

FINAL YEAR PROJECT – REPORT
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(Deemed to be University)

Submitted in partial fulfillment of the requirements for the award of
Bachelor of Technology Degree in Information Technology

By

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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the Bonafide work of who carried out the project entitled "Smart Voting System Using Deep Learning Techniques" Under our supervision from August 2021 to March 2022

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DECLARATION

We Vaishnavy.P and Nandhini.V hereby declared that the Project Report entitled “Smart Voting System Using Deep Learning Techniques” done by us under the guidance of **Dr. R.M Gomathi M.E, Ph.D.** at Sathyabama Institute of Science and Technology (Deemed to be University), Jeppiaar Nagar, Rajiv Gandhi Salai, Chennai - 600119 is submitted in partial fulfillment of the requirements for the award of Bachelor of Technology degree in Information Technology.

DATE: 28/02/2022

Place: Chennai

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ABSTRACT

Online voting system in which the election data is stored and processed. To achieve higher level of security, one levels of authentication techniques are used. The authentication technique used is a Face Detection and Recognition system. In this method of authentication, the voters face image captured during the registration is compared with the image captured by the webcam at the time of casting vote. After the first level of authentication is done a voter can casting the vote. These techniques provide a more secure platform thus overcoming vulnerabilities of the traditional voting system. We use OpenCV, Flask are the python package and Haar Cascade Algorithm

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INTRODUCTION

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,

past purchases, items liked or added to cart, brand preferences etc., the product recommendations are made.

9. Online Fraud Detection

Machine learning is proving its potential to make cyberspace a secure place and tracking monetary frauds online is one of its examples. For example: PayPal is using ML for protection against money laundering. The company uses a set of tools that helps them to compare millions of transactions taking place and distinguish between legitimate or illegitimate transactions taking place between the buyers and sellers.

CHAPTER - 3

3.1. Existing System

This system isolates the malicious devices by eliminating the threats encountered during communication and path formation process by computing the weighted trust of each device. Moreover, to ensure transparency in the polling mechanism, a blockchain is maintained that includes IoT devices to further formulate a secure polling process. IoT devices are used record and collect the vote.

Limitations

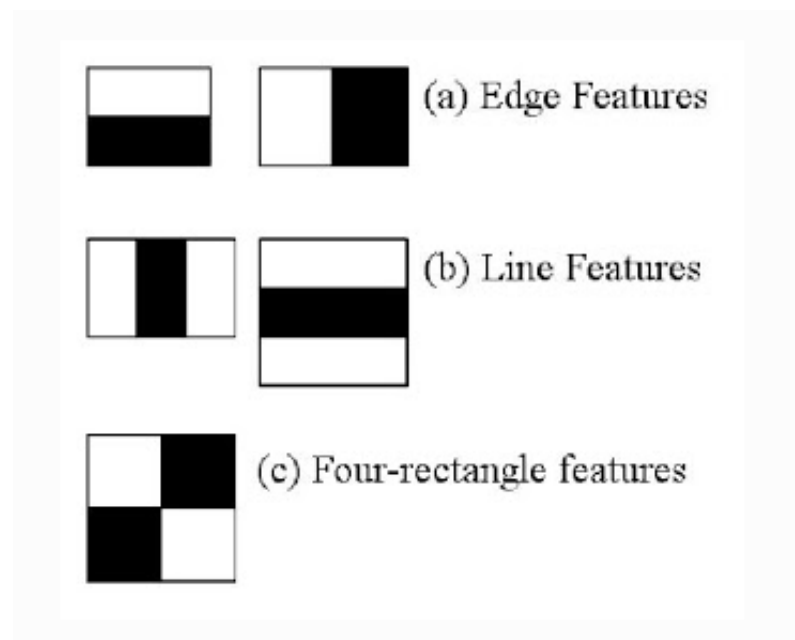
- It Use an Iot Based hardware for Casting the vote
- The IoT devices are either legitimate or malicious
- Malicious devices and not be able to add in the blockchain

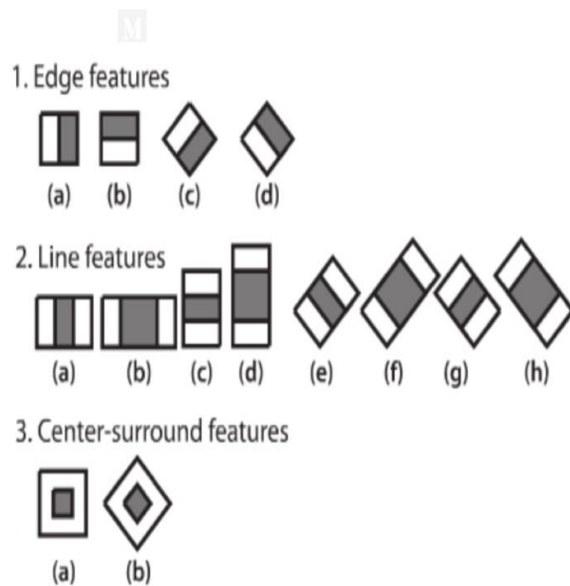
3.2. Proposed System

System is used cast your vote through online via website using facial authentication and machine learning techniques. To get a high degree of accuracy from what is called “training data”. Haar Cascades use the Adaboost learning algorithm, which selects a small number of important features from a large set to give an efficient result of classifiers. Initially, the algorithm needs a lot of positive images (images of faces) and negative images (images without faces) to train the classifier. Then we need to extract features from it. For this, Haar features shown in below image are used. They are just like our convolutional kernel. Each feature is a single value obtained by subtracting sum of pixels under white rectangle from sum of pixels under black rectangle.

