This case study involves the election process and the implementation of a blockchain-based application. [6].

Paper 3: Improved Face Recognition Rate with HOG Features and SVM Classifier

This paper presents a revolutionary facial recognition method. The Support Vector Machine classifier receives the extracted histogram of Oriented Gradient features for both the training and test pictures. The steps for collecting HOG features and classifying them using SVM are described in depth. The Eigen feature-based face recognition algorithm has been compared with the algorithm. PCA and the recommended technique have been tested on eight different datasets. The findings indicate that, in comparison to the conventional Eigen feature-based face recognition method, the suggested algorithm exhibits a superior face recognition rate across all face datasets. Comparing this face recognition method to one based on PCA shows an improvement of 8.75% in face recognition rate. There are three performance curves taken into consideration: CMC, EPC, and ROC. The curves demonstrate how the suggested technique performs better than the PCA algorithm [7].

Paper 4: Collaborative Filtering Based Recommendation Of Online Social Voting Systems:

Social E-voting is a relatively recent feature in online interpersonal groups. It has unique obstacles and opportunities for suggestion. This system dispenses with the administrative effort that is associated with normal democratic interaction. It is a method that provides access to a simple medium for directing votes while lowering the administrative cost, allowing bodies to announce results on time with no additional effort. Even though there is a double check system, security threats will not be able to breach it, and a unique distinguishing proof method will allow only approved users to use their denial power [9].

IV. EXISTING SYSTEM

This is the current election framework utilized in India. In this electronic voting system, votes are recorded using electronic ballots. The voting process involves casting votes on a device, which is essentially a combination of several counters and registers. This voting framework is very simple, straightforward. It has advantage like versatility, secure, adaptability for race commission. But in nowadays world all individuals are so much active that they don’t have time to vote. This paper introduces a perspective on an online voting system that includes, but is not limited to, recognizing the voting handle and preparing the actual voting process used on election day. To fulfill the protection and security prerequisites for e-voting, and to guarantee that the decision framework ought to not empower coerced voting, voters will have to vote in a administered environment[2].

V. COMPARATIVE STUDY

Table.1: Comparative Analysis

Paper Title	Author	Year	Publication	Description
A Framework to Make Voting System Transparent Using Blockchain Technology	Muhammad Shoaib Farooq, Usman Iftikhar, Adel Khelif	2022	IEEE	Blockchain based e-voting system with Ethereum blockchain network,SHA-256 algorithm and face recognition with KNN.
Secure E-Voting System using Block-chain technology and authentication via Face recognition and Mobile OTP	A. Parmar, S. Gada, T. Loke, Y. Jain, S. Pathak and S. Patil	2021	12th International Conference on Computing Communication and Networking Technologies (ICCCNT)	Blockchain, a distributed ledger, is crucial for democracy and web-based voting systems, ensuring citizens have a say in legislation. Decentralized systems like blockchain link transactions and ensure security. A proposed solution is to store voting-related information on the blockchain and monitor users with a Face Recognition System..
E-Voting using Blockchain	Yash Dalvi, Shivam Jaiswal, Pawan Sharma	2021	International Journal of Engineering Research & Technology	An overview of the blockchain's fundamental properties and architecture in respect to electronic voting.
Improved Face Recognition Rate Using HOG Features and SVM Classifier	Harihara Santosh Dadi, Gopala Krishna Mohan Pillutla	2019	Iosr Journal Of Electronics And Communication Engineering (Iosr-Jece)	This paper presents an improved face recognition algorithm using HOG features and SVM classification, outperforming traditional methods by achieving an 8.75% higher recognition rat.

VI. PROBLEM STATEMENT

Creating a robust facial recognition system capable of precisely verifying a voter's identity, ensuring that each eligible voter can only cast one vote and minimizing the potential for impersonation or fraud. Employing blockchain technology to establish an immutable and transparent ledger for recording votes. This ledger must be resistant to tampering and allow for public verification of the results, enhancing trust in the election process. Employing blockchain technology to establish an immutable and transparent ledger for recording votes. This ledger must be resistant to tampering and allow for public verification of the results, enhancing trust in the election process[1].

