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MORSE CODE-BASED AUTHENTICATION SYSTEM

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Abstract - To tackle analytically complex issues, data science is a multidisciplinary combination of data inference, algorithm development, and technology. Nearly every industry, including business, finance, healthcare, and education, uses data science to manage massive volumes of data. Practical uses include text prediction, image processing, identity recognition, audio processing for speech, stock movement, and cancer prediction. Given that the majority of individuals on the planet have issues with security and authentication, For those who use Morse Code for self-authentication, we can offer real-time eye tracing for password authentication. As we all know, the 21st century has seen significant support for advancements in authorization and authentication technology. Since the late 1990s, personal identification numbers, or PINs, have been extensively used for user authentication and security. These days, it is easy to crack PIN codes, so we would rather use a different strategy. On the other hand, PIN authentication using hands-off gaze-based PIN entry techniques offers a more secure password entry option because it leaves no physical traces behind.

***Key Words*:** Morse code, Face recognition, Pin Entry, Eye Blinks, Gaze based

1. Introduction

The enormous benefits of technological advancements have greatly surpassed the drawbacks within the framework of civilized society. Additional ways to improve and streamline our lives are brought about by the advancement of technology. As a result, other branches were introduced, data science being one of them. Stated differently, data science is the study of information origins and representations and how it frequently becomes an important tool in the development of businesses. An organization can benefit from mining vast volumes of organized and unstructured data to find trends.

1.1 Problem Statement

To give physically challenged and disabled persons a platform where they can make a private, secure account that only they can access. Instead of entering a code via a keyboard, our solution would boost authentication slightly and enable users with motor limitations to engage with gadgets. This concept provides a catchphrase while utilizing less of the modern hardware sensors.

1.2 Existing System

The 21st century has witnessed advancements in authorization and authentication technology. Since the late 1990s, personal identification numbers, or PINs, have been extensively used for user authentication and security. These days, PINs are frequently easy to crack, so it is preferable to choose a different technique. On the other side, PIN authentication using hands-off gaze-based PIN entry techniques offers a safer password entry option because it leaves no physical trace.

1.3 Proposed System

The model is composed of a backup database and an interface. The GUI is designed to allow user interaction with the system. To make it, Pygame or OpenCV are used. The user had to first register on the front end by entering their preferred user ID, a password (PIN), and a keyword. Following registration, the user can access their account by entering their password and user ID. The PIN is entered into the Morse with the help of an internet camera. The PIN that was input is compared in the backend with the saved PIN that the user submitted at registration.

1.4 Objective

To provide a safe approach for verifying users who aren't blind in all directions. to develop a Morse Code-based secure password authentication system. to ensure that the system correctly recognizes the designated facial features. Anyone with a rudimentary understanding of Morse code, regardless of age, can use this device. There

are keyboards with braille dots on each button for those who are blind.

2. Scope of the project

Eye trackers are highly effective for ensuring security and preventing fraud in government and banking sectors. These devices measure visual activities and allow individuals, including those with physical disabilities, to use their eyes to communicate with computers. The main objective of this project is to provide an authentication procedure that people of all ages and abilities can use. Financial institutions and payment processors can utilize the system to authenticate users accessing online banking and payment services. Additionally, online merchants can employ this technology to ensure secure financial transactions when authenticating customers making purchases. Healthcare institutions by using this method to authenticate patients who access their electronic health records, healthcare practitioners may ensure that sensitive medical data is accessed securely. Education institutions by using this system to authenticate students' access to online tests and course materials, educational institutions may guarantee safe access to learning resources. Government institutions ensure secure access to sensitive data, government institutions can utilize this system to authenticate people accessing online services including social security, tax filing, and passport applications. Travel and Hospitality Institutions This system can be used by the travel and hospitality sectors to verify individuals making bookings and payments, guaranteeing safety.

3. System Requirement

3.1 Introduction

Project requirements are prerequisites or activities that need to be fulfilled for the project to be successful or finished. They give an accurate image of the tasks that must be completed. They are intended to match the organization's goals with the project's resources. Reduction of costs, increased project success rates, enhanced stakeholder communication, and more efficient change management are all advantages of collecting project requirements well. Requirements that specify the project's final goal are essential to any logical and sensible undertaking. A requirement is a goal that needs to be accomplished. Most needs are expressed in functional terms by planners, while developers are tasked with handling implementation and design details. Aspects of the user interface, price, performance, and reliability targets can all be specified in great detail. Sometimes, people give more accurate than realistic descriptions of their goals. Project requirements offer a clear means of assessing a project's quality; yet, as a final assessment should check to see if all criteria have been completed, it is seldom quite that simple. During a project, requirements frequently change, which means that the finished output might not match the original.