Proposed Algorithms involved

Haar cascade algorithm





Face Detection determines the locations and sizes of human faces in arbitrary (digital) images.

In **Face Recognition**, the use of Face Detection comes first to determine and isolate a face before it can be recognized.

ADVANTAGE

- The key advantage of a Haar-like feature over most other features is its calculation speed.
- Haar Cascade is a machine learning object detection algorithm used to identify objects in an image or video
- Haar Cascades use the Adaboost learning algorithm which selects a small number of important features from a large set to give an efficient result of classifiers.

3.3.CNN-Convolutional neural network

Convolutional neural network (ConvNets or CNNs) is one of the main categories to do images recognition, images classifications. Objects detections, recognition faces etc., are some of the areas where CNNs are widely used. In work project we are going to detect and classify drone in video using CNN algorithm.

Steps

- □ Provide input image into convolution layer
- □ Choose parameters, apply filters with strides, padding if requires. Perform convolution on the image and apply ReLU activation to the matrix.
- □ Perform pooling to reduce dimensionality size

- ☐ Add as many convolutional layers until satisfied
- ☐ Flatten the output and feed into a fully connected layer (FC Layer)
- Output the class using an activation function and classifies images.

Necessary Packages:

- NumPy
- Pandas
- Matplotlib
- pyplot
- Scikit-learn
- TensorFlow
- Jupyter
- Open-cv

3.4. FEASIBILITY STUDY

The feasibility of the project is analyzed in this phase and business proposal is put forth with a very general plan for the project and some cost estimates. During system analysis the feasibility study of the proposed system is to be carried out. This is to ensure that the proposed system is not a burden to the company. For feasibility analysis, some understanding of the major requirements for the system is essential. Three key considerations involved in the feasibility analysis are

- Economic feasibility
- Technical feasibility
- Social feasibility

ECONOMICAL FEASIBILITY

This study is carried out to check the economic impact that the system will have on the organization. The amount of fund that the company can pour into the research and development of the system is limited. The expenditures must be justified. Thus, the developed system as well within the budget and this was achieved because most of the technologies used are freely available. Only the customized products had to be purchased.

TECHNICAL FEASIBILITY

This study is carried out to check the technical feasibility, that is, the technical requirements of the system. Any system developed must not have a high demand on the available technical resources. This will lead to high demands being placed on the client. A feasibility study evaluates the project's potential for success.

SOCIAL FEASIBILITY

The aspect of study is to check the level of acceptance of the system by the user. This includes the process of training the user to use the system efficiently. The user must not feel threatened by the system, instead must accept it as a necessity. The level of acceptance by the users solely depends on the methods that are employed to educate the user about the system and to make him familiar with it. His level of confidence must be raised so that he is also able to make some constructive criticism, which is welcomed, as he is the final user of the system.

CHAPTER 4

EXPERIMENTAL METHODS AND ALGORITHMS

4.1. HARDWARE REQUIREMENTS

The most common set of requirements defined by any operating system or software application is the physical computer resources, also known as hardware. The minimal hardware requirements are as follows,

1. Processor : Pentium IV
2. RAM : 8 GB
3. Processor : 2.4 GHz
4. Main Memory : 8GB RAM
5. Hard Disk Drive : 1tb
6. Keyboard : 104 Keys

4.2. SOFTWARE REQUIREMENTS

Software requirements deals with defining resource requirements and prerequisites that needs to be installed on a computer to provide functioning of an application. The minimal software requirements are as follows,

1. Front end : python
2. Dataset : csv
3. IDE : anaconda
4. Operating System : Windows 10

4.3.Python Language

Python is an object-oriented programming language created by Guido Rossum in 1989. It is ideally designed for rapid prototyping of complex applications. It has interfaces to many OS system calls and libraries and is extensible to C or C++. Many large companies use the Python programming language include NASA, Google, YouTube, BitTorrent, etc. Python programming is widely used in Artificial Intelligence, Natural Language Generation, Neural Networks and other advanced fields of Computer Science. Python had deep focus on code readability & this class will teach you python from basics.

Python Programming Characteristics

- It provides rich data types and easier to read syntax than any other programming languages
- It is a platform independent scripted language with full access to operating system API's
- Compared to other programming languages, it allows more run-time flexibility
- It includes the basic text manipulation facilities of Perl and Awk
- A module in Python may have one or more classes and free functions
- Libraries in Python are cross-platform compatible with Linux, Macintosh, and Windows
- For building large applications, Python can be compiled to byte-code
- Python supports functional and structured programming as well as OOP
- It supports interactive mode that allows interacting Testing and debugging of snippets of code
- In Python, since there is no compilation step, editing, debugging and testing is fast.

Applications of Python Programming

Web Applications

You can create scalable Web Apps using frameworks and CMS (Content Management System) that are built on Python. Some of the popular platforms for creating Web Apps are: Django, Flask, Pyramid, Plone, Django CMS. Sites like Mozilla, Reddit, Instagram and PBS are written in Python.

Scientific and Numeric Computing

There are numerous libraries available in Python for scientific and numeric computing. There are libraries like: SciPy and NumPy that are used in general purpose computing. And, there are specific libraries like: Earth Py for earth science, Astro Py for Astronomy and so on. Also, the language is heavily used in machine learning, data mining and deep learning.