VII. PROPOSED SYSTEM

The system that is suggested is the face verified online e-voting system with Face Verification using KNN algorithm and identification of voter using Block chain Address [2]. The Blockchain address is used to determine whether a particular voter is valid or not. It enables a particular voter to cast their ballot online. The polling procedure keeps going until the voting period is over, updating the server's database. Block chain addresses are used by the Face Verification online voting method to obtain all of the voter's personal information [3]. Additionally, the votes are publicly accessible and kept on a blockchain server, guaranteeing a reliable environment. When a voter inquiries to vote, the VMS, checks the voter's voting status on the blockchain through contrasting all existing transaction hashes with his or her computerized ID (Ethereum address). If a transaction's hash has been determined against the voter's ID, VMS rejects the request and logs the voter out of the system.[1]

VIII. ALGORITHM

The Algorithm for E-Voting System.

Step 1: Start

Step.2: Face Recognition using k-nearest neighbors

```
def predict(self, X):
y_pred = [self._predict(x) for x in X]
return np.array(y_pred)
def _predict(self, x):
distances = [euclidean_distance(x, x_train) for x_train in self.X_train]
k_indices = np.argsort(distance)[:self.k]
k_nearst_labels = [self.y-train[i] for i in k_indies]
most_common= np.bincount(k_nearest_labels).argmax()
return most_common
```

Step 3: Voter Registration using Blockchain address

```
Require: Initialization of parameters
Initialize voter id = this voter_id
Initialize voter name = this voter_name
Func (Register Voter)
Input: voter id
Require: voter_id =! Null
If voter_id exist
then revert back to voter id else
if voter_age < 18
then revert back to voter id else
Add Voter successfully
End Func
End Smart Contract
```

Step 4: Voter identification Vote casting using SHA-256:

```
mapping(address => Voter) public voters;
event Voted(adress indexed voter, uint256 vote);
function vote(uint256 _vote) public {
require(!voters[msg.sender].hasVoted, "Voter has already voted");
voters[msg.sender].hasVoted = true;
voters[msg.sender].vote = _vote;
emit Voted(msg.sender, _vote);}
```

Step 5 : Stop

IX. MATHEMATICAL MODEL

1) K--Nearest Neighbor [KNN]

This classifier performs classification in three steps. In step-1, it computes K-value. In step-2, for each test sample it computes the distance between all the training data as well as sorts it and finally in step-3, the class name will be provided to the test sample data by applying majority voting approach. The Euclidean distance iscomputed by:

$$E_d = \sqrt{\sum_{i=1}^{n}(a_i - b_i)^2}$$

[S(X_i, X_j) = \sqrt{\sum_{k=1}^{n} (X_{i_k} -X_{j_k})^2}\] Where \(n\) is the spaciousness of the feature vectors, and \(X_{i_k}\) and \(X_{j_k}\) are the \(k\)-th components of the vectors \(X_i\) and \(X_j\).

The decision threshold may be a value indicating the maximum acceptable distance or a certain no of neighbors required to vote 'Verified.'This mathematical model serves as a conceptual framework.

2) SHA-256 algorithm

1. Data Representation:

Data, such as voter identities and voting records, is represented as a binary string or bytes. Let's denote this data as D.

2. SHA-256 Algorithm:

The SHA-256 algorithm gathers the binary data D as input and computes a fixed-size of 256-bit hash value H:

H=SHA-256(D)

3. Mathematical Formulation:

In SHA-256 algorithm the input values are get process D in blocks and performs several

bitwise operations, rotations, and modular additions. The details of the algorithm are quite complex but can be summarized mathematically as follows: H=SHA-256(D)=SHA-256(D0,D1,D2,…,Dn).

Where D0,D1,D2,,Dn are the blocks of data. The SHA-256 algorithm operates on each block using a sequence of logical functions, modular additions, bitwise shifts, and constants. It transforms the input data into the 256-bit hash

4. Security and Properties: The SHA-256 aglorithm is designed to have several important properties, including:

Efficiency: The algorithm should be computationally efficient, making it hard to find two different input values with the same hash value (a collision). These properties ensure that the SHA-256 hash is a secure and reliable way to represent data in a tamper-evident manner on a blockchain.

