

In Democratic countries like India, the voting system plays a major role during elections. Traditionally, the election commission in India uses electronic voting machines which need more manpower, time-consuming and also, they are less trustworthy. As we know, in every country Election is a basic process of democracy which allows people to show their opinions by selecting their candidate. India is spending huge money to improve our whole voting system to provide a better government to citizens. In India, voting system should be honest, translucent and fully secure for the better democracy. The current system is used to less transparency because there could be chances of cheating at the voting time.

Authentication of Voters, smartness of the voting process, protecting voted data these are the main challenges of current Election voting. That's because it is necessary to generate a smart election voting system. As the modern communications and Internet, today are almost accessible electronically, the computer technology users, brings the increasing need for electronic services and their security. Usages of new technology in the voting process improve the elections in natural. After the industrialization a greater number of people leave their native places and come to the cities for the job's sake. But many of them still have their voter ids in the address of their native places. On the day of voting, they can't able to go their places so they don't cast their valuable vote. this is the main reason for reduction of voting percentage in our country. Our government also keep on working to find out a best solution for this circumstance.

Objective

This system provides a better security as it ensures that no voter is allowed to vote more than once. Also, the system takes care that no voter can determine for whom anyone else voted and no voter can duplicate anyone else vote. Every voter can make sure his/her vote is cast. The developed application is based on an e-Voting methodology. The voter's image is captured using a webcam. This image is used as an input to the face detection algorithm. This image will compare with our dataset for verifying the user. This is achieved by template matching where the image received from the user side is compared with the image stored in user dataset at the time of registration. Once the user is verified, he can cast his vote. The vote cast by him is then stored in the database and is taken for tallying purpose after the deadline for voting process.

CHAPTER 2

2.1. LITERATURE SURVEY

1.Title - A Secure Verifiable Ranked Choice Online Voting System Based on Homomorphic Encryption

Author - Xue Chao Yang; Xun Yi; Surya Nepal; Andrei Kelarev; Fenagling Han,IEEE Access, March 2018

Advanced security methods are necessary to introduce effective online voting in the whole world. Elections conducted on paper consume a lot of resources and contribute to the destruction of forests, which leads to climate deterioration. Recent online voting experiences in countries, such as the United States, India, and Brazil, demonstrated that further research is needed to improve security guarantees for future elections, to ensure the confidentiality of votes and enable the verification of their integrity and validity.

2.Title - Electronic Voting Using Blockchain and Smart Contracts: Proof of Concept

Author - Fáber D. Giraldo; Barbosa Milton C.; Carlos E. Gamboa ,IEEE Latin America Transactions 10, October 2020

Blockchain technology has been presented as a support for trust needs between transactions in electronic information systems. Its successful use in cryptocurrencies has allowed it to explore its capabilities in commercial, industrial, and service systems, backed by the operational alternatives offered by Ethereum Smart Contracts and the cryptographic security of public and private key.

3.Title - A Secure End-to-End Verifiable Internet-Voting System Using Identity-Based Blind Signature

Author - Mahender Kumar; Satish Chand; C. P. Katti, IEEE Systems Journal, June 2020)

The end-to-end (E2E) verification enables a voter to check if his ballot is recorded as he intended and the public to check if the system has correctly counted all of the recorded ballots. The Internet voting systems based on the principle of E2E verifiability have many challenges; the most important is its

security. Several E2E voting systems have been discussed in the last decade in terms of analyzing the e-voting system and formalizing its security requirements. This article presents an E2E verifiable internet voting system that provides mobility to a voter and allows him to cast his vote secretly in public computer with the benefit of early voting. The proposed system aims to support the election process universally by using the voter's unique identification and biometric features. We propose a new identity-based blind signature scheme that ensures the voter's anonymity.

4.Title - A Smart Contract System for Decentralized Borda Count Voting

Author - Somnath Panja; Samiran Bag; Feng Hao; Bimal Roy, IEEE Transactions on Engineering Management, Nov. 2020

In this article, we propose the first self-tallying decentralized e-voting protocol for a ranked-choice voting system based on Borda count. Our protocol does not need any trusted setup or tallying authority to compute the tally. The voters interact through a publicly accessible bulletin board for executing the protocol in a way that is publicly verifiable. Our main protocol consists of two rounds. In the first round, the voters publish their public keys, and in the second round they publish their randomized ballots. All voters provide Non-interactive Zero-Knowledge (NIZK) proofs to show that they have been following the protocol specification honestly without revealing their secret votes. At the end of the election, anyone including a third-party observer will be able to compute the tally without needing any tallying authority.