Creating software Prototypes

Python is slow compared to compiled languages like C++ and Java. It might not be a good choice if resources are limited and efficiency is a must. However, Python is a great language for creating prototypes. For example: You can use Py game (library for creating games) to create your game's prototype first. If you like the prototype, you can use language like C++ to create the actual game.

Good Language to Teach Programming

Python is used by many companies to teach programming to kids and newbies. It is a good language with a lot of features and capabilities. Yet, it's one of the easiest languages to learn because of its simple easy-to-use syntax.

About OpenCV Package

Python is a general-purpose programming language started by Guido van Rossum, which became very popular in short time mainly because of its simplicity and code readability. It enables the programmer to express his ideas in fewer lines of code without reducing any readability.

Compared to other languages like C/C++, Python is slower. But another important feature of Python is that it can be easily extended with C/C++. This

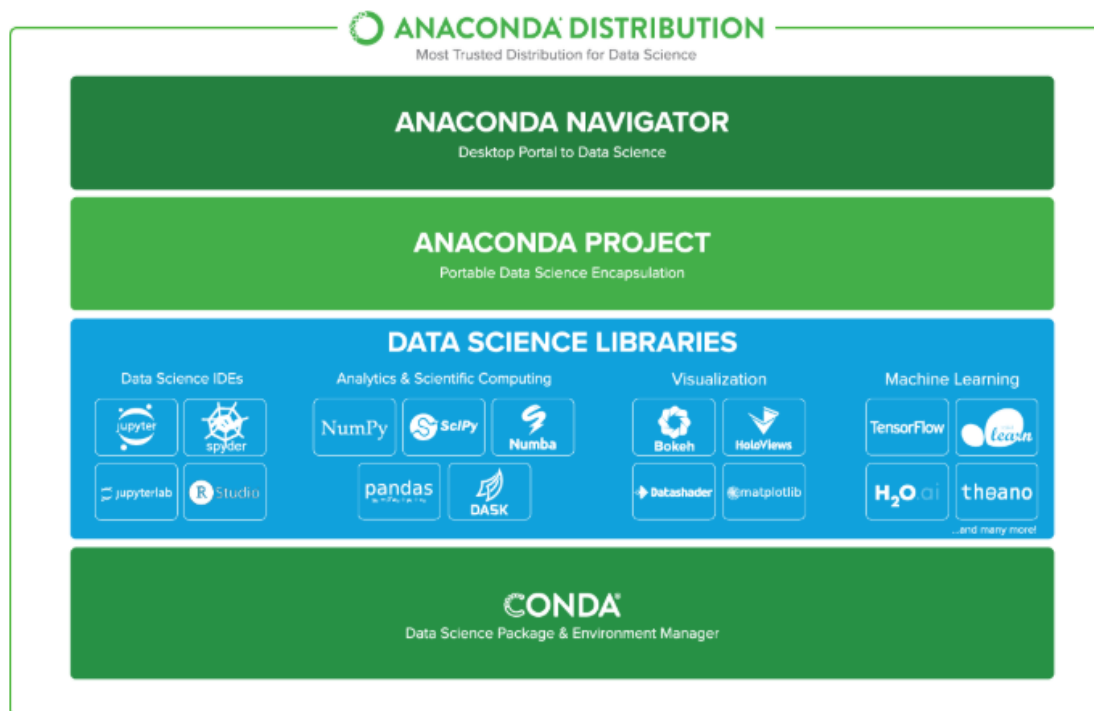
feature helps us to write computationally intensive codes in C/C++ and create a Python wrapper for it so that we can use these wrappers as Python modules. This gives us two advantages: first, our code is as fast as original C/C++ code (since it is the actual C++ code working in background) and second, it is very easy to code in Python. This is how OpenCV-Python works, it is a Python wrapper around original C++ implementation.

And the support of NumPy makes the task easier. NumPy is a highly optimized library for numerical operations. It gives a MATLAB-style syntax. All the OpenCV array structures are converted to-and-from NumPy arrays. So whatever operations you can do in NumPy, you can combine it with OpenCV, which increases number of weapons in your arsenal. Besides that, several other libraries like SciPy, Matplotlib which supports NumPy can be used with this. So OpenCV-Python is an appropriate tool for fast prototyping of computer vision problems.

