Providing Security for ATM through Face Recognition

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Abstract— **Automated Teller Machines are widely used nowadays by people. But It's hard to carry their ATM card everywhere,people may forget to have their ATM card or forget their PIN number. The ATM card may get damaged and users can have a situation where they can't get access to their money. In our proposal,use of biometrics for authentication instead of PIN and ATM card is encouraged.Here, The Face ID is preferred to high priority, as the combination of thesebiometrics proved to be the best among the identification and verificationtechniques. The implementation of ATM machines comes with the issue of beingaccessed by illegitimate users with valid authentication code.The users are verified by comparing theimage taken in front of the ATM machine, to the images which are present in the. If the user is legitimate the new image is used to train the model forfurther accuracy. This system uses openCV to process the image being obtainedandHaar Cascade Classifier to detect the faces in the image. The face recognitionis done using Local Binary Pattern.**

I. INTRODUCTION

An Automatic Teller Machine (ATM) is a computerized machine that is used to withdraw cash

from a customer's respective bank account. As financial users prefer ATM for cash withdrawals, cash deposits and many other transactions, the banks are focusing a lot over the security of ATMs. Hence ATM should be protected properly from the criminal activities or from any unwanted things.

Due to rapid development in science and technology, upcoming innovations are being built-up with strong security. But on the other hand, threats are also being posed to destroy this security level. Though enhancement in automation has made a positive impact overall, various financial institutions like banks and applications like ATM are still subjected to thefts and frauds. The existing ATM model uses a card and a PIN which gives rise to increase in attacks in the form of stolen cards, or due to statically assigned PINs, duplicity of cards and various other threats. Then another major problem is

hacking of PIN. There are other fraudulent attacks like eavesdropping, spoofing, brute force attacks, blackmail- Ing the user. In the worst case there can also be ATM machine Robbery. To overcome these problems, the project 'ATM Security system based on Face recognition, PIN and OTP' consists of conventional features ie is Personal identification Number (PIN) along with additional features like face recognition and one-time password (OTP) is used. Database holds information about a user's ac- count details, images of his/her face and a mobile number which will improve security to a large extent.

First, the user will come to the ATM machine and a live image is captured through the Web Camera

interfaced with System defining as the ATM sys- tem, which is compared with the images stored in the database. If the face is recognized, then the user is notified to type the PIN. If the PIN matches, an OTP will be sent to the corresponding registered mobile number. If the user correctly enters the OTP, the transaction can proceed. Therefore, the combination of face recognition algorithm, PIN and an OTP drastically reduces the chances of fraud. In order to obtain better accuracy deep learning based linear discriminate classification method is utilized. And executed the same in OS.

II. LITERATURE SURVEY

Face recognition and following [1-2] has been utilized for the motivations behind observation, security, human PC cooperation, and so on Different strategies for face recognition are accounted for in writing, they incorporate Viola Jones, Haris corner, Principal part investigation, Haar classifier. In this examination, Haar classifier removed from Viola Jones calculation is utilized for the face recognition. The Eigen

highlights of the face for following its position are recognized utilizing MATLAB and Raspberry pi[2]. Computational models of face area and face affirmation are generally used for the inspirations driving criminal distinguishing proof and affirmation. Face area and following has been used for the inspirations driving perception, security, human PC association, etc. In this paper, by implanting Raspberry PI with picture handling methods, shows the situation by turning the LED on when face is found[2]. In future, we might want to utilize signal for controlling gadgets. Additionally, this application is restricted for single individual face following reason as it were. In coming times, we might want to grow it into multiple user application.

In this paper, access might be approved basically through a selected client talking into an amplifier joined to the framework. The proposed framework then, at that point will choose whether the word is 'On' or 'Off'. The choice voice will be shipped off Arduino to actuate the auto transfer, which will be utilized to initiate the motor's engine starter. Especially Support Vector Machines based grouping framework is utilized in the proposed framework to distinguish the approved words.[1]

Programming solutions that utilize streamlined OpenCV executions can get 1.78 FPS(Frames Per Second) on VGA picture sizes [6]. An option is to utilize an equipment approach that speeds up the estimation of the calculation utilizing an application explicit plan. It can accomplish rates up to 15 FPS for little pictures. Nair et al. [8] fostered a group identification inserted framework utilizing a delicate center processor from Xilinx called Microblaze and accomplished about 2.5 FPS for picture sizes of 216×288. Gao et al. [7] proposed a FPGA configuration zeroed in on highlight classifier computation.