3.2 Functional Requirements

The following are the main functional requirements:
1) Web camera data is used to properly authenticate to reliably detect the user's eye.
2) To set up an eye typing pin entry system.
3) To improve security through the prevention of replay attacks.

3.3 Non-Functional Requirements

Rather than focusing on particular behaviors, a non-functional requirement (NFR) outlines criteria that can be used to assess how well a system operates. Functional requirements, which specify particular behaviors or functions, are contrasted with NFR. Because non-functional requirements are typically structurally significant, the strategy for implementing them is defined in the system architecture, while the plan for implementing functional requirements is detailed in the system design.

3.4 Software Requirements

1) Operating system: Windows 7/8/10, XP, 7
2) Programming Language: Python
3) Programme: Python 3.7 or Anaconda
4) Python IDE
5) Packages: OpenCV (5)

3.5 Hardware Requirements

Hardware specifications
1) System: Intel Core i3/i4/Pentium IV 2.4 GHz, etc.
2) Hard drive: 500 gigabytes
3) Ram: 4 GB

4. System Design and Architecture

4.1 Design Overview

The process of defining the architecture, parts, modules, interfaces, and data for a system to meet predetermined requirements is known as system design. It may also be described as the process of creating a new business system or updating an old one by specifying each module or component to meet the exact needs of the user. It concentrates on how to achieve the system's goal. It explains the partitioning and organization of software into its constituent parts as well as the interfaces that connect them.
System design includes three components: physical design, which explains how data is entered, processed, and presented during a system's life, logical design, which is an abstract description of the information flows, inputs, and outputs of the system, and architectural design, which describes the structure, behavior, and viewpoints of the system.

4.2 System Architecture

The conceptual model that outlines a system's behavior, structure, and viewpoints is called system architecture. System components that cooperate to implement the overall system can be found in a system architecture.

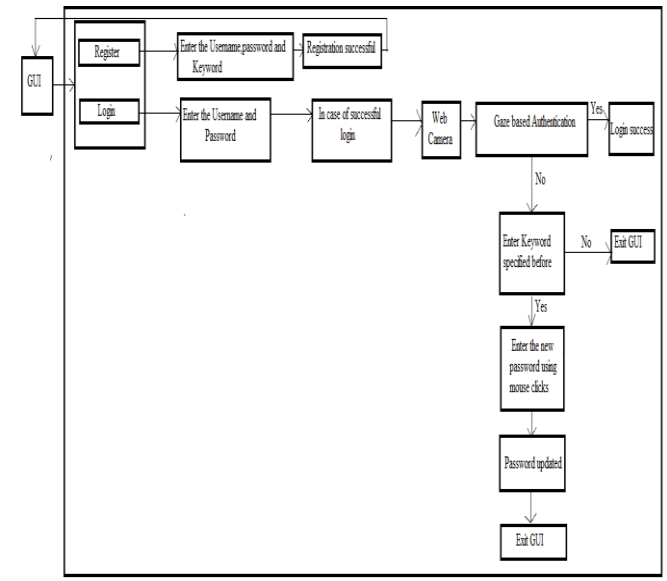

Fig 4.2 System Architecture

Above fig., symbolizes the fundamental architecture or design needed to put the model into practice. The model is composed of a back database and an interface. The GUI is designed to allow user interaction with the system. To make it, Pygame or OpenCV is used. The user had to first register on the front end by entering their preferred user ID, a password (PIN), and a keyword. Following registration, the user can access their account by entering their password and user ID. The PIN is entered into the kind of Morse with the help of an internet camera.

5. Implementation

5.1 Overview

A GUI (Graphical User Interface) will ask the user if he wants to log in or register as a new user when he first launches this application. The user must enter the necessary information during registration, including their user ID, password, and keyword. A database houses the inputs. When a user has to log in, they need to use the same credentials they used to register. The authentication is successful if the credentials are the same as those provided at registration. They must use the keyword they entered when they first registered to respond to the security question if their credentials do not match. The user can change the password if the term matches.