4.4. FEATURES OF ANACONDA NAVIGATOR

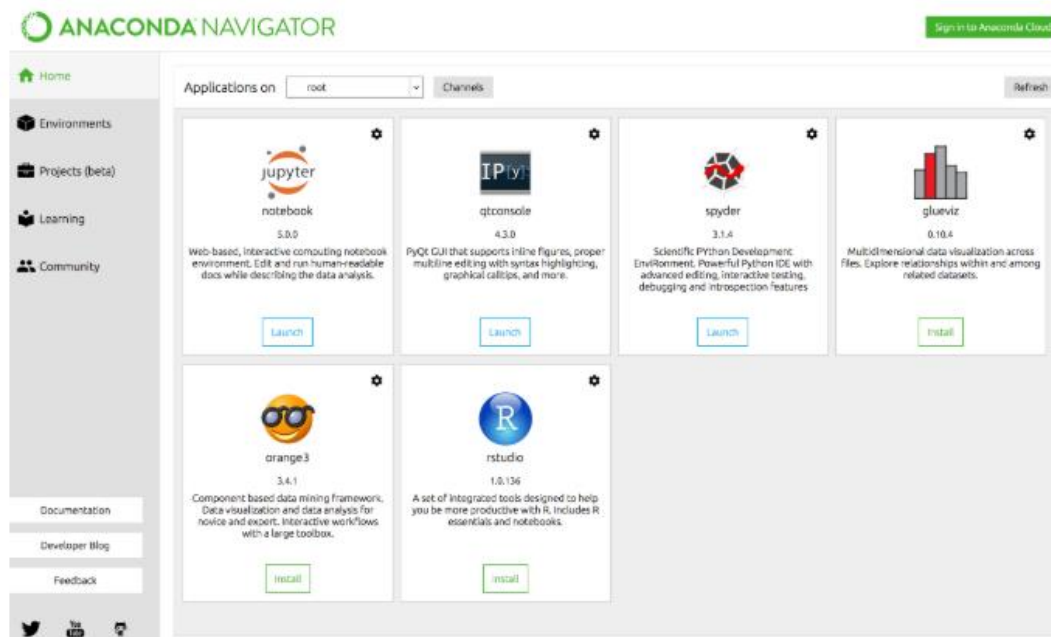
Anaconda is a free and open source, easy to install distribution of Python and R programming languages. Anaconda provides a working environment which is used for scientific computing, data science, statistical analysis and machine learning.

The latest distribution of Anaconda is Anaconda 5.3 and is released in October, 2018. It has the Conda package, environment manager and a collection of 1000+ open-source packages long with free community support.



What is Anaconda Navigator?

Anaconda Navigator is a desktop graphical user interface (GUI) included in the Anaconda distribution. It allows us to launch applications provided in the Anaconda distribution and easily manage conda packages, environments and channels without the use of command-line commands. It is available for Windows, macOS and Linux.



Anaconda Navigator

Applications Provided in Anaconda Distribution

The Anaconda distribution comes with the following applications along with Anaconda Navigator.

1. JupyterLab
2. Jupyter Notebook
3. Qt Console
4. Spyder
5. Glue viz
6. Orange3

7. RStudio

8. Visual Studio Code

> JupyterLab: This is an extensible working environment for interactive and reproducible computing, based on the Jupyter Notebook and Architecture.

> Jupyter Notebook: This is a web-based, interactive computing notebook environment. We can edit and run human-readable docs while describing the data analysis.

> Qt Console: It is the PyQt GUI that supports inline figures, proper multiline editing with syntax highlighting, graphical calltips and more.

> Spyder: Spyder is a scientific Python Development Environment. It is a powerful Python IDE with advanced editing, interactive testing, debugging and introspection features.

> VS Code: It is a streamlined code editor with support for development operations like debugging, task running and version control.

> Glue viz: This is used for multidimensional data visualization across files. It explores relationships within and among related datasets.

> Orange 3: It is a component-based data mining framework. This can be used for data visualization and data analysis. The workflows in Orange 3 are very interactive and provide a large toolbox.

> RStudio: It is a set of integrated tools designed to help you be more productive with R. It includes R essentials and notebooks.

New Features of Anaconda 5.3



Compiled with Latest Python release: Anaconda 5.3 is compiled with Python 3.7, taking advantage of Python's speed and feature improvements.

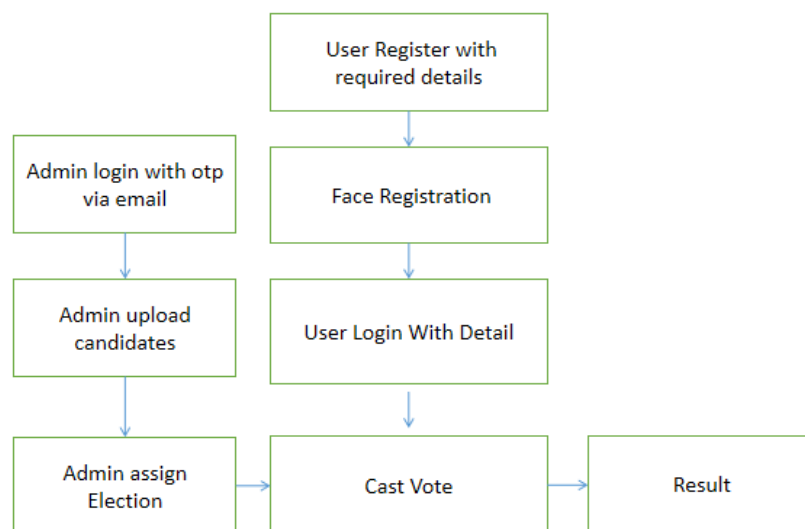
- **Better Reliability:** The reliability of Anaconda has been improved in the latest release by capturing and storing the package metadata for installed packages.

- **Enhanced CPU Performance:** The Intel Math Kernel Library 2019 for Deep Neural Networks (MKL 2019) has been introduced in Anaconda 5.3 distribution. Users deploying TensorFlow can make use of MKL 2019 for Deep Neural Networks. These Python binary packages are provided to achieve high CPU performance.

- **New packages are added:** There are over 230 packages which has been updated and added in the new release.
- **Work in Progress:** There is a casting bug in NumPy with Python 3.7 but the team is currently working on patching it until NumPy is updated.

CHAPTER-5

5.1. SYSTEM ARCHITECTURE



5.2.Modules Description

Register

Registration module is the starting point of this project where a user gone make use of this system by registering himself into it. In this module user will a unique voter id and user gone register with some basic information about him after the user gone complete the registration by giving his face as input and system will read the face and load it in datasets after that registration process is completed.

