Journal of Current Research in Engineering and Science
Bi-Annual Online Journal ( ISSN : 2581 - 611X )

Volume 6 –Issue 2,August 2023
Paper:76

# Realtime Secure Clickbait and Biometric Atm User Authentication and Multiple Bank Transaction System

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***Abstract*—The current work focuses on secured ATM transac- tion of customers using the concept of Deep convolution neural network techniques. The proposed methodology involves series of steps such as face recognition using region proposal network and further processing the image using segmentation techniques to extract facial features for customer identification during money withdrawal. The extracted facial features are segmented with different features for carrying out comparison of captured face image with the facial database. The accuracy, precision , recall and F1 score between the trained model and validation found to be 0.99 which ensures the ability of deep convolutional neural networks in exhibiting superior performance in ATM money transactions.**

***Index Terms*—ATM,DCNN,Neural Network**

## I. INTRODUCTION

By enabling consumers to conduct self-service operations like cash withdrawals, deposits, and fund transfers without the help of a teller, automated teller machines (ATMs) have transformed the banking sector. Customers also benefit from the convenience of banking services without having to visit an actual bank office thanks to them. While some ATM transactions require a debit or credit card, the majority of them

do not. Luther George Simjian created the first ATM in 1960, and John Shepherd-Barron installed the first one in London in 1967. ATMs can be divided into simple machines that offer basic services like cash withdrawal and balance inquiries, or more sophisticated machines that enable extra services like cash and check deposits, lines of credit, and bill payment. They can also be grouped according to the labels given to them, such as pink label for

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women, yellow label for e-commerce, and green label for agricultural use. Nonetheless, ATM fraudis becoming a bigger issue. Criminals prey on unwary usersto steal their debit card information and personal identifying details using strategies like skimming, shimming, cash-out, and jackpotting. It's crucial to be on guard and alert for any strange behaviour in order to protect yourself from ATM fraud.

## II. LITERATURE SURVEY

According to Seneviratne et al.'s 2020 paper "Impact of Video Surveillance Systems on ATM PIN Security," ATM PINs are a confidential piece of information that is used for transaction authentication. However, in circumstances where the keypad and fingertips are not visible, it is still possible to deduce the PIN using camera footage.In a lab study, the PIN could be deduced by human observers, and the PIN inference

was automated using an OpenCV Python application. ThePIN may be disclosed to outsiders by webcam put inside ATM cubicles to increase physical security. This risk canbe somewhat reduced by guidelines and regulations for the positioning of security cameras. Yadav et al.'s 2020 paper "Secure Card-less ATM Transactions" proposes a solutionto eliminate physical contact between the card and machine during ATM transactions to prevent fraud. The suggested approach entails a mobile app that dynamically creates a one- time security code to produce a unique code for authentication. The user generates a reference number after logging into the mobile app, which is only usable once and is good for aset amount of time. The user then uses the app to enter theuser ID, password, and code at the nearby ATM to sign in. The specified amount is withdrawn if the reference numberis accurate. This solution offers three levels of protection and gets rid of the issues with OTP sharing. Patil et al.'s 2019 paper "Efficient Cash Withdrawal from ATM Machine Using QRcode Technology" proposes an advanced system to make virtual banking consistent by using QR code technology. The QR code scanner installed in the ATM machine detects and decrypts the information stored in the QR code, including the card number, amount, PIN, CVV number, and other required credentials. After successful authentication with the bank's database, cash is dispensed by the ATM machine.

