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MORSE CODE BASED SECURED AUTHENTICATION SYSTEM THROUGH ARTIFICIAL INTELLIGENCE

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Abstract : Data science is a multidisciplinary blend of data inference, algorithm development and technology in order to solve analytically complex problems and also Face recognition has been one of the most interesting and important research fields in the past two decades. In this project, we'll go through general ideas and structures of recognition, important issues and factors of human faces, critical techniques and algorithms, where the individual have to get registered their details and later during login if the information gets satisfied with the previously registered details it moves on to the next step of Morse code. If the information does not match with the registered details it captures the picture and is sent to the to the authorized person through email and finally gives a comparison and conclusion. Gaze-based authentication refers to finding the eye location across sequential image frames, and tracking eye center over time. Password authentication will be done using Morse code, where numbers will be represented in dots and dashes. This model presents a real-time application for gaze-based PIN entry, and eye detection and tracking for PIN identification using a smart camera. Since most of the people in the world are facing problems in the field of authentication and security. We are able to provide a real time eye tracing for password authentication for people who authenticate themselves using Morse code.

Keywords: Morse Code, Face Detection, Password, PIN identification.

I. INTRODUCTION

Face recognition has been active research area in the pattern recognition and computer vision domains. It has many potential applications, such as, surveillance, credit cards, passport, security, etc. A number of methods have been proposed in the last decades. In the field of face recognition, the dimension of the facial images is very high and require considerable amount of computing time for classification. The classification and subsequent recognition time can be reduced by reducing dimensions of the image data. Principal Component Analysis (PCA). Is one of the popular methods used for feature extraction and data representation. It not only reduces the dimensionality of the image, but also retains some of the variations in the image data and provides a compact representation of a face image.
The key idea of the PCA method is to transform the face images into a small set of characteristics feature images, called eigenfaces, which are the Principal Components of the initial training set of face images. PCA yields projection directions that maximize the total scatter all classes, i.e., across all face images. We focus on image-based face recognition. Given a picture taken from a digital camera, we'd like to know if there is any person inside, where his/her face locates at, and who he/she is. Towards this goal, we generally separate the face recognition procedure into three steps: Face Detection, Feature Extraction, and Face Recognition.

Throughout history technology has been the driving force of change. From movable type, to television, to the Internet, technology has been embraced and incorporated into our daily lives. Within the constructs of civilized society, the vast rewards of technological innovations have far outweighed the negatives. Data science is used by almost all the industries like educational institutions, finance, healthcare, business to handle large volume of data .The practical applications range from predicting stock movement to predicting cancer; used in image processing to identity recognition, audio processing for speech to text prediction. The reasons come from the need of automatic recognitions and surveillance systems, the interest in human visual system on face recognition, and the design of human-computer interface, etc. These researches involve knowledge and researchers from disciplines such as neuroscience, psychology, computer vision, pattern recognition, image processing, and machine learning, etc.
With the improved technology comes different ways in which we can make our lives better and more efficient. This led

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to the introduction of many branches ,one of them is Data Science . To put it in simpler words Data science is the study of where information comes from, what it represents and how it can be turned into a valuable resource in the creation of business. Mining large amounts of structured and unstructured data to identify patterns can help an organization rein in costs, increase efficiencies, recognize new market opportunities and increase the organization's competitive advantage.
Machine learning is a field of computer science that often uses statistical techniques to give computers the ability to "learn" (i.e., progressively improve performance on a specific task) with data, without being explicitly programmed .Machine learning is employed in a range of computing tasks where designing and programming explicit algorithms with good performance is difficult or infeasible. Within the field of data analytics, machine learning is a method used to devise complex models and algorithms that lend themselves to prediction. These analytical models allow researchers, data scientists, engineers, and analysts to "produce reliable, decisions and results" and uncover "hidden insights" through learning from historical relationships and trends in the data. Usable security is concerned with the study of how security information should be handled in the system, both at the user interface and in the back-end process, without discarding consideration for resources and costs. Balancing usability and security to achieve optimal result has been defined by the principle of psychological acceptability. According to this principle, a security mechanism should not make accessing a resource, or taking some other action, more difficult than it would be if the security mechanism were not present. This means that a security mechanism should add as little as possible to the difficulty of the user's performing some action. Here the perception of "difficult" should account for the abilities, knowledge and mental models of the system users. In essence, for security to be more usable, it has to be less noticeable.
This project takes account of all those factors and tries achieve a result that is easily attainable by any user that interacts with our system. Currently there are not a lot of amenities for disabled people in the world which helps them to be incorporated in the normal society. Our system hopes to lessen that burden on them and makes sure that they are more integrated with the society.

II.LITERATURE SURVEY

1. Real time Eye Tracking for Password Authentication[1] : proposes a authentication process where a real time application for gaze-based PIN entry, eye detection and tracking for PIN identification using a smart camera. This process leaves no traces of physical footprints behind, therefore offering one of the most secure way to authenticate the password .

