A Shoulder Surfing Resistant Graphical Authentication System

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Abstract –
Nowadays computer as well as information security is the most significant challenge Authorized users should access the system or information Authorization can't occur without authentication For this authentication various techniques are available Among them the most popular and easy is the password technique Password ensures that computer or information can be accessed by those who have been granted right to view or access them In modern IT world computer as well as information security is the most significant challenge. Authorized users should access the system or information. Password ensures that computer or information can be accessed by those who have been granted right to view or access them. Traditional password technique is a textual password which is also called alphanumeric password. But these textual passwords are easy to crack through various types of attack. So to overcome these vulnerabilities, a graphical password technique is introduced. To overcome this problem, we proposed a novel authentication system PassMatrix, based on graphical passwords to resist shoulder surfing attacks. With a one-time valid login indicator and circulative horizontal and vertical bars covering the entire scope of pass-images, PassMatrix offers no hint for attackers to figure out or narrow down the password even they conduct multiple camera-based attacks. We also implemented a PassMatrix prototype on Android and carried out real user experiments to evaluate its memorability and usability. From the experimental result, the proposed system achieves better resistance to shoulder surfing attacks while maintaining usability.

Keywords– Usability Authentication, Graphical Passwords, Dictionary attack, Bruit Force attack etc.

I. INTRODUCTION

Textual passwords have been the most generally utilized validation strategy for quite a long time. Involved numbers and upper-and lower-case letters, literary passwords are viewed as sufficiently solid to oppose against animal power assaults. In any case, a solid printed secret word is difficult to remember and recall. Thusly, customers tend to pick passwords that are either short or from the word reference, instead of unpredictable alphanumeric strings. Shockingly more repulsive, it isn't a remarkable case that customers may use only a solitary username and mystery word for various records. Shoulder surfing technique of gathering information such as usernames and passwords by watching over a person's shoulder while he/she logs into the system, by helping attackers to gain an access to the system person using the system keyboard is unaware that such action is monitored.

Today, authentication is achieved through the use of password technique. To prove and maintain the identity every user uses a password authentication. The traditional method of password is a textual (alphanumeric) password. It is the combination of alphabets, digits and special symbols. But it has various limitations. To remember easily, here the passwords are kept short and simple like personal names, family member names, birth dates, pet names, phone numbers etc. and so vulnerable to various types of attacks like easy to guess, brute force, dictionary attack, shoulder surfing, hidden camera, social engineering and

malicious softwares like keylogger, spyware etc. To overcome these limitations users can use the strong (complex) password. But it is difficult to remember. So to memorize easily users write the password on paper and so it is easily available to anyone. Also nowadays various accounts are maintained by users for various purposes like personal computer, social network, email, online transactions etc. and to remember easily users can use the same password for all accounts and it reduces the security. So to reduce the shortcomings of textual passwords a new technique is developed which is a Graphical Password.

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II. MOTIVATION FOR THE PROJECT

When entering a PIN1 or password to access a phone, computer or ATM machine you might try to perform the authentication process discretely in case someone is watching. A graphical password system that has been implemented in a shoulder-surfing resilient way can be used without forcing the user to hide the process. In theory implementing this type of system could be a relatively simple task. However, depending on the area of usage the user will only accept some level of complexity before the system is deemed too difficult to use. Hence, creating a graphical password that is both user friendly and shoulder-surf resistant is a tougher task.

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III. EXISTING SYSTEM

TEXTUAL passwords have been the most widely used authentication method for decades. Comprised of numbers and upper- and lower-case letters, textual passwords are considered strong enough to resist against brute force attacks. However, a strong textual password is hard to memorize and recollect. Therefore, users tend to choose passwords that are either short or from the dictionary, rather than random alphanumeric string.

IV. OBJECTIVE

To provide high level security to account. To A Brute Force, Dictionary shoulder surfing attack. To overcome problem of hacking data. To prevent Hackers from access Account Data To prevent data from interception.