Data Preprocessing

In this module the collected dataset from user in the time of registration will be stored in folder and all image are resized to standard and unique size and the image are converted to gray scale image and noise are removed.

Feature Extraction

In this feature extraction module, we extract the feature from registered user datasets folder

Admin upload candidates and assign election

Admin is the one who monitor the entire system. First admin has a standard login id and password. Admin can upload election candidates the candidates list must be in a csv file where the candidate's detail like part name email and area the he gone compete with this detail the file will be uploaded from data the details will be uploaded to system. Admin can also monitor the registered user. Admin can also assign election on the upcoming dates.

Login

Now the register user will login in this this system with registered information if information given by the user matches the database the user will be allowed to login into this system. After the user successfully logged in now the user can see the upcoming election if the election was assigned and user can also see the candidates list.

Face Recognition

Every time a new user register or the existing user vote his face will be recognition to check whether user is authorized or not.

Voting

After user logged in now user can vote for his area. After selecting the party, he can vote in that time user face will be recognized and check whether he is an authorized registered user or not if the user is unauthorized user will not allow to vote his vote will not be registered.

See the result

After the user voted his vote now the result will be automatic updated with the vote count.

5.3.UML DIAGRAMS

UML stands for Unified Modeling Language. UML is a standardized general-purpose modeling language in the field of object-oriented software engineering. The standard is managed, and was created by, the Object Management Group.

The goal is for UML to become a common language for creating models of object-oriented computer software. In its current form UML is comprised of two major components: a Meta-model and a notation. In the future, some form of method or process may also be added to; or associated with, UML.

The Unified Modeling Language is a standard language for specifying, Visualization, Constructing and documenting the artifacts of software system, as well as for business modeling and other non-software systems.

The UML represents a collection of best engineering practices that have proven successful in the modeling of large and complex systems.

The UML is a very important part of developing objects-oriented software and the software development process. The UML uses mostly graphical notations to express the design of software projects.

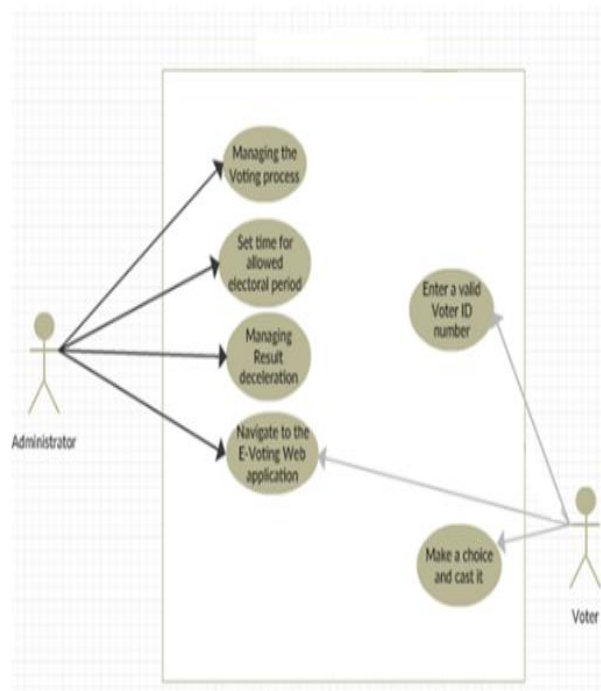
GOALS:

The Primary goals in the design of the UML are as follows:

1. Provide users a ready-to-use, expressive visual modeling Language so that they can develop and exchange meaningful models.
2. Provide extendibility and specialization mechanisms to extend the core concepts.
3. Be independent of particular programming languages and development process.
4. Provide a formal basis for understanding the modeling language.
5. Encourage the growth of OO tools market.
6. Support higher level development concepts such as collaborations, frameworks, patterns and components.
7. Integrate best practices.

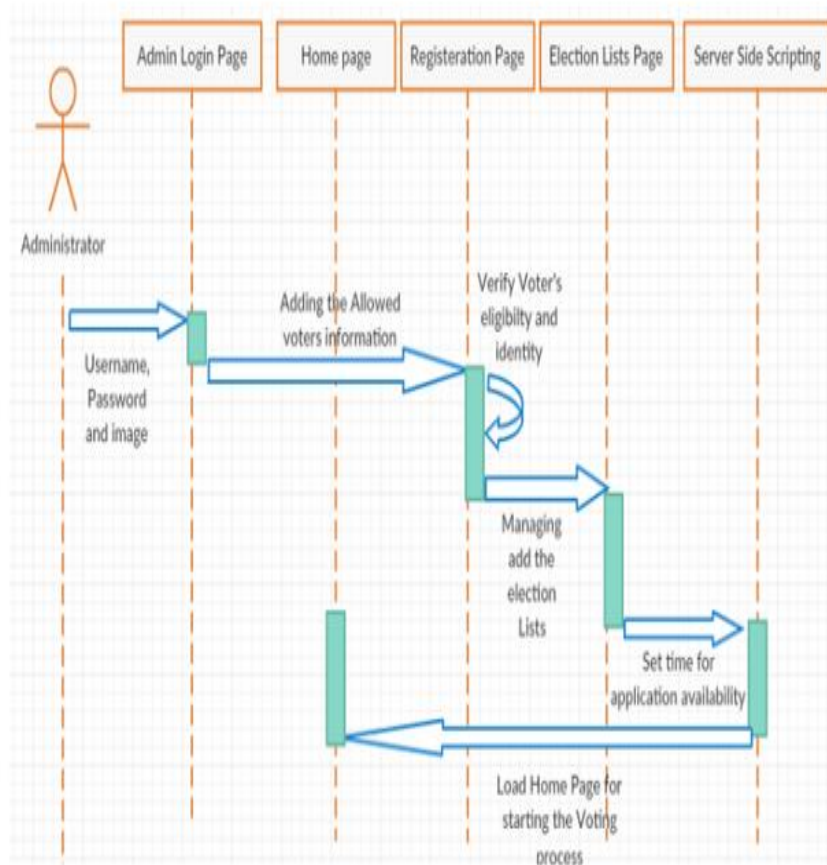
USE CASE DIAGRAM:

