Enhanced Security for ATM Transactions using Facial Verification

P.Bala Saiteja[1], K.Vasavi[2], M.A.Sathveek Prasad[3], K.Ramakrishna[4], V.V.K.D.V.Prasad
Department of ECE, Gudlavalleru Engineering College, Gudlavalleru , Andhra Pradesh , India

Abstract

There is an urgent need for improving security in banking region. With the birth of the Automatic Teller Machines, banking became a lot easier though with its own troubles of insecurity. Due to tremendous increase in the number of criminals and their activities, the ATM has become insecure. ATM systems today use no more than an access card and PIN for identity verification. The recent progress in biometric identification techniques, including finger printing, retina scanning, and facial recognition has made a great efforts to rescue the unsafe situation at the ATM. This research looked into the development of a system that integrates facial recognition technology into the identity verification process used in ATMs. An ATM model that is more reliable in providing security by using facial recognition software is proposed .The development of such a system would serve to protect consumers and financial institutions alike from intruders and identity thieves .In this an automatic teller machine security model is proposed that would combine a physical access card, a PIN, and electronic facial recognition that will go as far as withholding the fraudster's card. If this technology becomes widely used, faces would be protected as well as PINs. However, it obvious that man's biometric features cannot be replicated, this proposal will go a long way to solve the problem of Account safety making it possible for the actual account owner alone have access to his accounts. The combined biometric features approach is to serve the purpose both the identification and authentication that card and PIN do.

Keywords*:* *ATM Security, Face Verification, PIN, Access card.*

I. INTRODUCTION

Faces have the most descriptive features that anyone remembers once meeting human beings. Looking at person`s face allows knowing whether you met him/her before. Face identification is the process of approving the identity of somebody while face recognition is the process of recognizing somebody from a set of others. Simply face identification answers the question "Is this TEJA?" while recognition answers the question "Who is this person?"

For either face identification or recognition, face detection process is required. Detecting an object requires some knowledge about the nature of this object. Face has some features that make it distinctive from other objects. One commonly used feature is the color of skin. Many researchers utilize skin color only in face detection systems. Unfortunately, skin color only cannot be used to make an accurate decision that an object is a face. This is because not only face contains skin; hands, legs, and shoulders also have skin. Skin detection is complicated procedure because skin color has a wide range and determined the accurate range is not an easy task. The color space used for this process should be able to differentiate between skin and non-skin pixels. Other features that can be used in addition to skin are facial features; e.g. by detecting that face starts by two brows followed by two eyes and a nose then a mouth and a chin. Finding these features in an object is sufficient to make sure it is a human face. Face identification is to determine whether two faces are identical or not, while face recognition is to create large database of faces and input a face then determine whether this face is already found or not. Both techniques have a wide literature and many challenges. In this work, we concerns with face identification problem.

II. FACE RECOGNITION

One of the simplest and most effective approaches used in face recognition systems is PCA approach. This approach transforms faces into a small set of essential characteristics, which are the main components of the initial set of learning images (training set). Recognition is done by projecting a new image in the data set, after which the person is classified by comparing its position with the position of known individuals. The advantage of this approach over other face recognition systems is in its simplicity, speed and insensitivity to small or gradual changes on the face. The problem is limited to files that can be used to recognize the face. Namely, the images must be vertical frontal views of human faces.

III. RELATED WORK

System starts with a RGB image, face detection using skin color is detected using YCBCR color space. Face region then is cropped to narrow down the area to extract features using segmentation

method. Extraction process is done by creating HOG features and after successfully detecting these components. Create a feature vector at the system's output .Our proposed method combines between the robustness and simplicity in action. At first errors in face detection is decreased by combining the detection process and features .More distance between facial features are extracted in our method that makes it more accurate to determine whether two faces are identical.

IV. PROPOSED WORK

The system should first recognize the client at first step of transaction, the face should be detected from the video input and then preprocessed .The frame work behind includes a video input of RGB is captured and face detection algorithm in MATLAB is used for detection .The inputs are stored in training dataset .Facial verification is done by comparing the training dataset with the dataset also termed as a database.

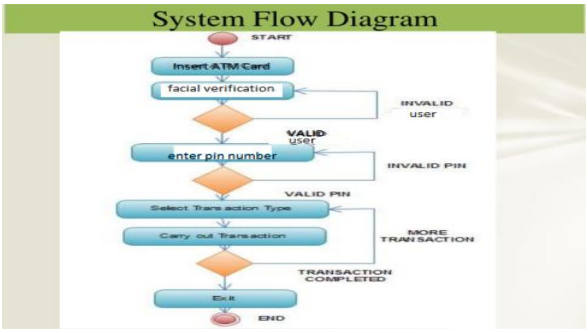

Fig1. Facial Recognition System Flow Diagram

The facial verification includes different steps which includes image capturing, face detection, extracting facial features and testing the train image with data base images .After the verification the ATM transaction starts automatically.

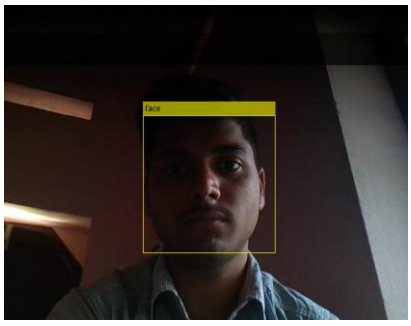

Fig2: Image Detection from Video Input

Fig3: Processed Image After Face Detection

Fig4: Dataset or Images in Database

V. EXPERIMENTAL RESULTS

The experiment was conducted using database of eight faces taken from the web cam of user .The training dataset contains 10 images containing (8 known and 2unkown images).All photos are resized to dimensions 50x50 and the subject is photographed in an upright , frontal position.The images can be coloured as well as gray scale (intensity levels of gray are taken as image features). Example of images from the training data set are shown above. To recognize the face we calculate the distance of test image from each image from training dataset.Minimum distance shows us which image from training dataset matches the test image best.When the test image get best match from the data set the ATM window gets opened up for the transaction shown in fig.a.