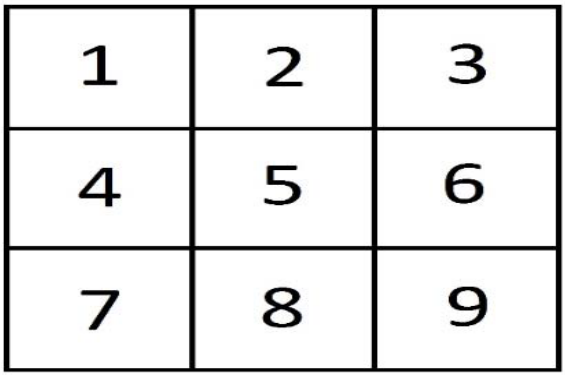

Fig.1 Digital keypad for gaze-based authentication

2. Quantitative Analysis of Tennis Experts Eye Movement Skill[2] : proposes measurement the eye movements of an actual expert tennis player and a beginner tennis player. The measured eye movements of the players are compared and analyzed. The eye movements are recorded using an eye-tracker. Main observation made in this paper is that beginners have a tendency to follow the tennis ball unconsciously for a moment.

3. Smart-Eye Tracking System [3]: proposes a Smart Eye tracking system which is designed for people with disabilities and elder people. The concept of this research is to apply eye movement to control appliances, wheelchair and communicate with caretaker. This system comprises four components, imaging processing module, wheelchair-controlled module, appliances-controlled module and SMS manager module. The image processing module consists of webcam and C++ customized image processing, the eye movement image is captured and transmitted to Raspberry Pi microcontroller for processing with OpenCV to derive the coordinate of eye ball. The coordinate of eye ball is utilized for cursor control on the Raspberry Pi screen to control the system.

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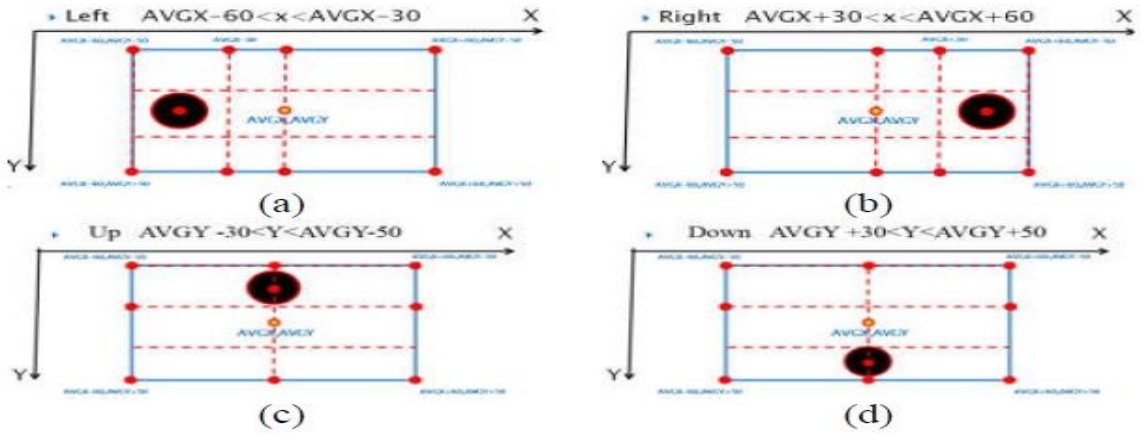

Fig.2

Eyeball Motion Detection

Besides the eye movement, the eye blink is applied in this system for entering a command as when you press, Enter button on keyboard. The wheelchair-controlled module is a cradle with two servos that can be moved to two dimensions and also adaptable to other wheelchair joysticks. This system also remotely controls some appliances and communicate with caretaker via send message to smartphone.

4. Extension of Desktop Control to Robot Control by Eye Blinks Using SVM [4] : proposes to issues related issues related to Accessibility, which should eliminate, or at least reduce, the distance between disabled people and technology. For severely-impaired persons, there are still many challenges that must be overcome. We present eye tracking as a valuable support for disability in the accomplishment of hands-free tasks. Moreover, we stress the potentials of eye-based interfaces to enhance the user-machine interaction process in "traditional" activities based on keyboard and mouse. Through the description of some of the projects we have recently developed a robot which can move according to the movements of the eye balls and can be triggered with some actions based on the eye blinks.

5. Eye Movement Related EEG Potential Pattern Recognition for Real-Time BMI [5]: proposes study which aims at rapid BMI (Brain Machine Interface) pattern recognition for the eye-ball movement, which is considered to be removed factor from EEG (Electroencephalogram) as artefact. We investigated the repeatability of eyeball movement ERP (Event related Potential) and the characteristics, which possess steady, high voltage and 50ms rapid reaction. As ERP pattern discriminator, this paper proposes 3 methods to extract and distinguish characteristic patterns induced by several directional ocular movements.

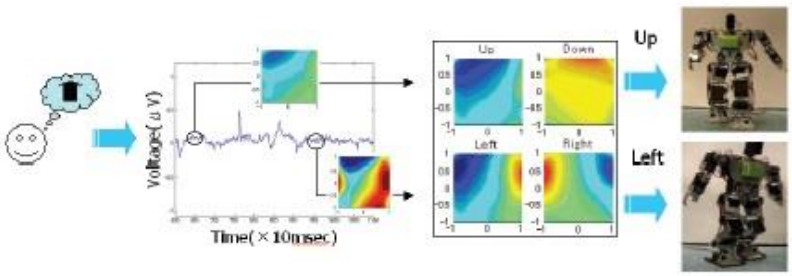

Fig.3 Eye-movement Induced EEG interface Application.

Besides the eye movement, the eye blink is applied in this system for entering a command as when you press Enter button on keyboard. The wheelchair-controlled module is a cradle with two servos that can be moved to two dimensions and also adaptable to other wheelchair joysticks. This system also remotely controls some appliances and communicate with caretaker via send message to smartphone.