X. SYSTEM ARCHETECTURE

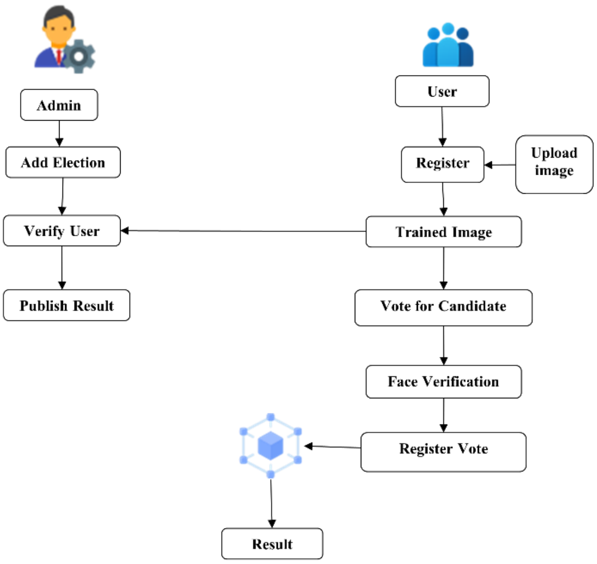


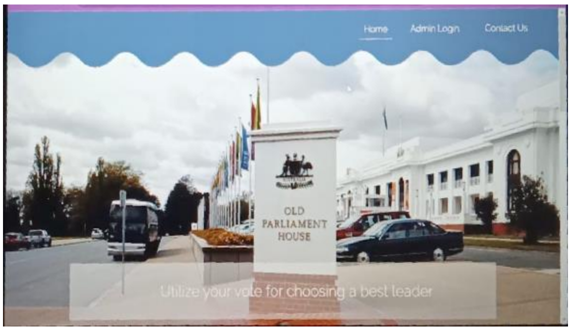
Fig.1: System Architecture

Explanation: Explanation: Admin: The admin initiates the process by adding an election Verify User.. Once the voting is complete, the admin publishes the results .User. Users begin by registering for the election. Voter upload his photo for face verification .Trained Image: for accurate face verification the system will train uploades images. Vote for Candidate: After verification, users vote for their chosen candidate. The system verifies the user's face to validate the vote. The vote is registered in the system. The Result is then determined based on the registered votes and published by the admin.

XI. ADVANTAGES

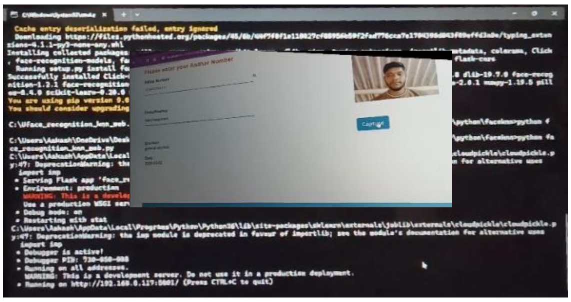
- Helps solve advanced real-world issues with many constraints.
- Voters have the extremely secure option to votes from anywhere in the nation without physically visiting voting booths.
- This will lower the expense of the voting procedure and raise the voting rate in India.
- Facial Verification offers sufficient security, hence reducing the number of fraudulent votes.
- The election results are gathered from the stored data on the blocks via the significant configuration of the nodes in the block chain.

XII. DESIGN DETAILS



Utilize your vote for choosing a best leader

Fig 2 : Home Screen



```
Cache entry deserialization failed, entry ignored
  Downloading https://files.pythonhosted.org/packages/45/6b/44f7f8f1e110827cf88956e59f2fad776cca7e1704396d043f89eff4d1a0e/typing_exten
sions-4.1.1-py3-none-any.whl
Installing collected packages:                                   metadata, colorama, Click
, face-recognition-models, fa                                    flask-cors
  Running setup.py install fo
Successfully installed Click-                                    .0 dlib-19.7.0 face-recog
nition-1.2.1 face-recognition                                    -2.0.1 numpy-1.19.5 pill
ow-8.4.0 scikit-learn-0.20.0
You are using pip version 9.0
You should consider upgrading

C:\Uface_recognition_knn_web.                                    \python\faceknn>python f

C:\Users\Aakash\OneDrive\Desk                                    \python\faceknn>python fa
ce_recognition_knn_web.py
C:\Users\Aakash\AppData\Local                                    cloudpickle\cloudpickle.p
y:47: DeprecationWarning: the                                    n for alternative uses
  import imp
 * Serving Flask app 'face_r
 * Environment: production
   WARNING: This is a develop
   Use a production WSGI serv
 * Debug mode: on
 * Restarting with stat
C:\Users\Aakash\AppData\Local\Programs\Python\Python36\lib\site-packages\sklearn\externals\joblib\externals\cloudpickle\cloudpickle.p
y: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: 730-050-088
 * Running on all addresses.
   WARNING: This is a development server. Do not use it in a production deployment.
 * Running on http://192.168.0.117:5001/ (Press CTRL+C to quit)
```