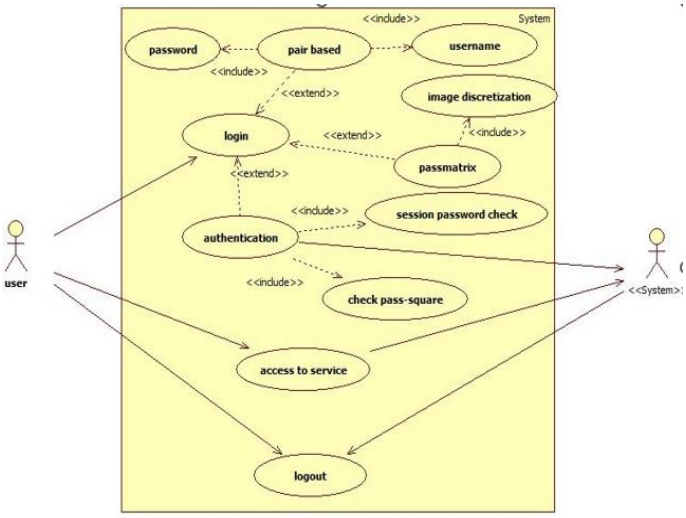
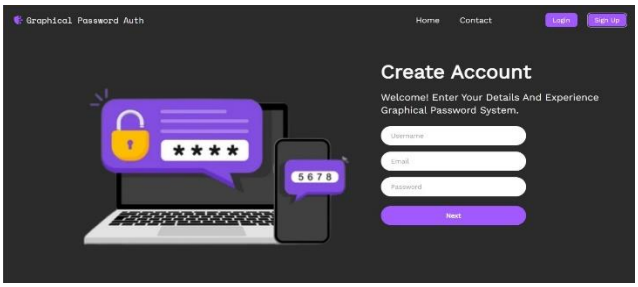


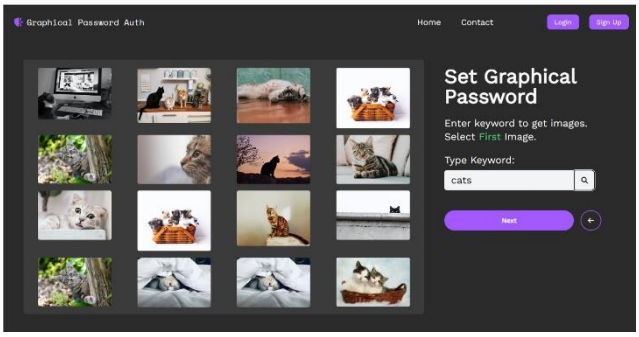
Fig: Use Case Diagram

I. PROPOSE SYSTEM

Registration Phase:



The registration process begins with the user entering an ID and password in the registration form. These credentials serve as the user's first means of authentication. The ID entered is checked for uniqueness and the password is stored securely using a hashing algorithm to ensure data security. After successful registration, the user proceeds to the next step.



Object Search :
In this phase, the user enters search terms. B. Enter "cat" in the search field. The system retrieves a set of images related to your search query. This step allows users to select objects of their choice for authentication,

increasing user engagement and personalization.

Image Choices (Round 1) :
User is presented with her 5x5 matrix of cat images. From this matrix the user should select an image of a cat. The selected image will be the reference image for authentication. The user is instructed to remember the selected image for later review.

Image Choices (Rounds 2-4) :
As in the previous round, the next round presents the user with a set of different cat pictures. For each round, the user selects a cat image from the provided matrix. This process repeats her four times, ensuring that the user selects a total of four unique cat images for multi-factor authentication.

Account Creation : Once the
image selection round is complete, an account is created for the user her. The selected image is securely stored in the system's database with an ID and password. This mapping creates a unique authentication profile for the user. Additional User Information: B. Email addresses may also be collected for account recovery and communication purposes.

Login Phase:
User login:
In the login stage, the user clicks the login button and enters her registered id and password. The system validates the entered credentials against the stored data. If the ID and password match, the user proceeds to the next step of the login process.