## III. EXISTING SYSTEM

The present ATM authentication procedure uses fixed PINs for identity verification along with access cards that typically feature magnetic stripes and password-PINs. Some systems also use chip and PIN cards as a backup. QR code withdrawalshave also been enabled, allowing customers to withdraw cash by scanning a QR code using a mobile app. The proposed system aims to incorporate a new feature into the existing ATM authentication process ATM security systems can also incorporate biometric authentication using fingerprint recog- nition, efficient minutiae feature extraction algorithms, and location-based GSM technology for transaction confirmation. However, problems with noisy data, limited degrees of free- dom, and spoof assaults plague biometric systems. Gaussian Mixture Models (GMMs), Artificial Neural Networks (ANNs),Fuzzy Expert Systems (FESs), and Support Vector Machines are among the techniques frequently employed for biometric authentication. (SVMs). Using face and speech samples from biometric databases, these algorithms were developed and evaluated. Some of the disadvantages of the current system include lower accuracy, slow face detection and training processes, limited face detection distance, and the need for QR code scanners or mobile apps for some functionalities. Additionally, unimodal biometric systems may face challengeswith intraclass variations, non-universality, and unacceptable error rates.

## IV. PROPOSED SYSTEM

In this research, a digital facial recognition system usinga Deep Convolutional Neural Network is combined with aphysical access card to create a multi-modal security modelfor an ATM. (DCNN). We can recognize faces more accurately using deep learning than we can with conventional machine learning techniques. The multi-modal security model for an ATM proposed in this project combines a physical accesscard with digital facial recognition utilizing a DCNN. We can recognize faces more accurately using deep learning than we can with conventional machine learning techniques. Filters, kernel size, strides, input shape, kernel initializer, activation, optimizer, batch size and epochs are just a few of the pa- rameters used in the CNN face recognition process. If the taken image and the

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saved image conflict, an unidentified face verification link generator will be utilized to create and deliver a Face Verification Link to the user. This will use specialized artificial intelligent agents for remote certification to confirm the identities of illegal users, after which the banking security system will either authorize the transaction as necessary or receive a security-violation alert. The benefits of the suggested system include quick and accurate prediction, reduction of fraudulent attempts, prevention of theft and other criminalactivity, provision of a safe and secure lifestyle infrastructure, prevention of unauthorized access using Face Verification Link, and everyone's face ID being unique.

## V. METHODOLOGY

The current study proposes a secured method for allowing transactions at ATM and rejects transaction when a criminal or deceiver makes an attempt to withdraw money from ATM.The money dispatch from ATM is done through the verification of the customer after verifying his face.The face recognition of the customer plays a predominant role for issue of money which has been stored earlier in bank's server. The ATM dispatches money only when customer's face gets recognised with the presaved images.The system architecture depicted in figure 1 gives a crystal clear idea about the steps involved in dispatching money to a customer from ATM.

The design includes an ATM simulator, a Next Generation testing tool for XFS-based ATMs. (also known as Advanced Function or Open-Architecture ATMs). A virtualized replica of any ATM can be used for ATM testing thanks to a web-based program called ATM Simulator.ATM Simulator uses virtualization in addition to automated testing for facial authentication and the Unknown facial Forwarder Technique to create a realistic ATM simulation.

### *A. FACE RECOGNITION*

The face recognition phase involves certain steps like face enrollment, face image acquisition and frame extraction. The enrolment of face involves registration of few frontal face of beneficiary templates which can be varied in their position liketilting up and down, zooming closer or far away and turning left or right.For the purpose of image acquisition cameras has been deployed to capture video of the customer entering ATM. The process continues by extracting images from the captured videos through webcam for the purpose of processing further.

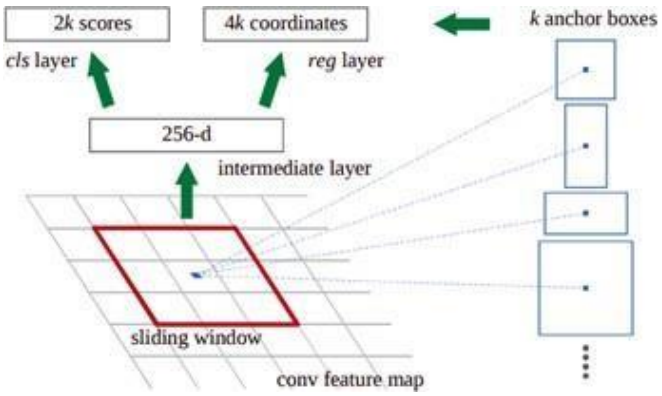


Fig. 1. System Architecture

Normally, 20 to 30 fps are captured and delivered to followingstages.