A use case diagram in the Unified Modeling Language (UML) is a type of behavioral diagram defined by and created from a Use-case analysis. Its purpose is to present a graphical overview of the functionality provided by a system in terms of actors, their goals (represented as use cases), and any dependencies between those use cases. The main purpose of a use case diagram is to show what system functions are performed for which actor. Roles of the actors in the system can be depicted.



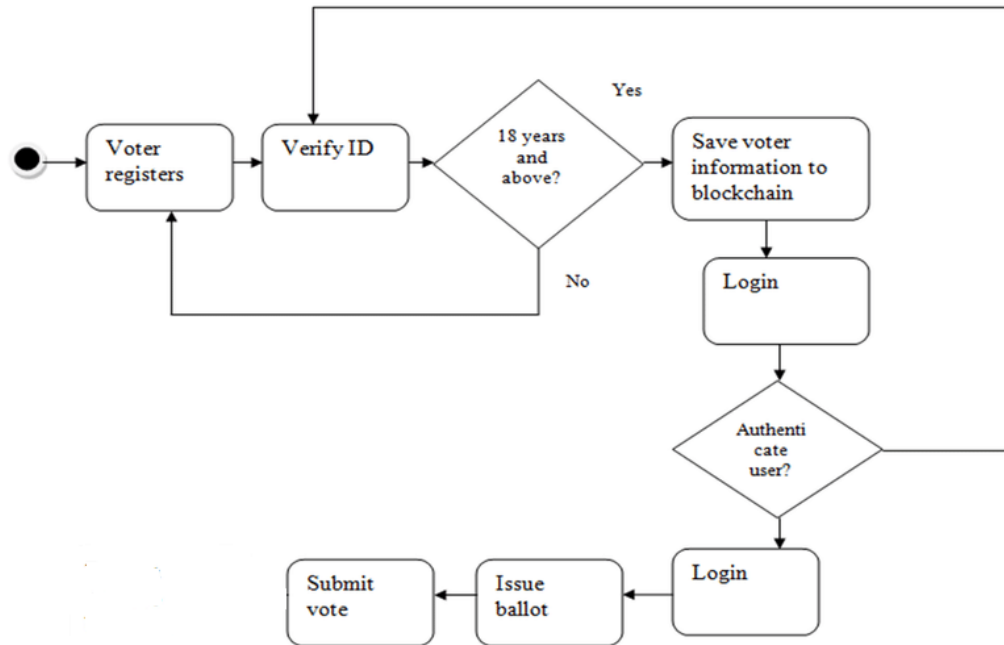
SEQUENCE DIAGRAM:

A sequence diagram in Unified Modeling Language (UML) is a kind of interaction diagram that shows how processes operate with one another and in what order. It is a construct of a Message Sequence Chart. Sequence diagrams are sometimes called event diagrams, event scenarios, and timing diagrams.



ACTIVITY DIAGRAM:

Activity diagrams are graphical representations of workflows of stepwise activities and actions with support for choice, iteration and concurrency. In the Unified Modeling Language, activity diagrams can be used to describe the business and operational step-by-step workflows of components in a system. An activity diagram shows the overall flow of control.



5.4. SOFTWARE TESTING

General

In a generalized way, we can say that the system testing is a type of testing in which the main aim is to make sure that system performs efficiently and seamlessly. The process of testing is applied to a program with the main aim to discover an unprecedented error, an error which otherwise could have damaged the future of the software. Test cases which bring up a high possibility of discovering an error are considered successful. This successful test helps to answer the still unknown errors.

TEST CASE

Testing, as already explained earlier, is the process of discovering all possible weak-points in the finalized software product. Testing helps to counter the working of sub-assemblies, components, assembly and the complete result. The software is taken through different exercises with the main aim of making sure that software meets the business requirement and user-expectations and doesn't fail abruptly. Several types of tests are used today. Each test type addresses a specific testing requirement.

Testing Techniques

A test plan is a document which describes approach, its scope, its resources and the schedule of aimed testing exercises. It helps to identify almost other test item, the features which are to be tested, its tasks, how will everyone do each task, how much the tester is independent, the environment in which the test is taking place, its technique of design plus the both the end criteria which is used, also rational of choice of theirs, and whatever kind of risk which requires emergency planning. It can be also referred to as the record of the process of test planning. Test plans are usually prepared with signification input from test engineers.

(I) UNIT TESTING

In unit testing, the design of the test cases is involved that helps in the validation of the internal program logic. The validation of all the decision branches and internal code takes place. After the individual unit is completed, it takes place. Plus, it is taken into account after the individual unit is completed before integration. The unit test thus performs the basic level test at its component stage and test the particular business process, system configurations etc. The unit test ensures that the particular unique path of the process gets performed precisely to the documented specifications and contains clearly defined inputs with the results which are expected.