5.Title - Modeling Reliability of Threshold Weighted Indecisive Voting Systems

Author - Hainan Zhang; Hoang Pham, IEEE Transactions on Computational Social Systems, Feb 2020

In industry, the method of hypothesis acceptance based on available information is widely used in applications such as system modeling. Xie and Pham modeled the reliability of weighted threshold voting systems with a

general recursive reliability function in human organization systems. As an extended study, we introduce a generalized weighted indecisive-voting n-unit system using a new decision rule consisting both a threshold parameter τ and a new indecisive parameter θ . In general, indecision happens due to limited information, and an indecisive parameter is then applied if no decision is made. System reliability R is calculated to show the system performance.

6.Title: SecEVS : Secure Electronic Voting System Using Blockchain Technology

Authors: Ashish Singh; Kakali Chatterjee, 2018 International Conference on Computing, Power and Communication Technologies (GUCON)

In today's digital environment, the voting system move from paper based to a digital system. A digital e-voting system have many properties such as transparency, decentralization, irreversibility, and non-repudiation. The growth in digital e-voting system arises many security and transparency issues. In this paper, we used the blockchain technology in digital e-voting system to solve the security issues and fulfill the system requirements. It offers new opportunities to deploy a secure e-voting system in any organization or country. The solution is far better as compared to other solution because, it is a decentralized system, contain the results in the form of bit-coins, having different locations. We will also analyze the security of our proposed voting system, which shows our protocol is more secure as compared to other solutions.

7.Title: An Approach to the Efficient Security Algorithms Used in Voting Scanning in an Electoral Process

Authors: Segundo Moisés Toapanta Toapanta; Josue Andrés Tamayo Lamar; Javier Gonzalo Ortiz Rojas; Luis Enrique Mafla Gallegos, 2019 2nd International Conference on Safety Produce Informatization (IICSPI)

It was considered that the security of information is an important factor in an electoral process in a country; for the frequent problems that have been

detected in the scanning of votes to expedite the count. The objective is to analyze a method of vote scanning that allows improving security, administration, and implementation so that vote counting is faster and more secure compared to the traditional voting system. The deductive method and the exploratory investigation were used to analyze the information of the articles of the reference. It turned out to be a prototype of a voting scan algorithm based on the OCR reader scanner that was proposed and analyzed; for the scanning of the votes and projection of results via the internet for the next elections to improve the integrity of the information. It was concluded that a prototype of an adequate algorithm for vote scanning is an alternative to improve a traditional system that will be integrated into a voting system.

8.Title: Decentralized E-Voting Portal Using Blockchain

Authors: Kriti Patidar; Swapnil Jain, 2019 10th International Conference on Computing, Communication and Networking Technologies (ICCCNT)

Online voting is an alternative to age old paper ballot system and the currently popular electronic voting machines (EVM). An electronic voting portal should offer security and integrity along with the transparency of votes and privacy of voters. This paper proposes an e-voting system based on blockchain that eliminates some of the limitations in existing voting systems. The paper also presents state of art of some blockchain frameworks for e-voting. The presented implementation is suitable for small scale elections like inside corporate houses, board rooms etc. The implementation uses smart contract from Ethereum. Truffle framework is used in this paper for development, testing and deploying smart contracts. Ganache is used as Ethereum client for testing. Here Meta-mask is used as browser wallet.

9.Title: Increasing Participation and Security in Student Elections through Online Voting: The Case of Kabaark University

Authors: Moses M THIGA, 2020 IST-Africa Conference (IST-Africa)

Electronic voting systems have enhanced efficiency in student elections management in universities, supporting such elections to become less

expensive, logistically simple, with higher accuracy levels as compared to manually conducted elections. However, e-voting systems that are confined to campus hall voting inhibits access to eligible voters who are away from campus. This study examined the challenges of lack of wide access and impersonation of voter in the student elections of 2018 in Kabarak University. The main objective of this study was therefore to upgrade the offline electronic voting system through developing a secure online voting system and deploying the system for use in the 2019 student elections at Kabarak University. The resultant system and development process employed demonstrate the applicability of a secure online voting not only in the higher education context, but also in other democracies where infusion of online access and authentication in the voting processes is a requisite.

