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ATM Secure Transaction with Face and Eye Recognition Using Deep Learning

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ABSTRACT

ATM was most popular for the bank customer for money transactions due to technology improvements in financial infrastructure. A new generation of ATM card-less transactions based on face and Eye recognition systems is replacing ATM cards to enhance security. A high-quality image has an essential role in the recognition process using deep learning which is based on a convolutional neural network (CNN). Face and Eye image is used for authentication purpose. Firstly, a particular person's face and Eye image is compared with the database images. Then the comparing output result is matched, the Money Transaction Process initiated. If an unauthorized person is identified, the payment process is not started. It will fail. Thus, a bank model which provides security by using Facial and Eye and face verification software by adding up Eye and face recognition systems can reduce forced transactions to a great extent and offer complex safe authentication.

Keywords: ATM, Biometric, Eye Recognition, Face recognition

I. INTRODUCTION

The banking sector is one of the essential parts of day-to-day human life. People widely use banking facilities for their economic activities. An Automatic Teller Machine (ATM) is an electronic machine used for accessing a bank account from anywhere without the help of bank staff. The user can perform several banking activities like cash withdrawal, money transfer with the help of an ATM. It is noted that the frequency of crimes related to ATMs is grown consequently there is a demand to provide improves security to ATMs. Previous technologies provide security to transactions for the identification of the authorized user. However, this is limited to secure transactions with ATMs. Currently, ATMs authenticate transactions using the card and pin method, and then they allow access to banking services. The ATM system verifies the PIN entered against the stored permission PIN for every ATM user. When a match is found, the system identifies the user and enables access to all ATM services. If there is a discrepancy, the user authentication procedure fails, and the user is given two additional tries to input the right PIN. If the wrong PIN is entered, the card gets banned and held by the ATM. Previous efforts concentrated on smart card approaches to give greater security to ATM transactions, however GSM-based technique is also employed for the same goal. At the same time, some system uses a combination of both strategies. Currently, ATM security is supplied to the transactions only.

As the number of ATM-related crimes such as robberies, breaking into ATMs, ATM password hacking is going on around, the technology has to be brought out to overcome this, and the approach has to be enhanced. Banks have to be more diligent in securing ATM transactions. In this period, the existing technology contains Card readers, a digital pad, ATM PIN and Video Cameras. Current system offers clients with an ATM card and it's PIN. Nowadays, a PIN can be hacked and scanned quickly by using ATM scanning machines and video cameras. The cash drawer is equipped with a contact switch which delivers feedback when the drawer is opened or broken. This technology has limitations, hence biometric technology is adopted for ATM transactions. Eye and facial recognition technologies are employed for ATM transactions in a biometric way.

In this paper work, first present the system design, which employs a multimodal recognition method to increase security and combines Eye authentication with facial recognition. The facial recognition approach is also utilized for security in which the face is identified for authentication reasons. Also, security is strengthened & facial recognition features. The Eye and face image is depicted in Figure 1.

The current facial and Eye image is matched with the database image in this system. After matching the images accurately, the cash delivery request will be forwarded to the ATM.

Figure 1: Eye and Face Recognizing

This research paper is organized as follows: Section II mentioned the past contribution of researchers in ATM security, Section III describes the implementation of the proposed system, and Section IV represented the result of the proposed System. Finally, in section V the paper is concluded.

II. RELATED WORKS

In this section, present some previous research works for aiding visually impaired people with text to speech technology. A number of handy reading assistants have been designed specifically for the visually challenged.

In the study Surjith et al. [1] offered a methodology of creating an embedded system for the augmentation of ATM security. Serial communication is controlled by the system to scan the cardholder's face and fingerprint database, which then spontaneously creates a message to the mobile of the authorized user's using the 89C51 microcontroller attached GSM module.

The major focus of the paper proposed by Joyce Soares al. [2] is utilized to produce practical and effective employment of embedded systems and sophisticated technologies to designs to actualize the look of the card owner iris and fingerprint to identify and verify the authorized customer. Through GSM, it is to send SMS between two addresses, and GPS helps to pinpoint the spot where the box is taken. In article [3], Shweta Singh et al. explained Electronic money transfer using EDC has been strengthened using embedded fingerprints as well as pin numbers. It's meant to safeguard swipe card transactions by integrating bio-metric elements like fingerprint identification with traditional PIN. Saranraj et al. [4] implemented a paper on employ RFID tag rather than ATM card. If there should be an occurrence of three bad efforts in a day, the customer can't play out the swap. Author Ayusha et al. [5] presented Deep learning-based security is offered in which fingerprint and face authentication for the transaction. There are several approaches to increase the safety of the transaction utilizing a biometric recognition system [6] to [10].

