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Securing ATM Transactions using Face Recognition

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ABSTRACT

The implementation of ATM machines comes with the issue of being accessed by illegitimate users with valid authentication code. This project provides service to the user only when the user is legitimate or the user is verified by the legitimate user of the ATM card. The users are verified by comparing the image taken in front of the ATM machine, to the images which are present in the database. If the user is legitimate the new image is used to train the model for further accuracy. In case of an illegitimate user, a web link is sent to the registered mobile number who owns the ATM card, to verify the access of the illegitimate user to his/her account only then the user is considered as a legitimate user. Histogram algorithm and Machine learning techniques are used to identify the personals using the machine. This system uses openCV to process the image being obtained and Haar Cascade Classifier to detect the faces in the image. The face recognition is done using Local Binary Pattern. These processes are done in AWS cloud for their architecture facilities.

Key Words: ATM, Camera, OpenCV, Python, Haar cascades, Local binary patterns, AWS

1. INTRODUCTION

The ATM was invented in 20th century from then a lot of changes have been made in it. We tried to improve the security integrating face recognition into the system with the help of Machine Learning. The ATM machines used to withdraw money using the debit & credit cards are introduced, installed and spread to the vast in our society. But there are many unauthorized access attempted in the ATM by knowing the password of card holder and Withdrawing money without the knowledge of the card holder, this leads to a serious problem for both card holder and the bank. To rectify this type of problem we introduce this project to provide a safety mechanism for ATM's [10]. The unauthorized access found only after the transaction is done or when the amount gets debited from the account of the authorized user. So this project deals about the method to prevent the ATM security threat related to unauthorized users by allowing access to the user only after the confirmation of the user identity by using camera that is mounted on the ATM Machine [3, 10]. When the people try to take money in the ATM, ATM's will use face detection and face recognition to check it with the account holder image in the bank. If the image matches the user, the system will permit to continue the transaction else the image will send to the account holder's mobile number to verify the image of the user [12]. If the account holder clicks "ACCEPT", then transactions will be allowed. The account holder will click the "DECLINE", means the transactions are declined.

2. EXISTING SYSTEM

2.1 ATM Security Using Facial Recognition

The ATM using Face Recognition System is indicate the way to a lot of forgery attempt and abuse through card theft and pin theft of customer account details [5]. This system works based on the face matched with the image of Account holder and the current image of the user. In this system they are used many components like Face Detector, Face Recognizer, 2- D, 3 - D Technique[8] and Surface Texture Analysis.

2.1.1 Working

When a customer enters into the ATM they should insert card in the ATM card reader. After inserting a card in ATM the camera captured the image of the user using face detector and it identify the facial region of the user and using recognizer it will check with the database to find a match with the accountholder [4].

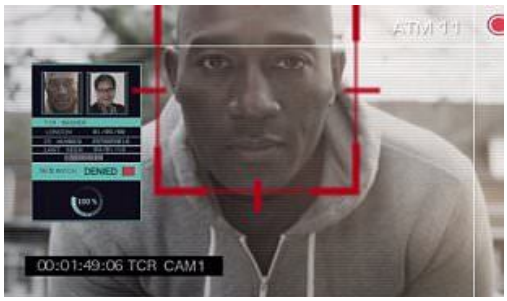

Figure 1: Face Recognizing

The machine will detect the user face at the distance of two to four feet. If the image matches correctly the transaction will be continue otherwise transaction will be terminate. In this system they are using the 2D and 3D techniques for identify the image of the user [4, 8].

2.2 ATM Security using Machine Learning techniques in IOT

The main idea of this system is to secure the ATM by using face recognition and prevent unauthorized access. After inserting a card the transaction will be permitted only after the images captured by the CCTV and it will matches with the original account holder. When both of the images is same means the transaction will be continue otherwise the One Time Password (OTP) send to the register mobile number of the accountholder [13].

2.2.1 Working

In this project they are using RFID reader instead of the ATM card reader to identify the account details and CCTV is used to recognize the face and check the face of the current user in the bank database. In this they used Haar cascade and local binary pattern for recognize the face. If the face will match to the database the transaction will be continue else the OTP will sent to the authorized account holder and the user will enter the OTP in the ATM after the verification is successfully done the transaction and process will continues. When the OTP is typed wrongly the alert message will sent to the account holder and the transaction will be terminated [1].