Cell phone outfitted [9-10] with Bluetooth gadget, Short Message Service (SMS) and Camera. It has been incorporated and introduced in cell phone chipsets so supporter could utilize cell phone as PC. Generally mainstream and broadly utilized information application in cell phone is SMS text informing Short Message Service (SMS) is an interchanges convention permitting the traded of short instant messages between cell phone gadgets. By sending an instant message (SMS) from cell phone, framework could touch off the motor. Here BJT circuits are utilized as outside circuit to touch off the motor. The framework design is to touch off the motor by utilizing the cell phone.[10]

Remote vehicle ignitions are getting mainstream among the vehicle clients. Time turns out to be valuable and significant for the individuals who are specific with their time, for

instance another leader who is continually racing to his work environment. Auto hardware assumes a critical part in the vehicle business and gives extravagant highlights and all the more significantly addresses the wellbeing and security concerns [3]. In this work, our point is to giving a practical answer for the plan and advancement of an occasion information recorder which has been essentially received from the flying area thinking about the need and the corresponded benefits.

Face recognition is a significant viewpoint for biometrics, video observation and human PC communication. We show a multi-GPU execution of the Viola-Jones face identification calculation that meets the presentation of the quickest known FPGA implementation. The GPU design offers far lower development costs, but the FPGA implementation consumes less power.[6]

III. TECHNOLOGY OVERVIEW

Recognizing faces in pictures might be a principal task for the Face Recognition Based Car Ignition and Security System. the use of Haar-like element has been to distinguish and perceive the essence of the verified client so on accomplish the safe climate for start and getting to the vehicle.

Face identification and acknowledgment strategy upheld highlights extraction might be an incredible basic sign of human countenances. Face is distinguished by Ada-help calculation.

Ada-Boost learning is utilized to select little number of feeble classifiers and blend them into strong classifier choosing whether an image might be face or not. Then, at that point, by utilizing Haar Classifier calculation, the chosen faces are regularly perceived by contrasting the Haar Classifier of current face to the face of recognized individuals. Haar Cascade is an AI object placement calculation to recognize objects in a picture or video.

Haar-like component has been utilized to identify and perceive the essence of the confirmed client in order to accomplish the safe climate for start and getting to the vehicle an average rectangular haar-like element can be appeared as follows:

Fig.1. Haar-like Features
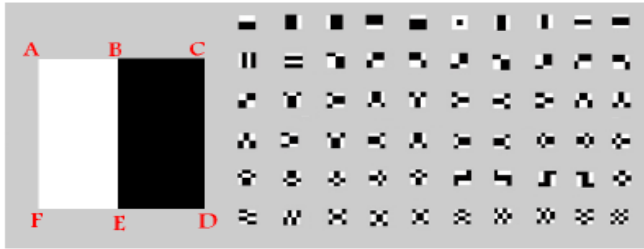
First it needs to detect the face and mark the rectangle for face detected along with gray scale image. Before face recognition process it must be completed with training of variety of different images and it should be store in yml file. Dynamic face is detected in web camera is verified with the trained images stored in yml file and popped up with exact matching of image. once the face is recognized as specified individual, signal is passed to microcontroller.

Training the AdaBoost :

-Taken image examples $(x_1, y_1)...(x_n, y_n)$ where $y_1 = 0,1$ for negative and positive instances.

-Load weights $w_{1,i} = \frac{1}{2m}, \frac{1}{2l}$ for $y_1 = 0,1$

where m and l are number of positive and negative examples.

-For t =1,...,T:

1) Normalize the weights, $w_{t,i} \leftarrow \frac{w_{t,i}}{\sum_{j=1}^{n} w_{t,j}}$

2) Choose the best weak classifier based on weighted error:

$\varepsilon_t = min_{f,p,\theta} \sum_i w_i |h(x_i, f, p, \theta) - y_i|$

3) Describe $h_t(x, f_t, p_t, P_t)$ where f_t, p_t and θ_t are the reducers of ε_t.