III. PROPOSED SYSTEM

In this paper propose multimodal biometric recognition to rectify the above problems and it will be overcome by providing a high security using a card-less ATM, users made a transaction. Our ATM has a pinhole camera and an iris camera that have already been installed to provide a secured transaction. These cameras will take a snapshot of the person who will be using the ATM.

Then the captured Eye and face image of the person will be compared with the account holder image in the respective bank database. If the user image gets matched with the anyone of the image in the database means then automatically it will allow the user to perform any operations like withdraw or transaction in the ATM. Whereas the other possibility will be, if the user image does not gets matched with any of the image from the account holders profile in the bank database within a fraction of decline the withdraw option. The system architecture of proposed system is depicted in Figure 2.

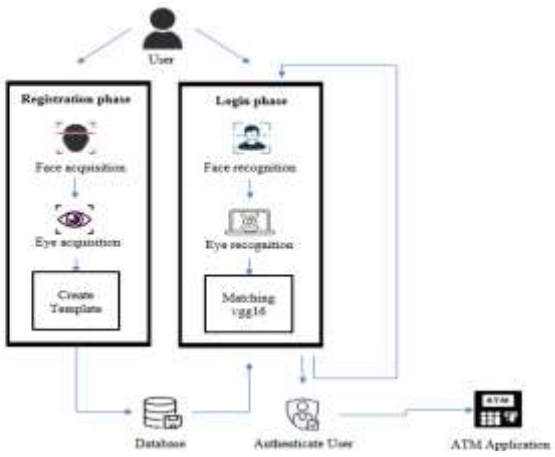


Figure 2: System Architecture of proposed system

3.1 IMPLEMENTATION

The project constitute of below modules,

- Registration Phase
- Login Phase

1. Registration Phase

1. The purpose of this program is to register the user's Face in the database when the user's face is captured.
2. This procedure captures and stores the user's Eye in the database. To complete the registration process, it makes use of the built-in detection method.
3. Users' details are collected and stored in the database.

2. Login Phase

1. Users' Eye are read and verified against their stored Eye. Upon successful user verification, a success message is shown. Once Eye authentication has been completed, a token is generated.
2. In this case, the face recognition API invokes the built-in verify method to turn on the camera and capture the user's image. A token is issued if the comparison is successful.
3. After all authentication processes have been successfully completed, the MFA will generate the master token. A user will be able to select a bank from the list of all registered banks to access the prototype ATM application. There are several ATM operations the user can perform, such as Generate Account Numbers, Withdraw, Check Balance, Deposit, Fast Cash, and Mini-Statement.

3.2 Eye Recognition

Through Eye recognition technique, the thin nerve behind the pupil that processes light entering the eyeball is analyzed for patterns of blood vessels. Eye recognition contains three phases: image acquisition, pre-processing and image recognition. The image acquisition and processing steps are the most challenging. This sub-process may be completed substantially depending on user cooperation. On staring into the camera, the user sees a green light against a white background. Once the camera is enabled, the green light moves in a complete circle with 360 degrees. The blood vessel pattern of the Eye is collected throughout this process. The three to five photos are captured at this step.

Depending on the extent of user involvement, the capture step can take as long as one minute. In order to obtain clear and sharp Eye images, the Eye images must be acquired as well as converted. The next step is to extract the Eye images. As genetic factors do not influence the layout of the blood vessels, the Eye contains a diversity of unique traits. In the pre-processing stage, the Eye is recovered from an eye image, and then using the segmentation approach the vascular representation of Eye images is obtained.

This Eye image is represented by a feature vector after it has been normalized and enhanced to explain translated numeric values. For recognition, template matching is employed. This template matching performs recognizes the patterns that correspond to given Eye pictures using Vgg16.