10.Title: From Conventional Voting to Blockchain Voting: Categorization of Different Voting Mechanisms

Authors: SYada Tasmia Alvi; Mohammed Nasir Uddin; Linta Islam; Sajib Ahamed , 2020 2nd International Conference on Sustainable Technologies for Industry 4.0 (STI)

For the development of society and the enhancement of citizen's civic knowledge, voting plays an incredibly important role in many forms of practice as a guiding factor for the true growth of democracy. The world's electoral mechanism has been marked by several structural problems, leading in an election being held by a dishonest candidate. Scientists were mentally, psychologically, socially and critically worried about the mismanagement of electoral processes documented at various stages of selecting a leader. Deal with the question about how to protect dishonest participants in elections from unethical practices such as bribery and spoofing are a great concern. The results of making a dishonest participant a winner are bad administration, uncertainty and diversification for the financial benefit of public funds. Approaches ought to be created to fix the issues of the electoral processes. Thus, this paper concentrated on a systematic analysis of multiple forms of

voting with blockchain and without blockchain by numerous researchers as a forum to find vulnerabilities or weaknesses and propose a perfect voting mechanism to fulfill all the properties requires in voting system.

2.2 Machine Learning

Machine learning is an application of artificial intelligence (AI) that provides systems the ability to automatically learn and improve from experience without being explicitly programmed. Machine learning focuses on the development of computer programs that can access data and use it learn for themselves. The process of learning begins with observations or data, such as examples, direct experience, or instruction, in order to look for patterns in data and make better decisions in the future based on the examples that we provide. The primary aim is to allow the computers learn automatically without human intervention or assistance and adjust actions accordingly.

Machine Learning Methods

Machine learning algorithms are often categorized as supervised or unsupervised.

Supervised machine learning algorithms can apply what has been learned in the past to new data using labelled examples to predict future events. Starting from the analysis of a known training dataset, the learning algorithm produces an inferred function to make predictions about the output values. The system is able to provide targets for any new input after sufficient training. The learning algorithm can also compare its output with the correct, intended output and find errors in order to modify the model accordingly.

In contrast, **unsupervised machine learning algorithms** are used when the information used to train is neither classified nor labelled. Unsupervised learning studies how systems can infer a function to

describe a hidden structure from unlabeled data. The system doesn't figure out the right output, but it explores the data and can draw inferences from datasets to describe hidden structures from unlabeled data.

Semi-supervised machine learning algorithms fall somewhere in between supervised and unsupervised learning, since they use both labeled and unlabelled data for training – typically a small amount of labeled data and a large amount of unlabeled data. The systems that use this method are able to considerably improve learning accuracy. Usually, semi-supervised learning is chosen when the acquired labeled data requires skilled and relevant resources in order to train it / learn from it. Otherwise, acquiring unlabeled data generally doesn't require additional resources.

Reinforcement machine learning algorithms is a learning method that interacts with its environment by producing actions and discovers errors or rewards. Trial and error search and delayed reward are the most relevant characteristics of reinforcement learning. This method allows machines and software agents to automatically determine the ideal behaviour within a specific context in order to maximize its performance. Simple reward feedback is required for the agent to learn which action is best; this is known as the reinforcement signal.

2.3.Advantages of Machine Learning

Machine Learning undoubtedly helps people to work more creatively and efficiently. Basically, you too can delegate quite complex or monotonous work to the computer through Machine Learning - starting with scanning, saving and filing paper documents such as invoices up to organizing and editing images.

In addition to these rather simple tasks, self-learning machines can also perform complex tasks. These include, for example, the recognition of error patterns. This is a major advantage, especially in areas such as the manufacturing industry: the industry relies on continuous and error-free production. While even experts often cannot be sure where and by which correlation a production error in a plant fleet arises, Machine Learning offers the possibility to identify the error early this saves down times and money. Self-learning programs are now also used in the medical field. In the future, after "consuming" huge amounts of data (medical publications, studies, etc.), apps will be able to warn a in case his doctor wants to prescribe a drug that he cannot tolerate. This "knowledge" also means that the app can propose alternative options which for example also take into account the genetic requirements of the respective patient.