4) Upgrade the weights:

$w_{t+1,i} = w_{t,i}\beta^{1-e_i}$

Where e_i = zero if instance x_i is classified precisely and $e_i = 1$ otherwise, and $\beta_t = \frac{\varepsilon_t}{1-\varepsilon_t}$

-The final strong classifier is:

$$c(x) = \begin{cases} 1 & if \ \sum_{t=1}^{T} \alpha_t h_t(x) \geq \frac{1}{2}\sum_{t=1}^{T} \alpha_t \\ 0 & otherwise \end{cases}$$

Where $x\alpha_t = \log \frac{1}{\beta_t}$

Training the Haar cascade:

• The Maximum acceptable false positive rate per layer is set to f, and the Minimum acceptable detection rate per layer is set to d.

• User takes target overall false positive rate, F_{target}.
• P = collection of positive examples.
• Q = collection of negative examples.
• $F_0 = 1.0; D_0 = 1.0$
• $i = 0$
• While $F_i > F_{target}$
  - i ← i + 1
  - $n_i = 0; F_{i-1}$
  - While $F_i > f \times F_{i-1}$
    * $n_i \leftarrow n_i + 1$
    * Use P and Q to educate classifier with n_i capabilities using AdaBoost
    * Evaluate contemporary cascaded classifier on Validation set to decide F_i and D_i
  - Q ← ∅
  - If $F_i > F_{target}$ then examine the current cascaded detector against set non-face images and place any fake detections into the set Q.

Current face is captured using web-camera, Captured image is compared with images that is already in folder. Once face is recognized, API is requested to send OTP to registered mobile number, after validating the OTP users are allowed to do transactions such as withdrawing, ministatment etc.

Front end of the prototype will be developed using bootstrap framework, it has various pre-defined classed with which easy to use responsive web pages could be developed, to activate the web cam at front end side JavaScript will be used which allows users to invoke web cam to fetch face image of the users. Having captured the face image users need to upload the image to backend powered by python, to send request to back end server i.e Flask ajax is used, the read image is compared with pre trained model and if match is found users will be asked to enter the OTP. Having validated the OTP transaction page is displayed to carry out various transactions.

To face recognition process face recognition module of python which makes use of dlib to predict faces features will be used. Since it works on the deep learning, one could expect an accuracy of 92%. To send otp to end users an sms gateway will be used.

Flask webserver:

Flask is a micro web framework written in Python. It is classified as a micro framework because it does not require particular tools or libraries. It has no database abstraction layer, form validation, or any other components where pre-existing third-party libraries provide common functions. However, Flask supports extensions that can add application
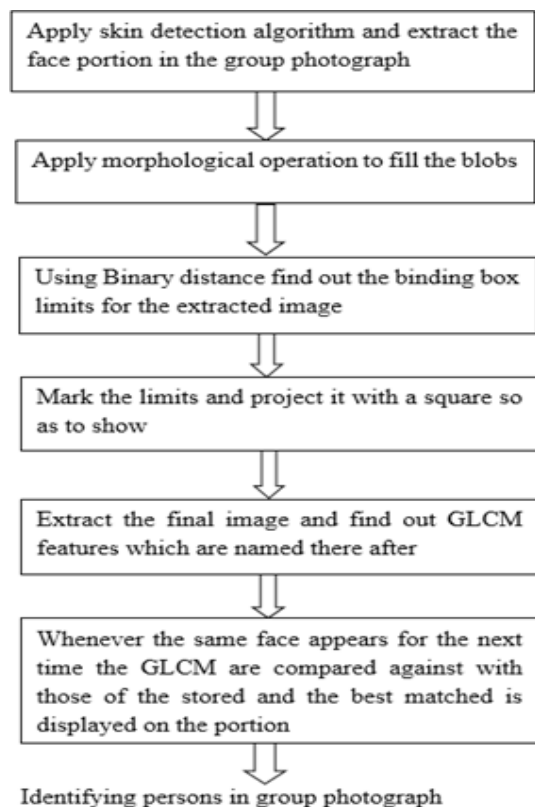
features as if they were implemented in Flask itself. Extensions exist for object-relational mappers, form validation, upload handling, various open authentication technologies and several common framework related tools.