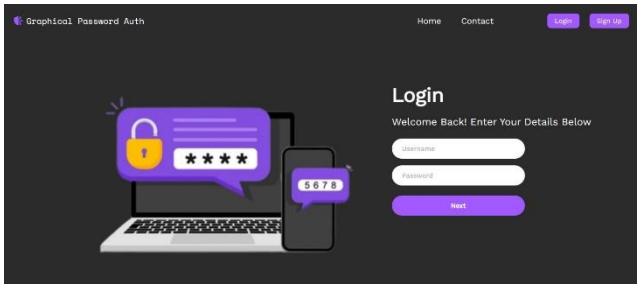


Image Choices (Rounds 1-4) :
Upon successful login, the user encounters a 5x5 matrix of images of her with previously selected cat images. The user must select the same cat image that was selected in the relevant round of the registration phase. This step allows the user to retrieve and identify previously selected images, adding an extra layer of security to the authentication process.

Compare & Authenticate: The image selected during the login process is compared to the saved image associated with the user's account. The system verifies that all selected images match the images taken during registration and appear in the correct order. If the comparison succeeds, the user is authenticated and granted access to their account.

Account Deactivation and Reactivation (400 words):
After 3 consecutive incorrect login attempts (wrong password, wrong photo, or wrong order), the user's account will be blocked because of To reactivate the account, the user will receive an email with a reactivation link. Clicking the link will initiate the reactivation process, allowing the user to access their account again.

Authentication Successful

Website URL: https://graphical-auth-client-ruby.vercel.app/

II. SYSTEM SPECIFICATION

Hardware Requirements:
- System : Pentium IV 3.5 GHz or Latest Version.
- Hard Disk : 40 GB.
- Monitor : 14’ Colour Monitor.
- Mouse : Optical Mouse.
- Ram : 4 GB.

Software Requirements:
- Operating system : Windows 10 or Windows 11.
- Coding Language : HTML, CSS, JavaScript
- Data Base : MangoDB
- Documentation : MS Office
- IDE : VS Code

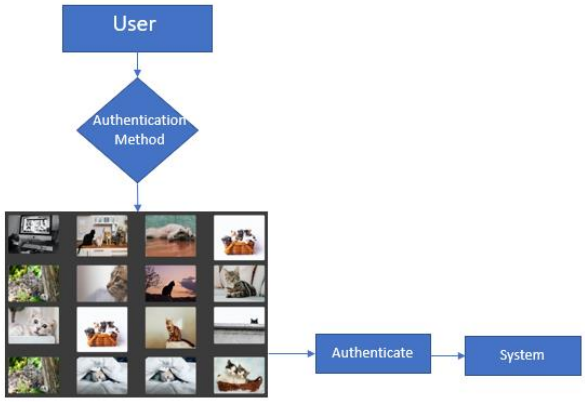


Figure: System Architecture Diagram

V1. CONCLUSION

With the increasing trend of web services and apps, users are able to access these applications anytime and anywhere with various devices. In order to protect users' digital property, authentication is required every time they try to access their personal account and data. However, conducting the authentication process in public might result in potential shoulder surfing attacks. Even a complicated password can be cracked easily through shoulder surfing. Using traditional textual passwords or PIN method, users need to type their passwords to authenticate themselves and thus these passwords can be revealed easily if someone peeks over shoulder or uses video recording devices such as cell phones. To overcome this problem, we proposed a shoulder surfing resistant authentication system based on graphical passwords, named PassMatrix. Using a one-time login indicator per image, users can point out the location of their pass-square without directly clicking or touching it, which is an action vulnerable to shoulder surfing attacks. Because of the design of the horizontal and vertical bars that cover the entire pass-image, it offers no clue for attackers to narrow down the password space even if they have more than one login records of that account. Furthermore, we implemented a PassMatrix prototype on Android and carried out user experiments to evaluate the memorability and usability. The experimental result showed that users can log into the system with an average of 1.64 tries (Median=1), and the Total Accuracy of all login trials is 93.33% even two weeks after registration. The total time consumed to log into PassMatrix with an average of 3.2 pass-images is between 31.31 and 37.11 seconds and is considered acceptable by 83.33% of participants in our user study. Based on the experimental results and survey data, PassMatrix is a novel and easy-to-use graphical password authentication system, which can effectively alleviate shoulder-surfing attacks. In addition, PassMatrix can be applied to any authentication scenario and device with simple input and output capabilities. The survey data in the user study also showed that PassMatrix is practical in the real world.

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