The captured images are further pre-processed to make themsuitable for model training and validation. Reading the image, conversion of RGB to grey scale and finally resizing the imageto a reduced size from its original size are the steps involved. The process further proceeds with removing the noise from image and subjecting the image for binarization.

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*B. REGION PROPOSAL NETWORK*

An RPN is a fully convolutional network that simultane- ously predicts object limits and objectless scores for each location. Each feature (point) on the CNN feature map, on which it operates, is referred to as an Anchor Point. We overlay the image with nine anchor boxes (combinations of various sizes and ratios) for each anchor point. These anchor boxes are cantered where the feature map's anchor point is located in the image.Figure 2 shows the steps involved in Region Proposal Network.

*C. TRAINING OF RPN*

To be aware that there are nine anchor boxes for each place on the feature map, making a very large total number that does not include all of the essential anchor boxes. An anchor box can be referred to as the foreground if it contains an item ora part of an object, and as the backdrop if it doesn't.

Therefore, depending on each anchor box's Intersection overUnion (IoU) with the provided ground truth, assign a labelto each one for training purposes. We essentially give each anchor box one of the three labels (1, -1, 0). If an anchorhas the highest IoU with ground truth, then it is possible

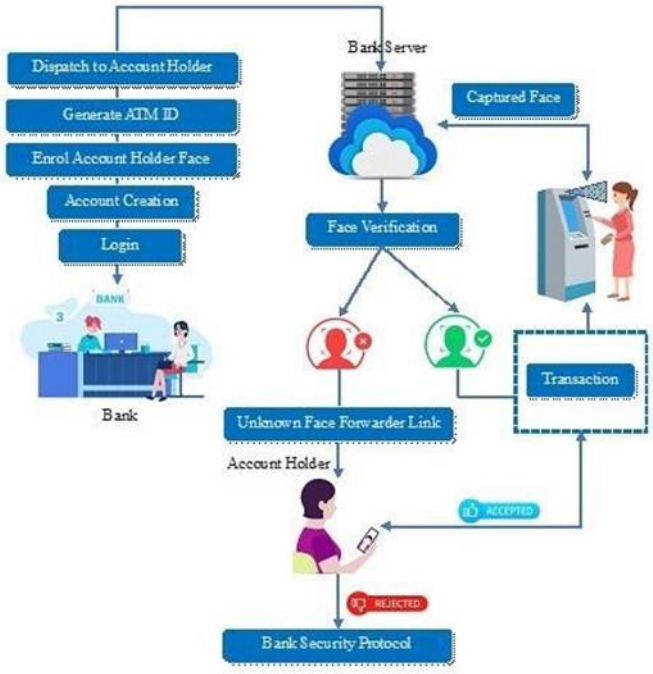


Fig. 2. Region Proposal Network

for such anchor to have label 1. if the ground truth IoU is greater than 0.7. ( IoU¿0.7). If IoU is less than 0.3, an anchor is given the label "-1" (Background). Label = 0: If it doesn't fit into one of the aforementioned categories, this kind of anchor doesn't help with training and is disregarded. After labeling the boxes, it generates a mini-batch of 256 anchor boxes that are selected at random from the same image. Backpropagation and stochastic