(II) INTEGRATION TESTING

These tests are designed to test the integrated software items to determine whether if they really execute as a single program or application. The testing is event driven and thus is concerned with the basic outcome of field. The Integration tests demonstrate that the components were individually satisfaction, as already represented by

successful unit testing, the components are apt and fine. This type of testing is specially aimed to expose the issues that come-up by the component's combination.

(III) FUNCTIONAL TESTING

The functional tests help in providing the systematic representation that functions tested are available and specified by technical requirement, documentation of the system and the user manual.

(IV) SYSTEM TESTING

System testing, as the name suggests, is the type of testing in which ensure that the software system meet the business requirements and aim. Testing of the configuration is taken place here to ensure predictable result and thus analysis of it. System testing is relied on the description of process and its flow, stressing on pre driven process and the points of integration.

(V) WHITE BOX TESTING

The white box testing is the type of testing in which the internal components of the system software is open and can be processed by the tester. It is therefore a complex type of testing process. All the data structure, components etc. are tested by the tester himself to find out a possible bug or error. It is used in situation in which the black box is incapable of finding out a bug. It is a complex type of testing which takes more time to get applied.

(VI) BLACK BOX TESTING

The black box testing is the type of testing in which the internal components of the software is hidden and only the input and output of the system is the key for the tester to find out a bug. It is therefore a simple type of testing. A programmer with basic knowledge can also process this type of testing. It is less time consuming as compared to

the white box testing. It is very successful for software which are less complex are straight-forward in nature. It is also less costly than white box testing.

(V) ACCEPTANCE TESTING

User Acceptance Testing is a critical phase of any project and requires significant participation by the end user. It also ensures that the system meets the functional requirements.

Conclusion

Smart Voting is primarily responsible for the majority of India's city. It should be considered as the main issue for the majority of us. The existing methods for Voting involve manual work with lot of human work and man power and also if convert voting to online it need secured voting system to cast voter's vote. The Machine Learning technique. Are used to recognize person face and check whether voter is a authorized or not.

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APPENDIX

1. SOURCE CODE

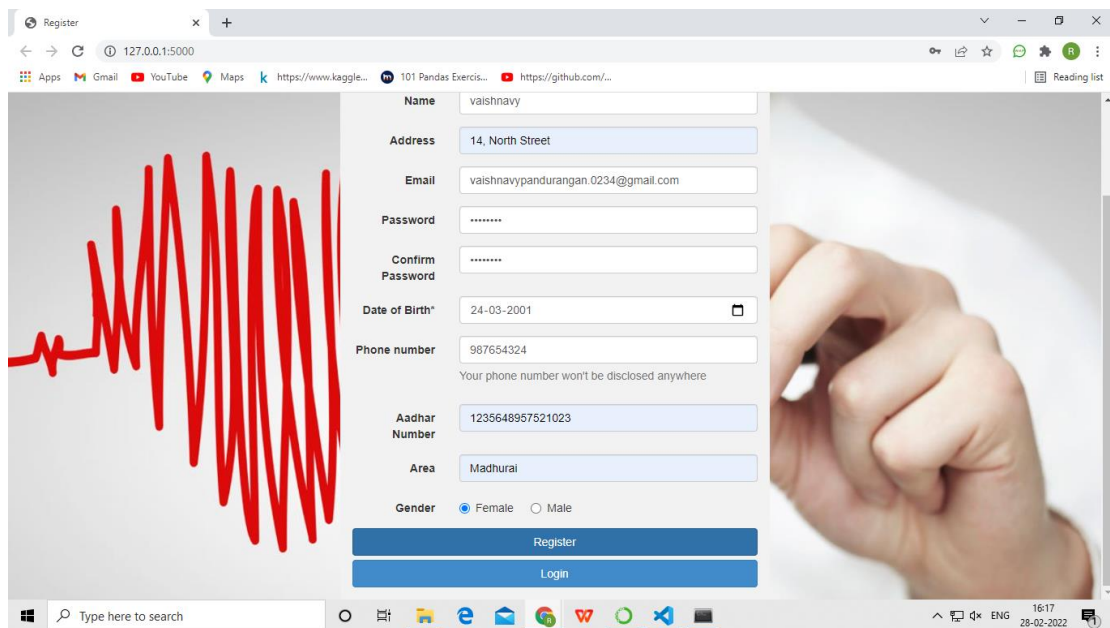
```
from email import message
from flask import *
import sqlite3 as sql
from random import randint
```

```
import datetime
from flask.helpers import url_for
from face_detection import face_register, face_reg
import smtplib
import os
import random
import operator
import string
import cv2
app = Flask(__name__)
app.config['UPLOAD_FOLDER'] = 'static/upload'
app.secret_key = 'any random string'

@app.route("/")
def index():
    def random_with_N_digits(n):
        range_start = 10**(n-1)
        range_end = (10**n)-1
        return randint(range_start, range_end)
    a=random_with_N_digits(10)
```

2. SCREEN SHOTS

A



Register

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Apps Gmail YouTube Maps k https://www.kaggle.com/ 101 Pandas Exercis... https://github.com/... Reading list