2.4. Applications of Machine Learning

1. Virtual Personal Assistants

Siri, Alexa, Google Now are some of the popular examples of virtual personal assistants. As the name suggests, they assist in finding information, when asked over voice. All you need to do is activate them and ask “What is my schedule for today?”, “What are the flights from Germany to London”, or similar questions. For answering, your personal assistant looks out for the information, recalls your related queries, or send a command to other resources (like phone apps) to collect info. You can even instruct assistants for certain tasks like “Set an alarm for 6 AM next morning”, “Remind me to visit Visa Office Day after tomorrow”. Machine learning is an important part of these personal assistants as they collect and refine the information on the basis of your previous involvement with them. Later, this set of data is utilized to render results that are tailored to your preferences. Virtual Assistants are integrated to a

variety of platforms. For example: Smart Speakers: Amazon Echo and Google Home Smartphones: Samsung Bixby on Samsung S8 Mobile Apps: Google app

2. Predictions while Commuting

Traffic Predictions: We all have been using GPS navigation services. While we do that, our current locations and velocities are being saved at a central server for managing traffic. This data is then used to build a map of current traffic. While this helps in preventing the traffic and does congestion analysis, the underlying problem is that there are less number of cars that are equipped with GPS. Machine learning in such scenarios helps to estimate the regions where congestion can be found on the basis of daily experiences.

Online Transportation Networks: When booking a cab, the app estimates the price of the ride. When sharing these services, how do they minimize the detours? The answer is machine learning. Jeff Schneider, the engineering lead at Uber ATC reveals in an interview that they use ML to define price surge hours by predicting the rider demand. In the entire cycle of the services, ML is playing a major role.

3. Videos Surveillance

Imagine a single person monitoring multiple video cameras! Certainly, a difficult job to do and boring as well. This is why the idea of training computers to do this job makes sense. The video surveillance system nowadays is powered by AI that makes it possible to detect crime before they happen. They track unusual behaviour of people like standing motionless for a long time, stumbling, or napping on benches etc. The system can thus give an alert to human attendants, which can ultimately help to avoid mishaps. And when such activities are reported and counted to be true, they help to improve the surveillance services. This happens with machine learning doing its job at the backend.

4. Social Media Services

From personalizing your news feed to better ads targeting, social media platforms are utilizing machine learning for their own and user benefits. Here are a few examples that you must be noticing, using, and loving in your social media accounts, without realizing that these wonderful features are nothing but the applications of ML. People You May Know: Machine learning works on a simple concept: understanding with experiences. Facebook continuously notices the friends that you connect with, the profiles that you visit very often, your interests, workplace, or a group that you share with someone etc. On the basis of continuous learning, a list of Facebook users is suggested that you can become friends with. Face Recognition: You upload a picture of you with a friend and Facebook instantly recognizes that friend. Facebook checks the poses and projections in the picture, notice the unique features, and then match them with the people in your friend list. The entire process at the backend is complicated and takes care of the precision factor but seems to be a simple application of ML at the front end. Similar Pins: Machine learning is the core element of Computer Vision, which is a technique to extract useful information from images and videos. Pinterest uses computer vision to identify the objects (or pins) in the images and recommend similar pins accordingly.

5. Email Spam and Malware Filtering

There are a number of spam filtering approaches that email clients use. To ascertain that these spam filters are continuously updated, they are powered by machine learning. When rule-based spam filtering is done, it fails to track the latest tricks adopted by spammers. Multi-Layer Perceptron, C 4.5 Decision Tree Induction are some of the spam filtering techniques that are powered by ML. Over 325, 000 malwares are detected every day and each piece of code is 90–98% similar to its previous

versions. The system security programs that are powered by machine learning understand the coding pattern. Therefore, they detect new malware with 2–10% variation easily and offer protection against them.

6. Online Customer Support

A number of websites nowadays offer the option to chat with customer support representative while they are navigating within the site. However, not every website has a live executive to answer your queries. In most of the cases, you talk to a chatbot. These bots tend to extract information from the website and present it to the customers. Meanwhile, the chatbots advances with time. They tend to understand the user queries better and serve them with better answers, which is possible due to its machine learning algorithms.

7. Search Engine Result Refining

Google and other search engines use machine learning to improve the search results for you. Every time you execute a search, the algorithms at the backend keep a watch at how you respond to the results. If you open the top results and stay on the web page for long, the search engine assumes that the results it displayed were in accordance to the query. Similarly, if you reach the second or third page of the search results but do not open any of the results, the search engine estimates that the results served did not match requirement. This way, the algorithms working at the backend improve the search results.

8. Product Recommendations

You shopped for a product online few days back and then you keep receiving emails for shopping suggestions. If not this, then you might have noticed that the shopping website or the app recommends you some items that somehow matches with your taste. Certainly, this refines the shopping experience but did you know that it's machine learning doing the magic for you? On the basis of your behaviour with the website/app,