6. Eye Contact Game Using Mixed Reality for The Treatment of Children with Attention Deficit Hyperactivity Disorder[6] proposes an observation where many children with ADHD perform poorly in their academics. They also face difficulty in their social lives due to lack of attention and also due to lack interpersonal skills and often continues to their adult life. Considering the problem, this paper offers a solution where they have introduced and demonstrated the benefits of a new type of treatment, an eye-contact game which successfully

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exploits mixed reality technology. To the best of our knowledge, this study is one of the first studies to use a mixed reality head-mounted display to treat children with attention deficit hyperactivity disorder and to prove its potential as a treatment for clinically diagnosed children.

7. The frontal image of a face in non-frontal pose can be reconstructed from a single image, by exploiting affine transformations. An example is the method proposed by Chai et al. The limit of this method is the use of only three face vertical stripes, identified through eye centers, to compute the suitable transformation. This might not be sufficient for a satisfying result. A higher number of regions (patches) are exploited in, under the assumption that there exists a linear mapping between subregions (patches) of non-frontal and frontal images of the same subject. The approach presented by Rudovic et al. includes a training phase where the system estimates a mapping among each single pose and the frontal pose through a suitable Gaussian process regression (GPR). During testing, the pose is first estimated, and then, the appropriate GPR is applied. One limitation of this approach is that only anticipated poses, i.e., those from a predetermined discrete set, can be reliably mapped to a frontal one. Moreover, this requires a computationally expensive training phase. One frontal and one profile image have been shown to recover both 3-D shape and texture information. While exploiting a 3-D model facilitates recovering a frontal pose, the involved computational cost is prohibitive for large-scale applications

8. Characteristic of the attempts to achieve invariance to illumination changes is the method proposed by Gao et al. They define a new extension to the edge map technique, the line edge map, where face contours are extracted and combined in segments, which are then organized as lines. The resulting feature vectors are compared using a modified Hausdorff distance; prefiltering is then applied before engaging in proper authentication. Fisher faces have been shown superior in performance to Gao's methodology as they exhibit a better ability to maximize the between-persons variability while minimizing the within-person differences. According to this and similar results, Li et al argue that the performance of a recognition system can benefit from combining several suitable linear techniques.

9. Another approach uses a ratio-image between the face image and a reference face image. An iterative algorithm updates the reference image, which is reconstructed from the restored image by means of PCA. A different group of techniques relies on near-infrared illumination to obtain face images of good quality regardless of the visible illumination in the environment. These techniques, however, require special hardware. Alternatively, many existing 2-D methods pursue explicit robustness to illumination changes through some normalization technique, rather than devising distortion invariant recognition techniques. A comparison among many illumination normalization algorithms concludes that Self-Quotient Image (SQI) and Local Binary Patterns (LBPs) represent the best solution, in terms of simplicity, speed, and authentication accuracy, when used with eigen-space-based nearest-neighbor classifiers.

10. Generative methods provide a 3-D alternative to the aforementioned approaches, which try to perform both kinds of normalization within the same algorithm. However, not much use has been reported so far. Among the few examples in literature of such methods, Georghiades et al. employ shape-from-shading techniques to extract the face shape for pose correction and the albedo for illumination normalization from a few images of a subject. The derived 3-D model is then used to synthesize a wide set of face views in different pose and illumination conditions. The core underlying hypothesis is that, for each fixed pose of the object/face, all such views form a convex cone in the image space. This convex cone is therefore computed for every subject and pose and then approximated by means of a low-dimensional linear subspace. During testing, the pose of the subject is estimated, and the identity with the nearest cone is assigned to it, using the Euclidean distance. While this method is much better than many alternatives in terms of recognition rate (RR), it also requires a high computational cost during training. Multiview face recognition is yet another example of generative methods. It requires gallery images for each pose and thus cannot handle faces acquired from a quite novel viewpoint.

SYSTEM DESIGN AND ARCHITECTURE

4.1 Design Overview

System design is the process of defining the architecture, components, modules, interfaces and data for the system to satisfy specified requirements. It can also be defined as a process of planning a new business system or replacing an existing system by defining its components or modules to satisfy the specific requirements of the user. It focuses on how to accomplish the objective of the system. It describes how software is decomposed and organized into components and the interfaces between those components.

System design involves Architectural design (describes the structure, behavior and views of the system), Logical design (abstract representation of the data flows, inputs and outputs of the system) and Physical design (describes how data is

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input, processed and displayed in a system).

System design is one of the most important phases of software development process. System design takes problem statement, requirements determination plan, current situation analysis and proposed system requirements as input and gives a data schema, function hierarchy diagram, a prototype for the proposed system as output. It is a crucial part in system development without which the proposed system cannot be developed.

4.2 System Architecture

System architecture is the conceptual model that defines the structure, behavior and views of a system. A system architecture can consist of system components that will work together to implement the overall system.