Data storage:

All information is available in the MySQL database which is excellent for distributed application. It does not require any extra drivers/features to make transactions with database which is an advantage for the proposed system.

This system depends on the rules of client server model it do not require any extra applications/software to users/client to make system functioning properly. All the truncations are done using only MySQL database no additional software used for transaction between user and system.

IV METHODOLOGY


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Apply skin detection algorithm and extract the
face portion in the group photograph
            ↓
Apply morphological operation to fill the blobs
            ↓
Using Binary distance find out the binding box
limits for the extracted image
            ↓
Mark the limits and project it with a square so
as to show
            ↓
Extract the final image and find out GLCM
features which are named there after
            ↓
Whenever the same face appears for the next
time the GLCM are compared against with
those of the stored and the best matched is
displayed on the portion
            ↓
Identifying persons in group photograph
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Skin Detection Algorithm

Skin detection algorithm is applied to detect the face in a digital image. Better recognition is directly proportional to the quality of the image . There are various types of approaches which includes easy and difficult approaches to extract the face portion like edge based, geometry based, with controlled background in a given photograph. By using one of the approaches we extract face portion of the given input image. From the Figure , Input image can be composed of varieties of colours i.e., not color specific. In this approach color information is going to play a key role in extracting the images. This technique is gaining an enormous response in recent days. When image segmentation provides infected region to do analysis. There are lot of data that can be extracted from the image. Dimensionality reduction is a crucial step to be followed. So as to avoid model confusion and conflict Also it is very important to consider all necessary features and avoid any miss. Feature Extraction is one of the most crucial steps in machine learning. Extraction of essential features is very important. Features need to be selected to avoid overfitting and under- fitting. In this project, various image features are extracted such as randomness, mean, entropy, the standard deviation of the colored image.

Morphological Operations

We need to perform the morphological operations to fill the gaps in the input image. Dilation and Erosion are the main morphological operations[8]. Both operations aim to process the pixels. Dilation deals with maximum value whereas erosion deals with minimum values. Using binary distance approach for the given input image, we get bounding box which limits detecting the boundary of an image. Using the limits, face can be tracked and it is projected in the form of a square in the given image.

Grey Level Co-occurrences Matrix for Face Detection

Extracting the face from the image takes next step to detect who the person is. GLCM is one of the earliest approaches used for texture feature extraction[9]. From the extracted faces we are going to take the properties of the face. The extracted properties after detecting are pro- jected in the group photograph in the form of a square

V CONCLUSION

As the ATM technology got improved the idea of misusing it also got improved. The main disadvantage of this system is that if the PIN is known anybody can use it to take money. To address this issue, Face-id is used as a key. The main use of the Biometric is that it is unique

for a person. The proposed innovation is not an alternative for the conventional ATM security system. The proposed innovation is considered as an additional support for the existing method.

Proposed system is an attempt to make use of AI and Computer vision to develop an useful product to bank sector, here the database of customers with their face image is maintained, a model is trained with training images of the customers, when they attempt to do transaction via ATM at first level face image is read using camera and compared with pre trained model if match is found asked to enter PIN if PIN matches allowed to transactions otherwise miss match message is displayed and transactions gets aborted

REFERENCES

[1] W. Astuti and E. B. Wahyu Riyandwita, "Intelligent automatic starting engine based on voice recognition system," 2016 IEEE Student Conference on Research and Development (SCOReD),2016,pp.1-5,doi:10.1109/SCORED.2016.7810061.

[2] Shah, Z. A. Zaidi, B. S. Chowdhry and J. Daudpoto, "Real time face detection/monitor using raspberry pi and MATLAB," 2016 IEEE 10th International Conference on Application of Information and Communication Technologies (AICT), 2016, pp. 1-4, doi: 10.1109/ICAICT.2016.7991743.