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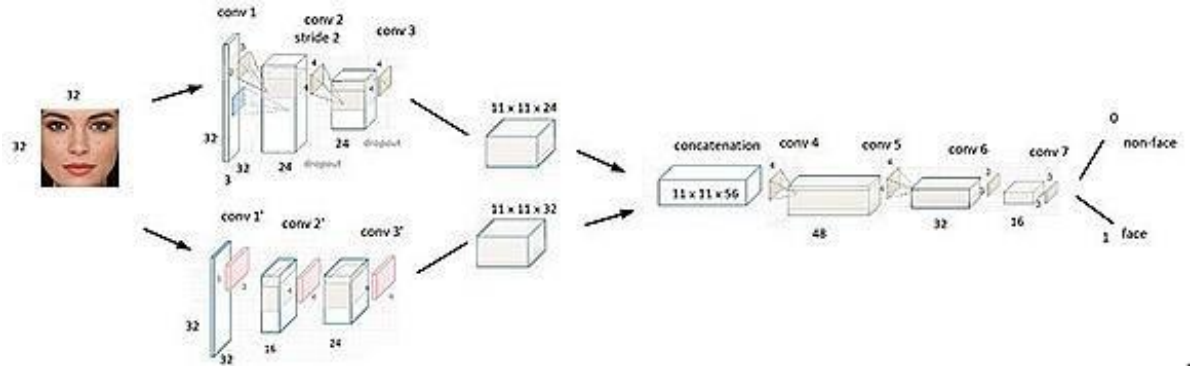
gradient descent can now be used to train the RPN from beginning to end. (SGD). The steps in processing are choose the first seed point, Add the adjacent pixels' intensity threshold, check the adjacent pixel's threshold, and Selected thresholds for the region's expansion. and the process is repeated until all regions are finished.

*D. FACE DETECTION*

The Region Proposal Network (RPN) in this module gen- erates RoIs by swiping feature map windows over anchors with different scales and aspect ratios.Face identification and segmentation technique based on enhanced RPN. RoIs arecreated using RPN, and RoIAlign accurately maintains the precise spatial placements. These are in charge of offeringa predetermined collection of bounding boxes of various sizes and ratios that will be utilized as a guide when the RPN initially predicts where items will be placed. Figure 3 shows the steps involved in Face Detection.

*E. SEGMENTATION*

The current study adopts a straightforward picture seg- mentation technique called "Region Growing" is based onthe region's seeds. It is sometimes referred to as a pixel-based technique because it selects the initial seed spots for picture segmentation. This segmentation method looks at the pixels that are in the immediate vicinity of the original "seed points" and decides whether or not to include the neighborsin the region depending on predefined criteria. In a typical region-growing method, only the "intensity" constraint is usedto analyze the neighboring pixels. The intensity value is compared against a threshold, and the neighboring pixels that meet the threshold are chosen to expand the region.



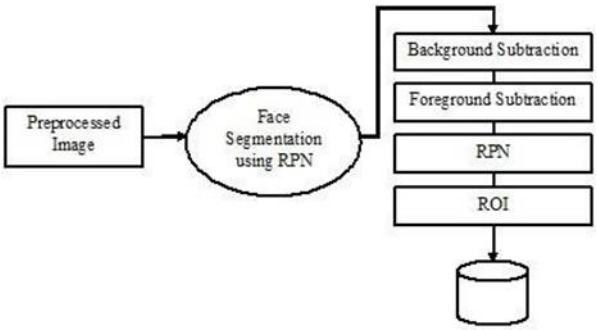



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Fig. 3. Steps involved in Face Detection

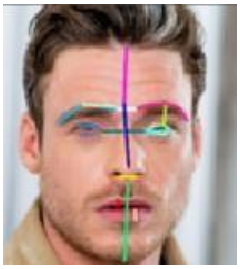

Fig. 4. Image under Feature Extraction

*F. FEATURE EXTRACTION*

Following face identification, the feature extraction module uses the face image as input to identify the most important aspects for classification. The association between each pose's facial characteristics and frontal face templates is used to calculate the effects of the change. These features includethe eyes, nose, and mouth.Forehead Height , Middle Face Height , Left Eye Area and Nose Length are few examples for facial information. Figure 4 shows the image considered for extraction features from facial images and figure 5 shows the steps involved in Segmented Image Processing

*G. FACE CATEGORIZATION*

When enrolling, offensive face photos were automatically detected and rejected using DCNN algorithms. This will ensure proper enrollment, which will lead to the best perfor-