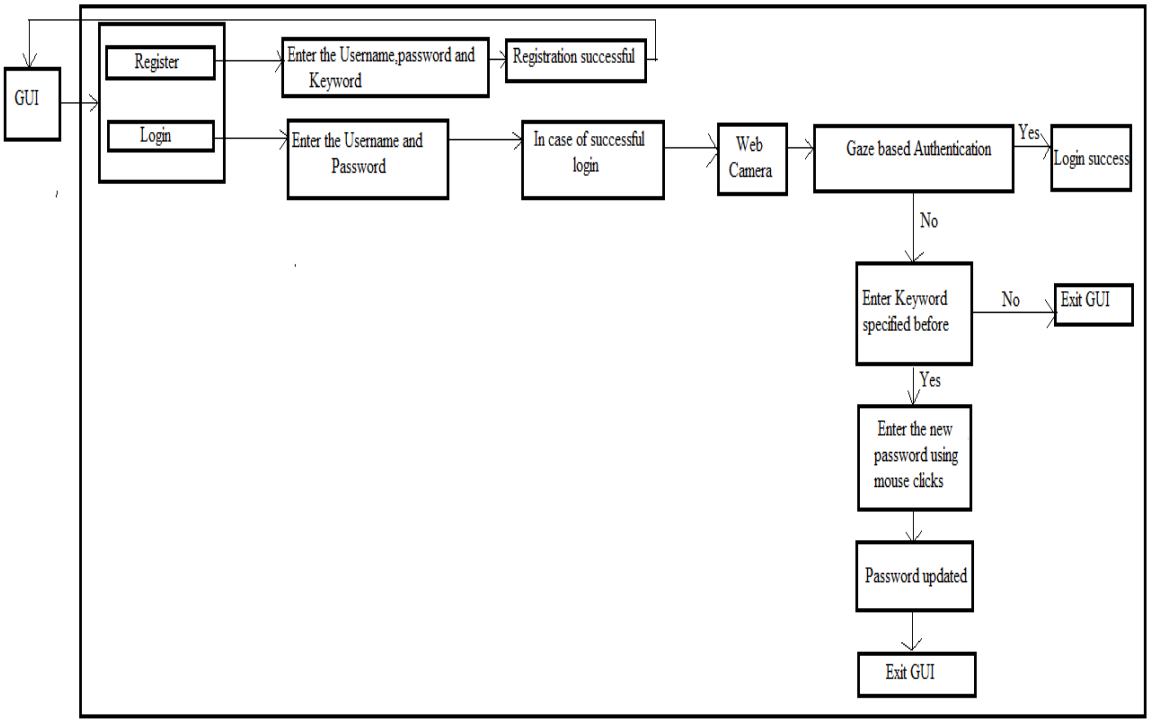

Fig .4.2 Architecture of the model

In the above fig 4, represents the architecture or the basic design that is required for the implementation of the model. The model consists of a user interface and backend database.
GUI is created such that the user can interact with the system. Pygame or OpenCV is used in to create it.
In the frontend firstly the user needs to register by providing a user id of choice, a password (PIN) and a keyword. After registration the user can log in by using the credentials i.e., user id and password. With the help of a web camera the PIN is taken as input in the form of Morse code.

In the backend, the entered PIN is checked with the stored PIN which was entered into the database by the user while registering. If the entered PIN is not correct, it exits the screen. If the entered PIN is correct, it displays successful authentication. If the user has forgotten his password, then he can use the keyword to authenticate and update the existing password with a new one.

System Diagram of Face Recognition

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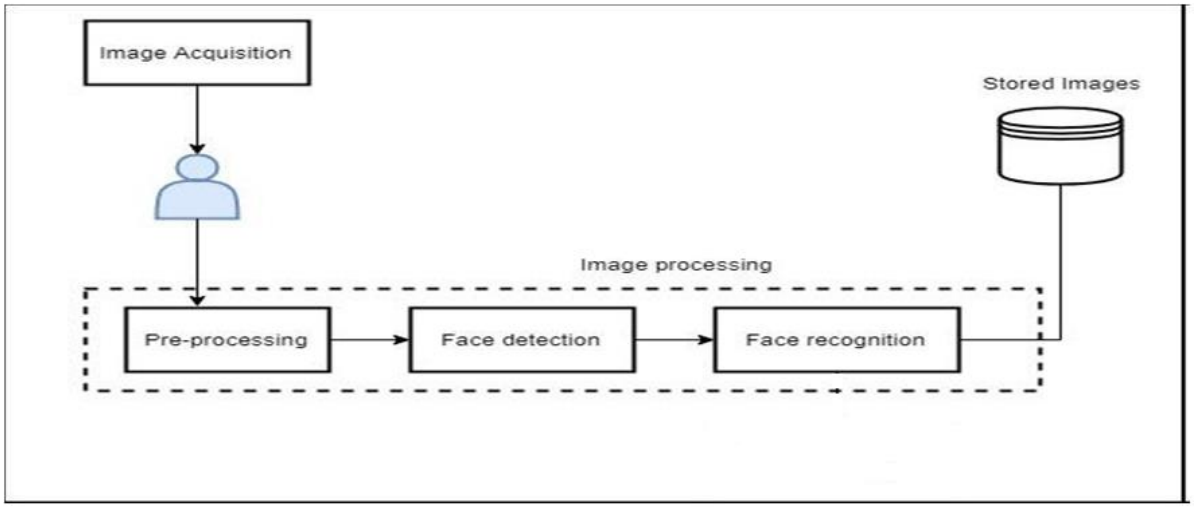

Overall Architecture:

4.3 Dataflow Diagram

A dataflow diagram (DFD) maps out the flow of information/ data for processes or systems. They use defined symbols like rectangles, circles, arrows and text labels to show data inputs, outputs, storage points and routes used by the system. DFDs can be simple, hand drawn overviews to in depth descriptive diagrams that delve deeper into the flow of data.