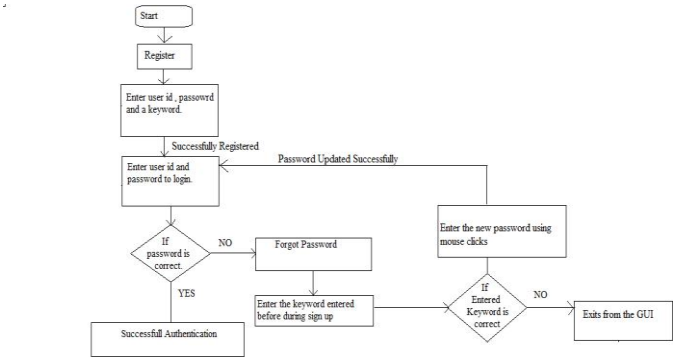

Fig 5.1 Implementation

5.2 Facial Landmark Algorithm

Finding points of interest in a photo of a person's face is known as facial landmark detection. For instance, we have demonstrated the ability to recognize emotion through facial motions, gaze direction estimation, face swapping, altering the appearance of faces using graphics, and manipulating virtual figures through puppetry. The landmark detector needs to locate dozens of locations on the face, including the jawline's outline, the corners of the mouth and eyes, and many more, to accomplish this. OpenCV was used to develop and implement a large number of algorithms. A trained model is necessary to use the face mark detector. We have employed the shape_predictor_68_face_landmarks pre-trained model.

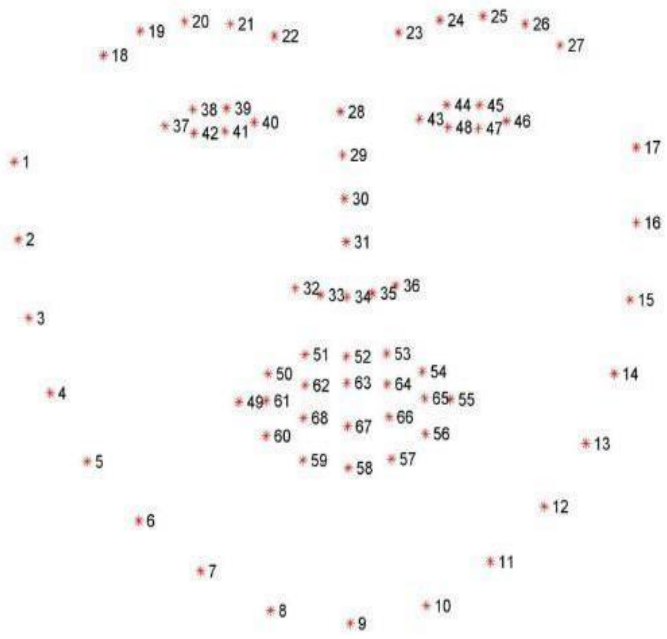

Fig 5.2 Facial Landmark Algorithm

5.3 Haar Cascade Algorithm

An item can be recognized in an image or video using the machine learning object detection algorithm Haar Cascade. This method is based on machine learning, and it involves training a cascade function with a large number of both positive and negative images. Next, it's applied to identify things in more pictures.
There are three phases to the algorithm:
1) Select Features With Haar
2) Producing Complete Pictures
3) Classifiers that cascade

5.4 OpenCV

A library of programming functions called OpenCV (Open Source Computer Vision) is primarily focused on real-time computer vision. Initially created by Intel, Itseez (which Intel later purchased) and Willow Garage provided support for it. Under the terms of the open-source BSD license, the library is cross-platform and free to use. TensorFlow, Torch/PyTorch, and Cafe are deep learning frameworks that are supported by OpenCV. It supports Windows, Linux, Android, and Mac OS and includes interfaces in C++, Python, Java, and MATLAB. With a preference for real-time vision applications, OpenCV uses MMX and SSE instructions when they are available. Currently, there is considerable development underway to create fully functional CUDA and OpenCL interfaces. More than 500 algorithms exist, and around ten times as many functions either support or comprise those algorithms. OpenCV features a templated interface that integrates well with STL containers and is written entirely in C++.

6. Testing and Results

Quality is frequently attained by testing the product using various methods at various stages of the project's development. The goal of testing is to find mistakes. The process of testing a work product involves attempting to find every potential flaw or vulnerability. It explains how to assess an assembly's or a product's final product's functioning. It is the process of testing software to make sure it satisfies user expectations and needs and doesn't malfunction unacceptably. Different test kinds exist. Every test type responds to a certain testing need.