3.3 Face Recognition

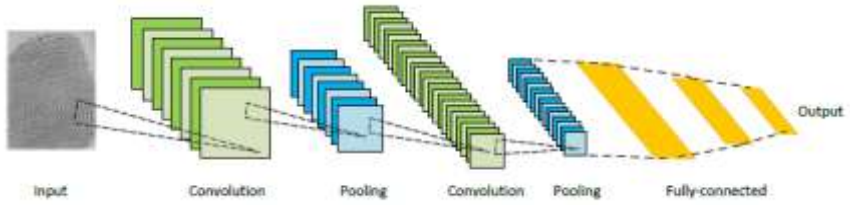
Face localization, normalization, feature extraction, and matching are the four modules that make up a face recognition system. These modules are described further below. Face detection distinguishes the face from the backdrop. Faces spotted in the video may need to be tracked across numerous frames utilizing a face tracking component. Face map marking localizes face images, whereas face detection provides a rough estimation of the location and scale of the face. This can be done with a landmarking module or a face alignment module.

Face normalization is the process of geometrically and photo metrically normalizing the face. This is required because cutting-edge identification systems are expected to recognize facial photos with variable stance and illumination. Face cropping is used in the geometrical normalizing procedure to transform the face into a standard frame. For more complex geometric normalization, warping or morphing may be applied.

Photometric normalization normalizes the face depending on factors such as light and gray scales. Face feature extraction is conducted on the normalized face to extract prominent information that is useful for distinguishing between different people's faces and is robust to geometric and photometric fluctuations. Face matching is performed using the retrieved face features. Face matching compares the extracted features from the input face to one or more of the enrolled faces in the database. When the top match is found with sufficient confidence, the output is the identity of the input face; otherwise, the output is unknown if the tip match score is less than a particular threshold.

3.4 Convolutional Neural Networks (CNN)

Convolutional Neural Networks (CNN) (inspired by the mammalian visual cortex) is one of the most successful and widely used architectures in the deep learning community (especially for computer vision tasks). CNN's mainly consist of three types of layers: convolutional layers, where a sliding kernel is applied to the image (as in image convolution operation) features are extracted by a feature extraction layer; nonlinear layers are applied element-wise, enabling the network to model nonlinear functions; and pooling layers take a small neighborhood of the feature map and replace it with some statistical information (mean, max, etc.). Nodes in the CNN layers are locally connected; that is, each unit in a layer receives input from a small neighborhood of the previous layer (known as the receptive field). The main advantage of CNN is the weight sharing mechanism through the use of the sliding kernel, which goes through the images, and aggregates the local information to get the features. In contrast to a similar-connected neural network, CNNs have a significantly smaller number of parameters since the kernel weights are shared across the entire image. Moreover, the higher levels learn features from wider receptive fields through the stacking of multiple convolution layers.



IV. RESULTS AND DISCUSSION

In this section, analyze the results of the proposed system which is implemented on the MATLAB platform. The screenshots the experimental results of our system. The balance amount and withdrawal amount details are depicted in Figures 3, 4 &5.

Figure 3: Checking

Figure 4: Deposit amount snapshot

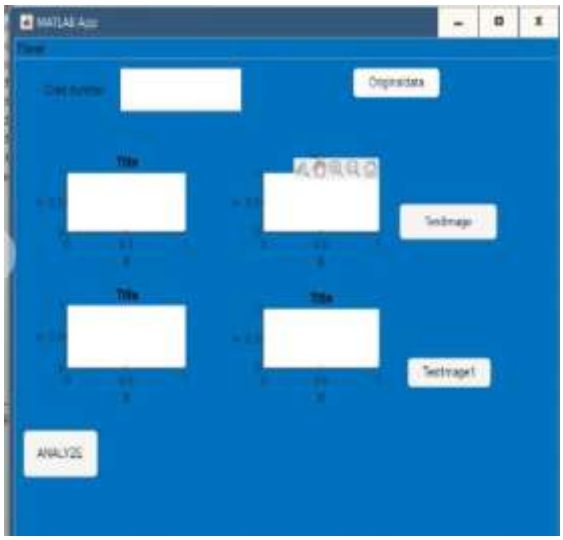


Figure 5: Withdraw amount snapshot

V. CONCLUSION

This research, suggested a multimodal biometric recognition system for card-less ATM transactions. The research aims at applying biometrics to make the ATM transaction framework progressively trustworthy and safe. The Eye and facial recognition notion incorporated to the framework further improves the security and dodges the need to recollect passwords. In addition, the system is implemented using MATLAB which makes it easy to grasp and non-intrusive. Contrasting the suggested system and the existing ATM systems, it indicates that the precision and security of the proposed framework is most extreme and progressively effective. The proposed framework delivers a more significant level of security and convenience to the consumers for simple, rapid, and card-less ATM exchanges.

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