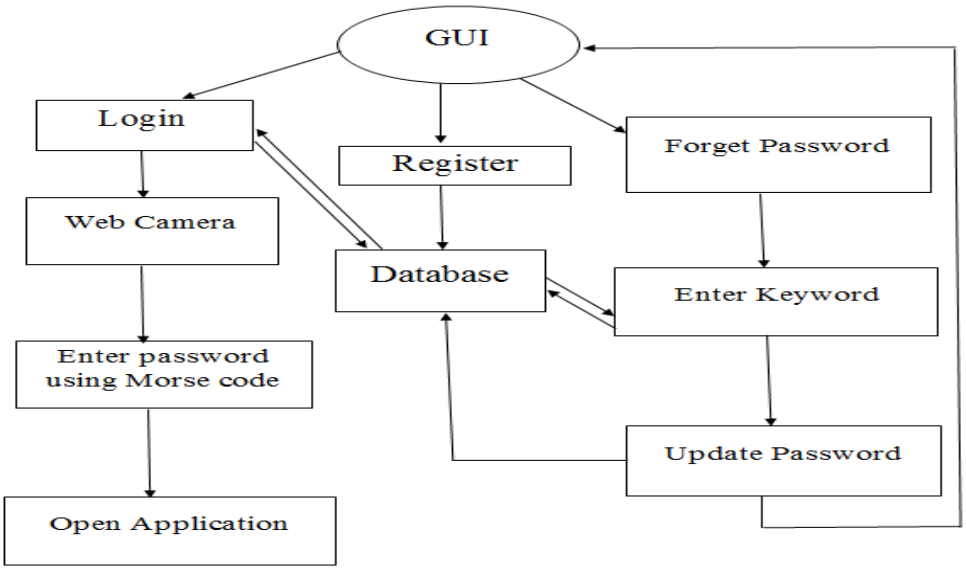

Fig 4.3 Dataflow diagram of the model

The above diagram represents the dataflow diagram of our project. With the GUI (Graphical User Interface) the user can register as a new user by providing the required credentials or log in if the user is already an existing user. After registration the details of the user is stored in a database. This database is checked for the user credentials when the user logs into his account to verify whether the user exists or not.

The webcam is used to identify the user and takes input of the password that is entered in the form of Morse code. The webcam converts the blinks generated by the user into Morse code. When the password matches then the required application is opened.

In the case that the user has forgotten his password then the user needs to answer the security question for which the user had given a keyword at the time of registration. When the keyword is matched with the one in the database then the user can update the password with mouse clicks in the form of Morse code. This change is also updated in the database in real time.

4.4 Use case Diagram

A use case diagram in the Unified Modeling Language (UML) is a type of behavioral diagram defined by and created

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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 diagram is to show what system functions are performed for which actor. Roles of the actors in the system can be depicted.

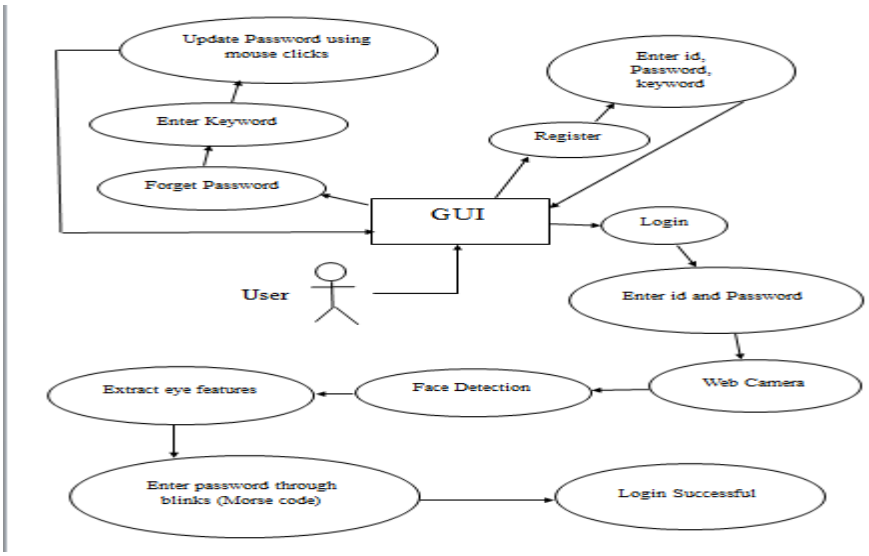

Fig.4.4 Use Case diagram of the model

The above diagram depicts the Use case diagram for our project. When the user interacts with the GUI (Graphical User Interface) they can login or register themselves as a user. When the user is registering they need to provide a user id, password and a keyword.

When the user needs to log in to their account then they need to enter their user id and password. Once they are recognized as genuine users then the web camera is launched. The webcam is used to identify the users face and it begins to extract the features of the eye in real time. During this time the user needs to enter their password in the form of Morse code by blinking their eyes. If the user is able to correctly enter the password then their login is successful.
Suppose there occurs a situation where the user is not able to remember their password or wants to change their password then the user needs to answer the security question with the keyword that they had given when they had registered. When the keyword matches the password can be updated.

4.5 Sequence Diagram

A sequence diagram simply depicts interaction between objects in a sequential order i.e., the order in which these interactions take place. Sequence diagrams describe how and in what order the objects in a system function. Sequence diagrams are sometimes also called event diagrams, event scenarios and timing diagrams.