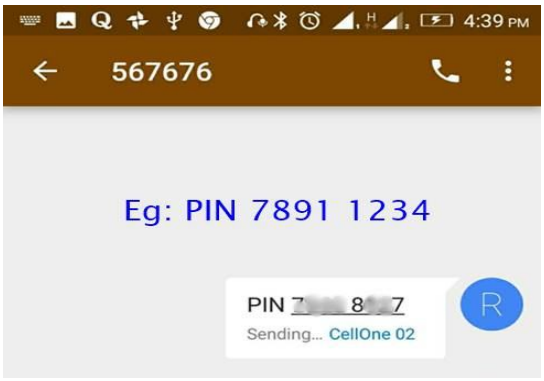

Figure 2: OTP Verification

In this type of system they will provide some security to the customer. In this project they used CCTV camera [9]to detect the face of a person approaching ATM by using face detection Haar cascade algorithm [11]. The RFID tag is used to store the information of the user account through which the original information stored in the database is detected using this component. The transistor is used to control the flow of current and resistor is used to reduce current flow and adjust signal levels [13]. The face recognition is identified by converted the images into gray scale image for reducing the errors occur and image of the user is split up into many pieces and each pieces is assigned by a value and get stored. Based mostly upon the information hold on within the card of the user the given values of the approaching user's image is compared with the revered values of the image of the user that was method and hold on whereas the cardboard provision process.

3. PROBLEM IDENTIFIED

The above project they described that to ensure the security of ATM using facial recognition. In this they are train the image of the account holder and save it in the database whenever the transactions happens the current user image match with the image of the account holder. If both of the images are same the transaction will be continues otherwise the transaction will be terminated [14]. The main drawback of this project is the transaction will be done by account holder only. In this project have some limitations like the family member or other person doesn't use the ATM card at any emergency situation. Even if the account holder provides permission to someone to access his card for withdrawing money from the ATM, it is not possible as they have employed face detection strategies. In next project they overcome some of the issues in the previous project. In previous project only the account holder will use the ATM, but next project non-account holder also use ATM to withdraw the money. In this they are using OTP concepts for transactions, but the accountholder doesn't know the exact person will make the transaction [13]. So, this project also having some issues.

4. PROPOSED SYSTEM

In this project we will rectify the above problems and it will be overcome by providing a high security to the users while doing a transaction in the ATM. To provide a secured transaction the pinhole camera which we had already fixed in the ATM machine will take a snap of the person who is going to credit the amount from the ATM. Then the captured image of the person will be compared with the account holder image in the respective bank database [8]. 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 second a message will be send as a link to the account holder registered mobile number [8]. If the user (account holder) clicks the link it will show the snap of the person who is currently using their ATM card to withdraw money from the ATM. And it will also enable three options to the user to choose any one of the option. The three options are it's me**,** Accept and Decline.

4.1 It's Me

This option will help the user to update the picture if it was really that account holder. Once if the user clicks that option it will automatically update the image in the database and allow the user to perform any operations in the ATM machine.

4.2Accept

This option will be helpful for the account holder to allow anyone to withdraw the money from their account once if the account holder touches the accept option it will allow the user to any operations in the ATM with the knowledge of accountholder.

4.3 Decline

This option helps the account holder to cancel the transaction being performed by him/her or someone. Once if the account holder clicks the decline option it will not allow the user to perform any operations in the ATM.

Figure 3: ATM Machine

5. ALGORITHMS AND WORKING COMPONENTS

The algorithms used in these systems are Haar cascade and LBPH and the components are Camera, ATM, ATM card and Smart phones.

5.1 Haar Cascade Classifier Algorithm

This is a machine learning object identification algorithm used to detect objects in an image or video based on the concept of rapid object detection. It is based on "Haar Wavelet Technique" which is used for detecting the face of the person and trained from lot of both positive and negative images. Wavelet analysis is similar to Fourier analysis. Fourier analysis is a periodic waveform and it is used in trigonometric functions. It uses a sequence of square shaped function in order to extract the every individual highlighted feature from the image of the person. In this classifier we used "Ada-Boost" algorithm. This is used to remove the redundant features and choose the relevant one [11].

5.2 OpenCV

The expansion of OpenCV is Open source Computer Vision. It is a cross platform library and it has more than 2500 optimized algorithm. These algorithms can be used to identify objects, recognizing faces and track camera movements. It is one of the library packages in python which is highly optimized library for numerical operations. All openCV array structure is converted to Numpy arrays and vice versa. It is mainly used to perform all kinds of operations related to image processing. It loads the data from images and videos and performs feature exaction and apply machine learning algorithm for decision making and recognizing the object. In openCV we are having many applications like face recognition, Human computer interaction 2dand3d features toolkit and gesture recognition [8].