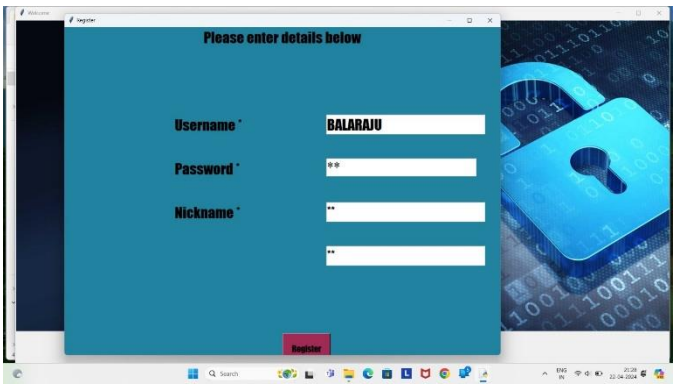

Fig 6.1 Registration Page

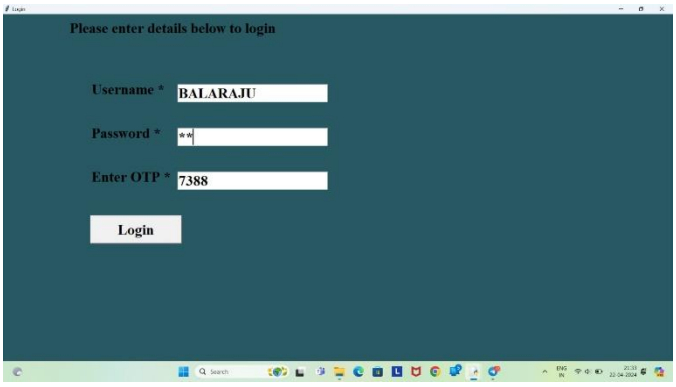

Fig 6.2 Login Page

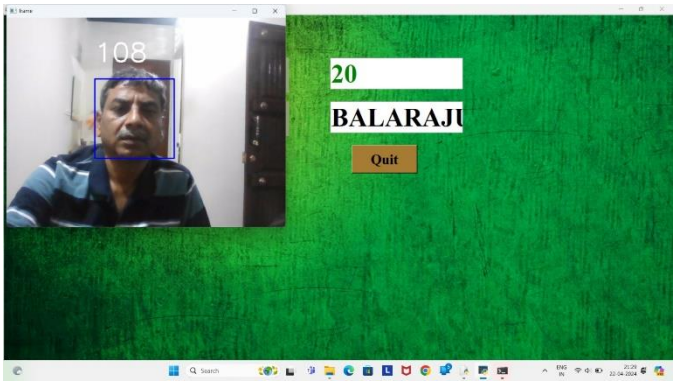

Fig 4.2 Face Registration

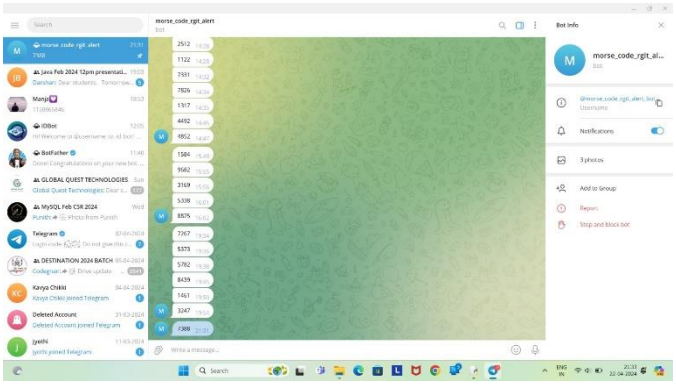

Fig 5. User Login through OTP

Fig 6. Unknown user alert message through BOT

7. Conclusion

In essence, two-factor authentication is what our project offers. Two layers of security are guarding a system or account with two-factor authentication. Here, we're using gaze-based authentication. To further security, click to convert numbers or an ASCII document. Keyboards with braille dots on every button are available for those who are blind. As for long-term improvement, we are working to make facial recognition a reality for every user. This means that entering the password won't be necessary at all. With fewer resources, we are also attempting to implement this paradigm in government areas.

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