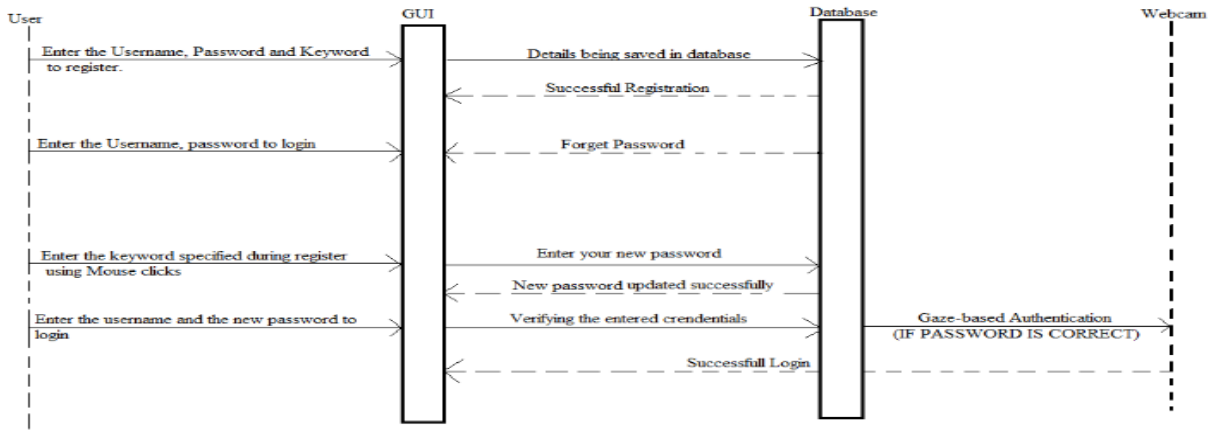

Fig 4.5 Sequence Diagram for the model

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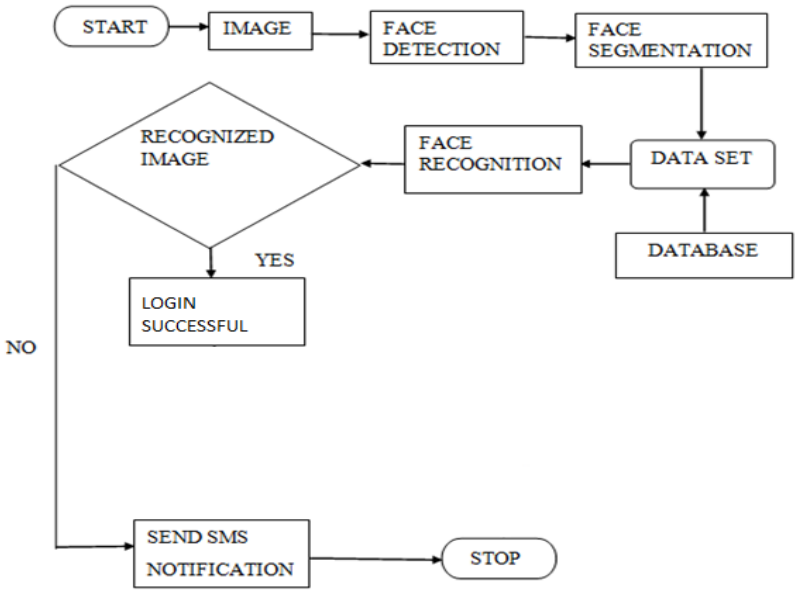
The above diagram represents the sequence diagram of the model. This diagram consists of three components. They are GUI, database(txt file) and a webcam. The User has to perform three actions here. First action is the register process, where the user has to enters the username, password and keyword. The communication is between user and GUI. After a successful register process, the second action is performed where the user has to login. If the credentials matches then the user can proceed through gaze-based authentication. Here the user has to blink his eyes to enter the password in morse code. If the user forgets his password, the third action is invoked where the user has to create a new password. The new password is created using mouse clicks. Then the user can re-enter his credentials, if it is a match to the details that was entered in register, then the user can the password through gaze-based software.