Name vaishnavy

Address 14, North Street

Email vaishnavypandurangan.0234@gmail.com

Password

Confirm Password

Date of Birth* 24-03-2001

Phone number 987654324

Your phone number won't be disclosed anywhere

Aadhar Number 1235648957521023

Area Madhurai

Gender ☒ Female ☐ Male

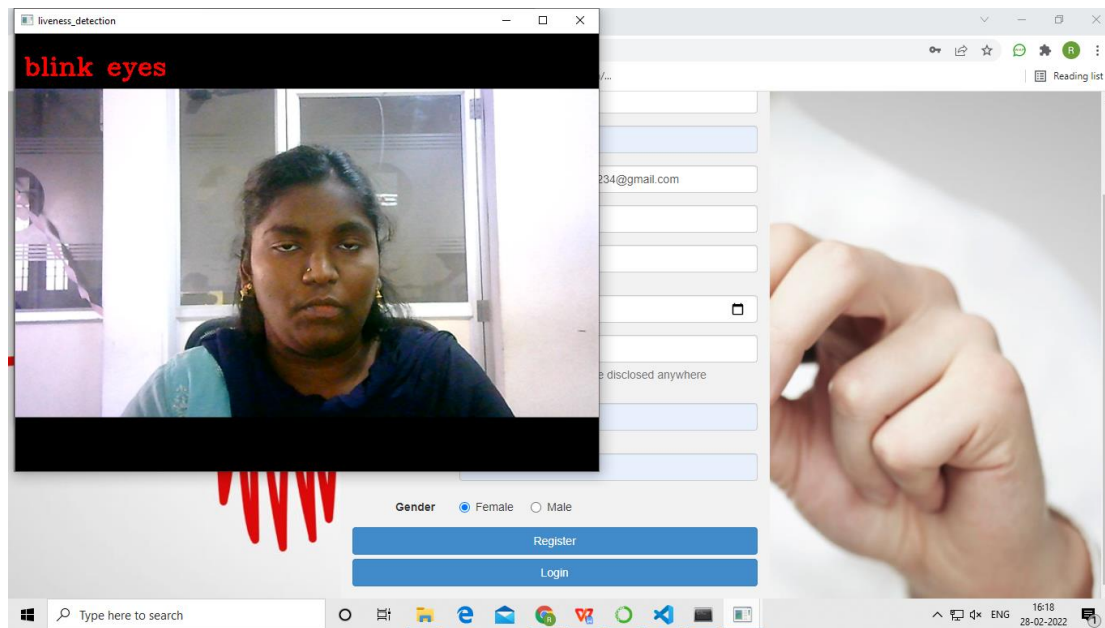
Register

Login

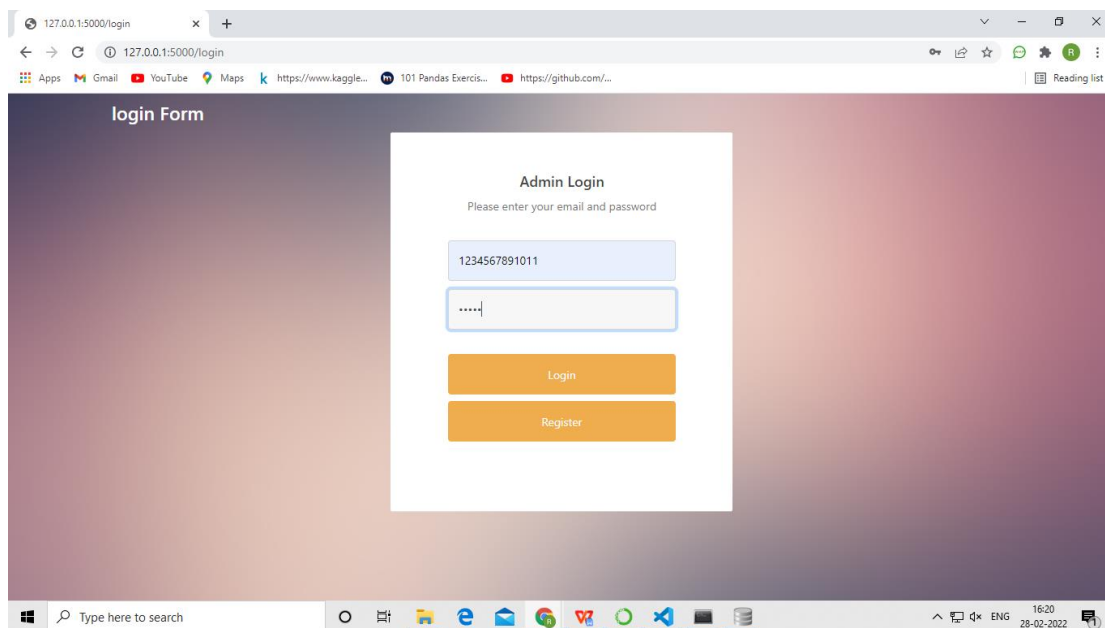
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HOME Delete All Entries

ID	Name	Age	Gender	Address	E-Mail ID	Mobile Number	Area	Party
13	OPS	70	Male	10/Chennai	ops@gmail.com	8907000090	Tambaram	ADMK
14	EPS	68	Male	Madurai	EPS@gmail.com	7058495849	Madurai	ADMK
15	Stalin	70	Male	10/TamilNadu	Stalin@gmail.com	8907563466	Tambaram	DMK
16	Tharik	25	Male	Madurai	Tharik@gmail.com	70603445666	Madurai	DMK

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Indian Election

ID	Name	Age	Gender	Party	Vote
13	OPS	70	Male	ADMK	<button>Vote</button>
15	Stalin	70	Male	DMK	<button>Vote</button>

F