[3] C. Patil, Y. Marathe, K. Amoghimath and S. S. David, "Low Cost Black Box for Cars," 2013 Texas Instruments India Educators' Conference, 2013, pp. 49-55, doi: 10.1109/TIIEC.2013.16.

[4] S. Chaklader, J. Alam, M. Islam and A. S. Sabbir, "Black Box: An emergency rescue dispatch system for road vehicles for instant notification of road accidents and post crash analysis," 2014 International Conference on Informatics, Electronics & Vision (ICIEV), 2014, pp. 1-6, doi: 10.1109/ICIEV.2014.6850749.

[5] J. A. Lopez Leyva and V. D. Ajas Terriquez, "Car Black Box System (CBBS) Using FPGA for Determine the Car orientation: Preliminary Results," 2014 International Conference on Mechatronics, Electronics and Automotive Engineering, 2014, pp. 125-128, doi: 10.1109/ICMEAE.2014.20.

[6] Daniel Hefenbrock, "Accelerating Viola-Jones face detection to FPGA-level using GPUs," Proceedings of the 2010 IEEE, 18th Annual International Symposium on Field-Programmable Custom Computing Machines, 2010, pp.11-18.

[7] C. Gao and S.-L. Lu, "Novel fpga based haar classifier face detection algorithm acceleration," in Field Programmable Logic and Applications, 2008. FPL 2008. International Conference on, Sept. 2008, pp. 373–378.

[8] V. Nair, P.-O.Laprise, and J. J. Clark, "An fpga-based people detection system," EURASIP J. Appl. Signal Process., vol. 2005, pp. 1047–1061, 2005.

[9] H. H. B. Aziz, N. H. A. Aziz and K. A. Othman, "Mobile phone car ignition system using EmbededBlue 506 Bluetooth technology," 2011 IEEE Control and System Graduate Research Colloquium, 2011, pp. 70-76, doi: 10.1109/ICSGRC.2011.5991832.

[10] J. Karim, W. M. A. B. W. Amat and A. H. A. Razak, "Car Ignition System via Mobile Phone," 2009 International Conference on Future Computer and Communication, 2009, pp. 474-476, doi: 10.1109/ICFCC.2009.116.

[11] 11. J.J.Patoliya, M.M. Desai, "Face Detection based ATM Security System using Embedded Linux Platform ", 2nd International Conference for Convergence in Technology (I2CT), 2017.

[12] 12. M.Karovaliyaa, S.Karediab, S.Ozac, Dr.D.R.Kalbande, "Enhanced security for ATM machine with OTP and Facial recognition features", International Conference on Advanced Computing Technologies and Applications(ICACTA), 2015.

13. Sivakumar T. 1 , G. Askok 2 , k. S. Venuprathap, "Design and Implementation of Security Based ATM theft Monitoring system", International Journal of Engineering Inventions, Volume 3, Issue 1, 2013.

14C. Bhosale, P. Dere, C. Jadhav, "ATM security using face and fingerprint recognition", Interna- tional Journal of Research in Engineering, Technology and Science, Volume VII, Special Issue, Feb 2017.

15. Manoj V , M. Sankar R , Sasipriya S , U. Devi E, Devika T , "Multi Authentication ATM Theft Prevention Using iBeacon", International Research Journal of Engineering and Technology (IRJET).

16. L. Wang,H. Ji, Y. Shi, " Face recognition using maximum local fisher discriminant analysis",18th IEEE International Conference on Image Processing, 2011.

17. K.Shailaja and Dr.B.Anuradha, "Effective Face Recognition using Deep Learning based Linear Discriminant Classification ", IEEE International Conference on Computational Intelligence and Computing Research, 2016.

18. H. R. Babaei, O. Molalapata and A.H.Y Akbar Pandor, "Face Recognition Application for Au- tomatic Teller Machines (ATM)", International Conference on Information and Knowledge Manage- ment (ICIKM), 2012.

19. https://docs.opencv.org/2.4/modules/contrib/doc/facerec/facerec-tutorial.htmlface- recognition

20.https://www.superdatascience.com/opencv-face-recognition/