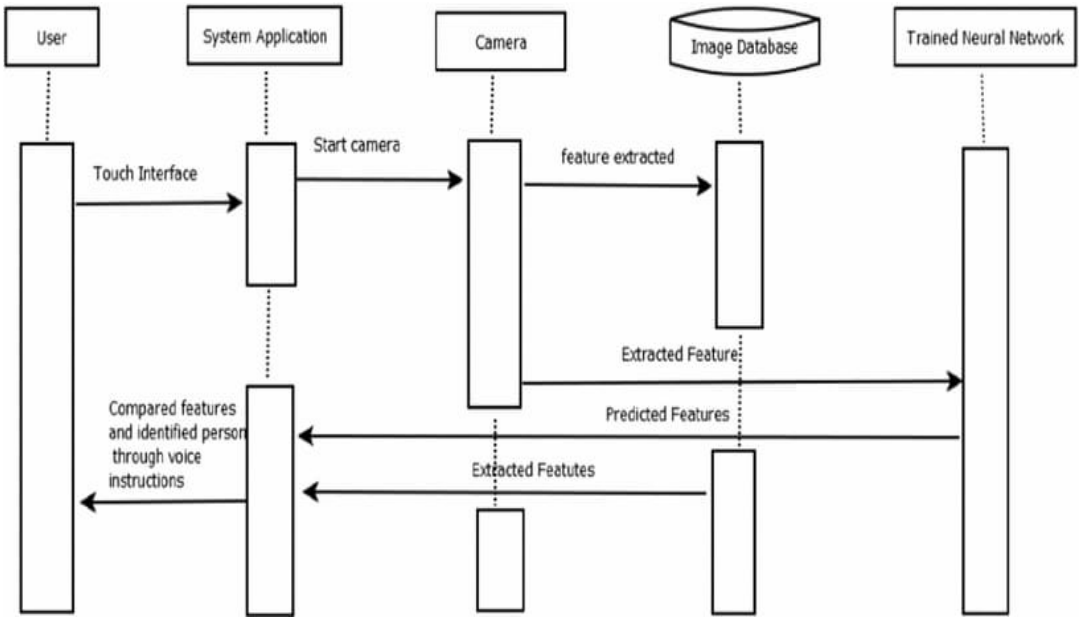
4.6 Data Flow Diagram

1. Face recognition



4.7 Sequence diagram

1. Face recognition



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CHAPTER 5

IMPLEMENTATION

Implementation is the process of converting a new system design into an operational one. It is the key stage in achieving a successful new system. It must therefore be carefully planned and controlled. The implementation of a system is done after the development effort is completed.

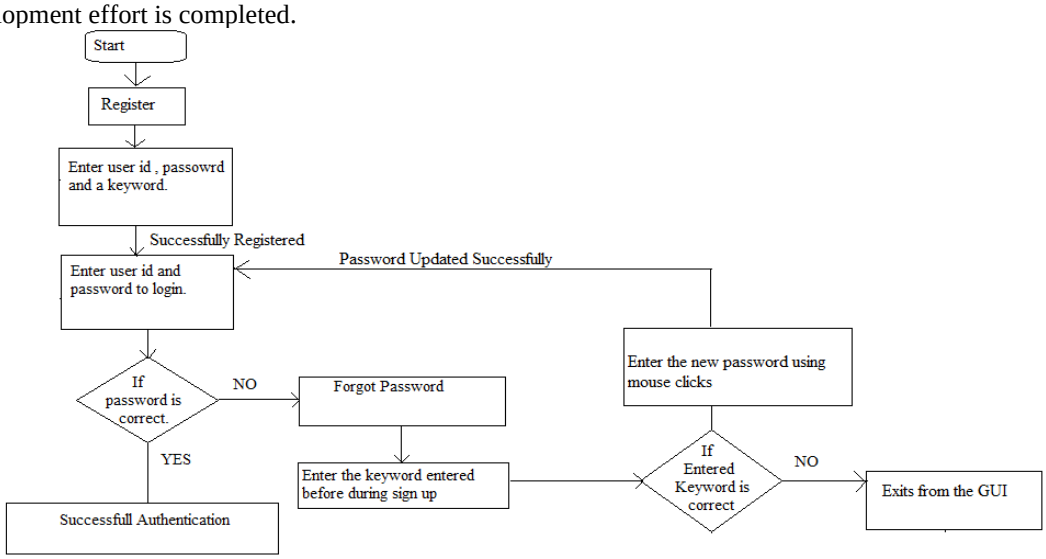

Fig 5: Implementation of the model

When the user firsts open this application a GUI (Graphical User Interface) will prompt the user whether he wants to login or register as a new user. When the user registers, they need to provide the required credentials such as user id, password and keyword. The inputs are stored in a database. When to user needs to login then they must enter the correct credentials which they had given while registering. If the credentials match the ones which were given when they had registered then the authentication is successful. If the credentials are not matching then they must answer the security question with the keyword which they had given when they had registered at the start. If the keyword matches then the user can update the password using the mouse buttons. The updated password is changed in the database. Hence the next time the user logs in they can use the new password which they have set. In a scenario where the keyword does not match then the user exits from the GUI application.

RESULTS AND SNAPSHOTS

This section describes the screens of the “Real Time Eye Tracking for Password Authentication”. The snapshot foreach module is shown below.

Snapshot 1: Home terminal of the system

This is the home terminal of the real Time Eye Tracking for Password Authentication.

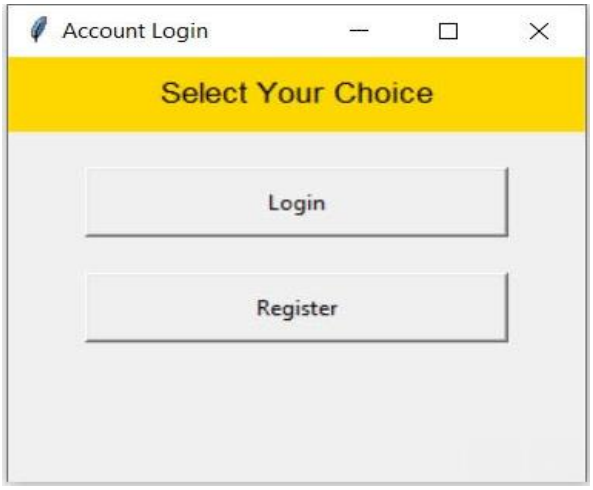

Fig 7.1 Home Terminal of the system

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Snapshot 2: Register terminal and register success terminal

This is register terminal and register success terminal of the Real Time Eye Tracking for Password Authentication.