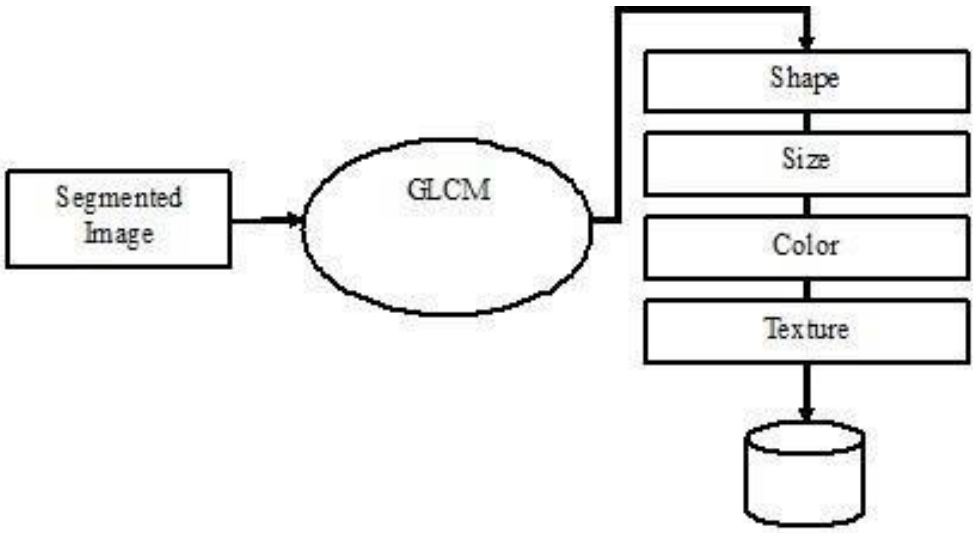


Fig. 5. Segemented Image Processing

Fig. 6. Face Categorization

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mance.By adding the convolved grid of a vector-valued input to the kernel with a bank of filters to a specific layer, theCNN generates feature maps. The activations of the convolvedfeature maps are then computed using a non-linear rectified linear unit (ReLU). Utilizing local response normalization,the new feature map produced by the ReLU is normalized. (LRN). A spatial pooling approach is used to further compute the output from the normalization. (maximum or average pooling).Figure 6 shows the face categorization Module .

*H. FACE IDENTIFICATION AND PREDICTION*

The face detection module receives the facial image afterit has been taken by the ATM Camera. This module finds areas of an image where people are most likely to be present. Following face recognition using RPN , the feature extraction module uses the face image as input to identify the mostimportant features that will be used for classification. After that, the face image is categorized as known or unknown. Ifthe image face is recognized, the appropriate Card Holderis found, and next step is taken. This module performs amatching procedure using test live camera-captured classified files and training classified results.

*I. UNKNOWN FACE FORWARDER*

An Unknown Face Verification Link will be established anddelivered to the cardholder in order to certify the identity ofan illegal user using some specific artificial intelligent agents for remote certification. This will either properly authorize thetransaction or notify the banking security system of a security breach.

*J. TRANSACTION*

In this phase , the customer enters the amount for with- drawal and collects money from the the machine before expiryof 30 seconds.

*K. PERFORMANCE ANALYSIS*

Based on the context of this project, the key points as- sociated with the performance indicators are discussed: True Positive (TP): The algorithms recognize the Card Holder and there is a Face. False Positive (FP): Although there isn't a Face, the algorithms identify the person as a Card Holder and display their name. False Negative (FN): Although a face exists, the algorithms fail to recognize the card holder's name and address. True Negative (TN): Nothing is being foundand there is no Face. Figure 7 shows Performance Analysis Parameters.