Fig 3: Casting Vote

The goal of proposing a block chain-based voting system solution was to foster trust between the government and voters, making them believe that their voting integrity is secure. Block chain-based voting also makes the voting process transparent and reliable. The

Framework allows a user to cast his or her vote via the internet without having to visit a voting booth, and it also prevents fake or duplicate voting, allows for quick access, is highly secure, and is simple to maintain all voting information. It is also highly effective and flexible. As a result, the voting percentage will rise significantly.

XIII. CONCLUSION

Thus, we have tried to implement the paper "Muhammad Shoaib Farooq, Usman Iftikhar, And Adel Khelifi" A Framework to Make Voting System Transparent Using Blockchain Technology " 2022 IEEE Access and the conclusion is as follows While e-voting on the blockchain with KNN and SHA-256 offers significant advantages in terms of security and transparency the fusion of blockchain technology, KNN, and SHA-256 encryption holds great promise for revolutionizing the electoral process, making it more reliable, resilient, translucent, and digitally relevant.

REFRENCES

[1] M. S. Farooq, U. Iftikhar and A. Khelifi, "A Framework to Make Voting System Transparent Using Blockchain Technology," in IEEE Access, vol. 10, pp. 59959-59969, 2022, doi: 10.1109/ACCESS.2022.3180168.

[2] A. Parmar, S. Gada, T. Loke, Y. Jain, S. Pathak and S. Patil, "Secure E-Voting System using Blockchain technology and authentication via Face recognition and Mobile OTP," 2021 12th International Conference on Computing Communication and Networking Technologies (ICCCNT), Kharagpur, India, 2021, pp. 1-5, doi: 10.1109/ICCCNT51525.2021.9580147.

[3] B. Shahzad and J. Crowcroft, ``Trustworthy electronic voting using adjusted blockchain technology," IEEE Access, vol. 7, pp. 47724488, 2019,s doi: 10.1109/ACCESS.2019.2895670.

[4] N. M. Crosby, P. Pattanayak, S. Verma, andV. Kalyanaraman, "Blockchain technology Beyond bitcoin," Sutardja Center Entrepreneurship Technol., Univ. California, Berkeley, CA, USA, Tech. Rep., Oct. 2015. Accessed: Jan. 24, 2018. [Online].

[5] K. M. Khan, J. Arshad, and M. M. Khan, ``Secure digital voting system based on blockchain technology," Int. J. Electron. Government Res., vol. 14, no. 1, pp. 5362, Jan. 2018, doi .4018/IJEGR.2018010103.

[6] F.P. Hjalmarsson, G. K. Hreidarsson, M. Hamdaqa and G. Hjálmtýsson, "Blockchain-Based E-Voting System," 2018 IEEE 11th International Conference on Cloud Computing (CLOUD), San Francisco, CA, USA, 2018, pp. 983-986, doi: 10.1109/CLOUD.2018.00151.

[7] Dadi, Harihara & Mohan, P.G. (2016). Improved Face Recognition Rate Using HOG Features and SVM Classifier. IOSR Journal of Electronics and Communication Engineering(IOSR-JECE). 11. 34-44. 10.9790/2834-1104013444

[8] M. S. Farooq, M. Khan, and A. Abid, ''A framework to make charity collection transparent and auditable using blockchain technol- ogy,'' Comput. Electr. Eng., vol. 83, May 2020, Art. no. 106588, doi:10.1016/j.compeleceng.2020.106588.

[9] Prof. Satish Jaywant Manje, Sayed Md Rafe, Saini Bhawani Singh, Gaurav Gurav, "Collaborative Filtering Based Recommendation Of Online Social Voting Systems", IJREAM, ISSN : 2454-9150 Vol-07, Special Issue, MAY 2021.