Fig 7.2 Register terminal and registration success terminal

Snapshot 3: Login terminal and login success terminal

This is login terminal and login success terminal of the Real Time Eye Tracking for Password Authentication.

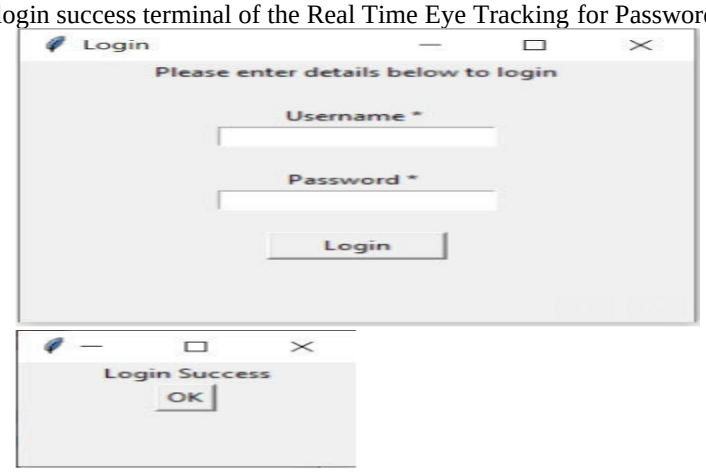

Fig 7.3 Login terminal and login success terminal

Snapshot 4: Incorrect password terminal

This is incorrect password page of the Real Time Eye Tracking for Password Authentication.

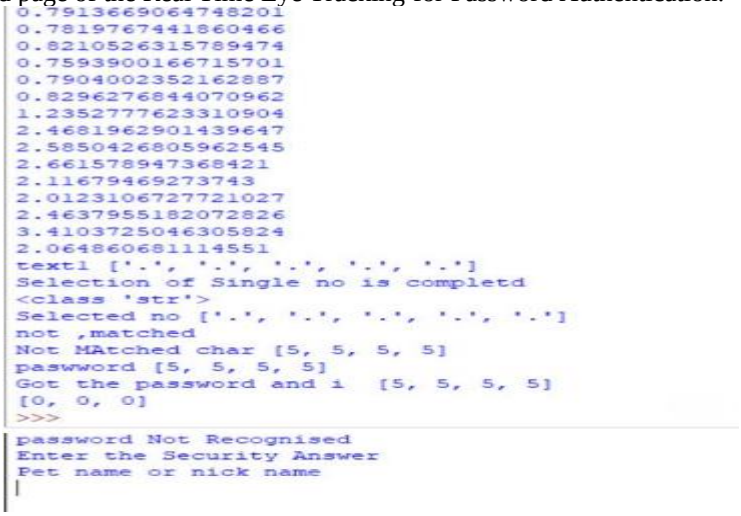

Fig 7.4 Incorrect password page

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Snapshot 5: Mouse click page.

This is the mouse click page of the Real Time Eye Tracking for Password Authentication.

Fig 7.5 Morse Code Page

Snapshot 6: Password matching page

This is the password matching page of the Real Time Eye Tracking for Password Authentication.

```
paswword ['5', '5', '5', '5']
Got the password and inputpassword  ['5', '5', '5', '5'],['5', '5', '5', '5']
Got the password and inputpassword  <class 'list'>,<class 'list'>
Got the password and inputpassword  ['5', '5', '5', '5'],['5', '5', '5', '5']
Got the password and inputpassword  ['5', '5', '5', '5'],['5', '5', '5', '5']
Got the password and inputpassword  <class 'str'>,<class 'list'>
Got the password and inputpassword  ['5', '5', '5', '5'],['5', '5', '5', '5']
Password matches
>>>
```

Fig 7.6 Password matching page

CHAPTER 6

CONCLUSION AND FUTURE ENHANCEMENT

Our project basically provides two factor authentication. Two factor authentication is basically providing two layers of security to protect an account or system. Here we are making use of gaze-based authentication and mouse click in order to convert numbers or alphabets into source code thereby increasing the security.

This project is also helpful for disabled people in order to authenticate. People from kids to old people can make use of this model who have basic knowledge on morse code. For blind people, there are keyboards with braille dots present on each button.

Concerning the future enhancement, we are trying to implement facial recognition for each user, there will be no need to enter the password at all.

We are also trying to deploy this model in government sectors, with a smaller number of steps required for authentication

REFERENCES

- Katie A. Hart, Jennifer Chapin, and Dr. Kyle B. Reed, “Haptics Morse Code Communication for Deaf and Blind Individuals” 38th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), 2016
- Cheng-Hong Yang, Ching-Hsing Luo, Yuan-Long Jeang, Gwo-Jia Jon, A novel approach to adaptive Morse code recognition for disabled persons, In Mathematics and Computers in Simulation, Volume 54, Issues 1–3, 2000, Pages 23-32.
- Albano Carrera, Alonso, Ramón de la Rosa and Evaristo J. Abril, “Sensing Performance of a Vibrotactile Glove for Deaf-Blind People”, Optical Communications Group, ETSI de Telecomunicación, Universidad de Valladolid, Paseo Belén, 15, 47011 Valladolid, March 2017, Spain; ejad@tel.uva.es
- Shubham Oulkar1, Ram Bamane, Sagar Gulave and Pravin Kothawale, “Voice Controlled Home Automation Using Raspberry Pi 3”,Student, E&TC, Sanjay Ghodawat Institute,Atigre , India