5.3 Local Binary Pattern Histogram

LBPH is an efficient texture operator and it is very simple to use, this will help to label the pixel of the images by threshold the neighborhood of every pixel and result in a binary number. It's one among the kinds of visual descriptor won't to classify the pc vision. Visual descriptor is one of the descriptions of visual features of the content in images and videos. It describes elementary characteristics like shape, color, texture or the motion of the image. LBP is a powerful technique that describes the texture of the image face. It's employed during a sort of tasks like facial feature extraction, classification, and face recognition [13]. LBP has been increasingly and constantly utilized in various computer visions and image processing tasks. This LBPH algorithm is a simple and effective solution on face recognition problems that recognize both front and side faces. This can represent the local features within the image to urge great results on top of the environment. This basically compares the input image with all other facial images from the trained dataset which aims to extract out the user from the dataset that matches the face.

5.4 Camera

In this task we are the use of pinhole camera to seize the photo of the user. It is the easy digital camera without lens but with the tiny hole. It's correctly a light-evidence field with a tiny low hole in one aspect. The photograph of the pinhole camera projected on a translucent display screen for a real–time viewing. But it's far more frequently used without semi-transparent display for pin hollow pictures with photographic film located at the surface opposite to the pinhole aperture. The camera is fixed inside the ATM machine itself [5]. It captures the facial features of the user for the identification purpose [11].

Figure 4: Pinhole Camera

5.5ATM

ATM is the expansion of Automated Teller Machine. We are using ATM for basic transactions without the help of the branch representative or teller. Who are having debit card or open-end credit can access the ATM. ATM is one of the easiest ways for customer for making transaction every day and it is used to deposit and withdraw money. In ATM we are having many features like check balance inquiry, mini-statement, change pin, withdraw and deposit. The ATM components are card reader, keypad, cash dispenser, printer and screen.

5.6 ATM Card

An ATM card is a payment card issued by the bank which enables a customer to access automated teller machine. In ATM card we are having 16 digit card number, logo of the card network and Card Verification Value (CVV). The latest ATM card we are having Europay MasterCard and Visa (EVM) chip. ATM card are secured with a personal identification number (PIN). It allow customer to withdraw cash as well as check their balance. When you insert your debit card or credit card in to the ATM it reads the information in the magnetic strip which contain in the card. ATM cards essentially a hardcopy of the get right of entry to facts on your account. The ATM then asks on your PIN to confirm your authorization to access budget and statistics [13]. Customers have to pay charge when the use of an ATM card.

5.7 Smart Phone

A smart phone is also a transportable with extremely advanced options. A typical smart phone has high resolution display, Wi-Fi connectivity and web browsing capabilities. The bulk of these devices run on popular OS like android, BlackBerry OS, iOS and Windows Mobile [13]. High-end smart phones now run on processors with high processing speed including low power consumptions.

Figure 5: User Verification

6. FLOWCHART

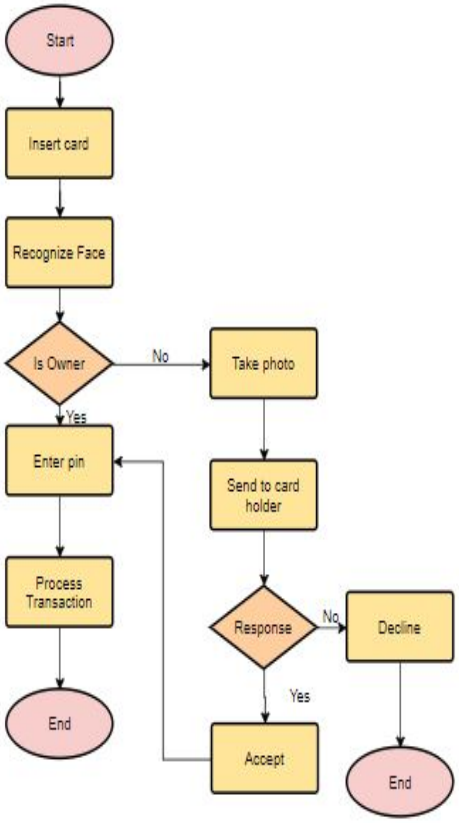

Figure 6: Flow Diagram

7. CONCLUSION

This project can overcome the issue of impersonation of a cardholder. This is like a two factor authentication method which is used to confirm that the transaction is done by the card owner or the persons trusted by the owner using face recognition. It limits the card usage of the unauthorized users who hold the password of someone's card. Thus, this ATM model provides security against exploitation of identity, by using a verification system using face recognition to the identity and confirm the user and it will scale back forced transactions to an excellent extent.

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