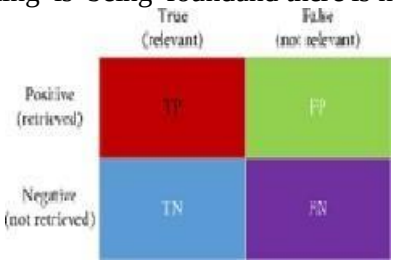

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Fig. 7. Performance Analysis Parameters

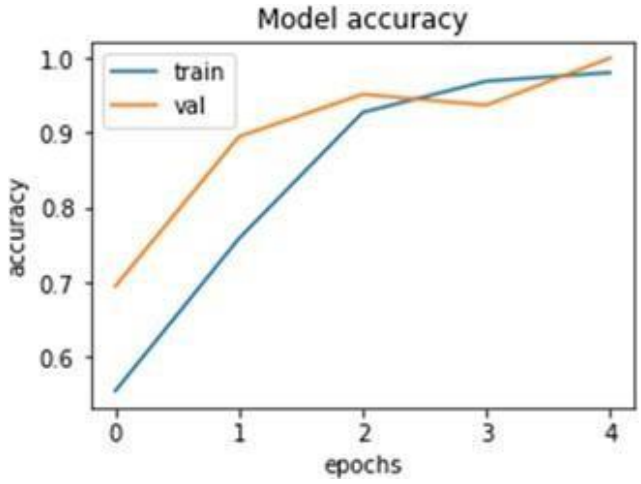


Fig. 8. Accuracy Plot

The accuracy, precision, recall and F1score for the training and validation obtained are detailed herewith a) Accuracy:0.9984025559105432 b) Precision: 0.9990234375 c) Recall: 0.9964285714285714 d) F1 score: 0.9977122020583142

Figure 8, 9 and 10 shows the plot for accuracy, precision and recall obtained for training and validation.

## CONCLUSION AND FUTURE ENHANCEMENT

Biometrics offers the long-needed and greatly awaited so- lution to the issue of fraudulent transactions by identifying

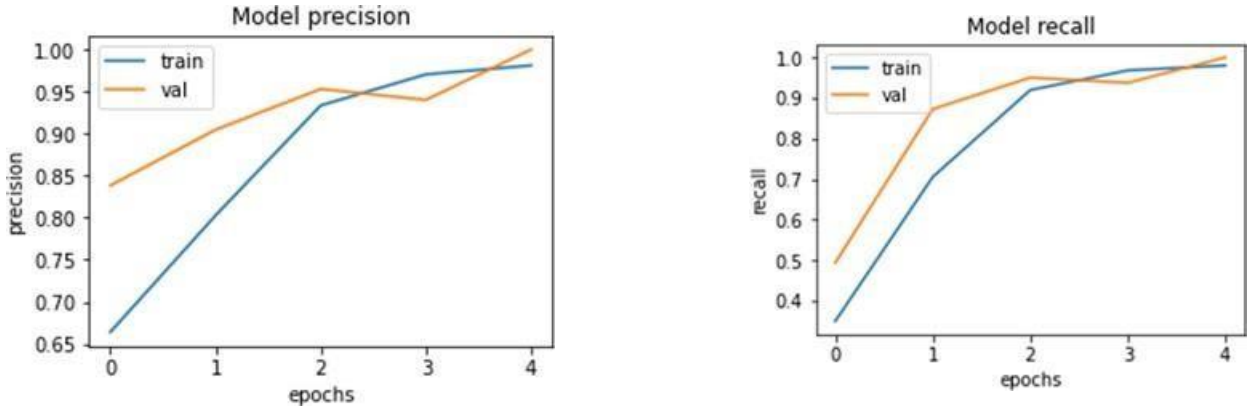


Fig. 9. Precision Plot

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Fig. 10. Recall Plot

and authenticating account owners at the Automated Teller Machines. This project aims to propose a remedy for the dreaded problem of fraudulent transactions that can only be completed if the account holder is physically presentor remotely present at an automated teller machine using biometrics and an anonymous face forwarder.As a result, it puts a stop to situations in which ATM locations experience illicit transactions without the real owner's knowledge. The efficiency of using one for identification is increased when another biometric attribute is utilized for authentication. The ATM security architecture accounts for potential proxy usage of data and security tools already in place, such as ATM Cards. All visible and accessible transactions are engaged in by the bank account owner in real-time.

Deep feature representation techniques should be developed in the future to further enhance recognition performance.

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