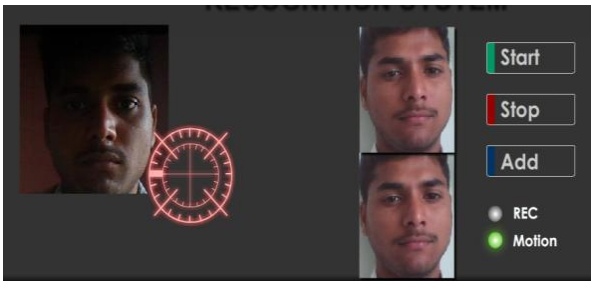

Fig5: The Final Outcome of Facial Verification Process.

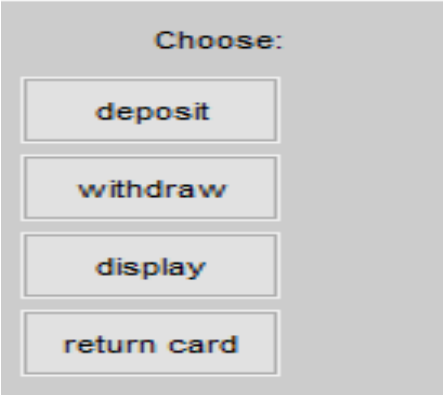

Fig6: ATM Window that Pop Out After Verification

VI. CONCLUSION

In this paper, a fast face recognition method using PCA is proposed. We used database of face images which contains 8 images, two images are taken for testing purpose, and one is related to database and other a random image. From the results, it can be concluded that, after recognition the transaction gets started. It is also clear that the recognition rate increases with the number of training images

ACKNOWLEDGEMENT

We would like to express our special appreciation and thanks to Prof. V.V.K.D.V.PRASAD for valuable suggestions and support.

REFERENCES

[1] Juhi Malhotra and Netra Raina, ―Biometric Face Recognition and Issues,‖ Second IEEE International Conference on Computing for Sustainable Global Development, pp. 1239-124, March 2015.

[2] Thiago H.H. Zavaschi, Alceu S. Britto Jr. Luiz E.S. Oliveira, Alessandro L. Koerich, ―Fusion of feature sets and classifiers for facial expression recognition,‖ ELSEVIER International journal on Expert Systems with Applications, Vol. 40, Issue 2, pp. 646–655, February 2013.

[3] Soma Biswas, Gaurav Aggarwal, Patrick J. Flynn, and Kevin W. Bowyer, ―Pose-Robust Recognition of Low-Resolution Face Images,‖ IEEE Transactions on Pattern Analysis and Machine Intelligence, Vol. 35, No. 12, pp. 3037- 3049, December 2013.

[4] Ramzi Abiantun, Utsav Prabhu, and Marios Savvides, ―Sparse Feature Extraction for Pose-Tolerant Face Recognition,‖ IEEE Transactions on Pattern Analysis and Machine Intelligence, Vol. 36, No. 10, pp. 2061 – 2073, October 2014.

[5] Jiwen Lu, Venice Erin Liong, Gang Wang, and Pierre Moulin, ―Joint Feature Learning for Face Recognition,‖ IEEE Transactions on Information Forensics and Security, Vol. 10, No. 7, pp. 1371 -1383, July 2015.

[6] Bing-Kun Bao, Guangcan Liu, Changsheng Xu and Shuicheng YanKai, ―Inductive Robust Principal Component Analysis,‖ IEEE Transactions on Image Processing, Vol. 21, No. 8, pp. 3794- 3800, August 2012.

[7] Huu-Tuan Nguyen and Alice Caplier, ―Local Patterns of Gradients for Face Recognition,‖ IEEE Transactions on Information Forensics and Security, Vol. 10, No. 8, pp. 1739 – 1751, August 2015.

[8] Changxing Ding, Chang Xu, and Dacheng Tao, ―Multi-task PoseInvariant Face Recognition,‖ IEEE Transactions on Image Processing, Vol. 24, No. 3, pp. 980 – 993, March 2015.

[9] Mehran Kafai, Kave Eshghi, and Bir Bhanu ―Discrete Cosine Transform Locality-Sensitive Hashes for Face Retrieval,‖ IEEE Transactions on Multimedia, Vol. 16, No. 4, pp. 1090 - 1103, June 2014.

[10] Loris Nanni, Alessandra Lumini, and Sheryl Brahnam, ―Survey on LBP based texture descriptors for image classification,‖ ELSEVIER International Journal on Expert Systems with Applications, Vol. 39, Issue 3, pp. 3634-3641, February 2012.

[11] Baochang zhang, Lei zhang, David zhang and Linlin shen, ―Directional Binary Code with Application to PolyU Near-Infrared Face Database,‖ ELSEVIER Pattern Recognition Letters, Vol. 31, Issue 14, pp. 2337- 2344, October 2010.

[12] Jagadeesh H S, Suresh Babu K and Raja K B, ―DBC based Face Recognition using DWT,‖ An International Journal in Signal & Image Processing, Vol.3, No.2, pp. 115 – 130, April 2012.

[13] Giovanni Betta, Domenico Capriglione, Mariella Corvino, Consolatina Liguori, and Alfredo Paolillo, ―Face Based Recognition Algorithms: A First StepToward a Metrological Characterization,‖ IEEE Transactions on Instrumentation and Measurement, Vol. 62, No. 5, pp. 1008 -1016, May 2013.