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Face and Multi-Fingerprint Based ATM System through Machine Learning

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Abstract: *Fingerprints and facial features of the individual are being used in biometric authentication techniques, which are increasingly extensively used across significant implementations. Despite the fact that there multiple facial recognition systems accessible. A greater number of researches should unearth factors that improve efficiency and accuracy. Facial as well as fingerprint identification play an important part in the identifying process since they do not need human assistance, unlike some other biometrics methods. This not only proves the huge potential to create far greater protection for such Virtual ATM transactions, but also explains the reasoning why biometric identification systems have been attracting so much attention.. Therefore, for this purpose an effective framework for biometric authentication on Virtual ATMs through the use of biometric features, such as Facial and Fingerprint have been proposed. The presented framework utilizes Live Streaming and Region of Interest along with Channel boosted Convolutional Neural Networks and OTP authentication has been implemented. The framework has been measured using lengthy experimentations to achieve quite reassuring outcomes.*

Keywords: Face Recognition, Fingerprint Recognition, Virtual ATM, Machine Learning

I. INTRODUCTION

Biometrics is a field of technology which performs Recognition, Verification and Identification by behavioural and anatomical characteristics. Biometrics is the best solution as far as security authentication is considered. In proposed system, a combination of bio-metrics is proposed so that the FAR (False acceptance rate) and FRR (False rejection rate) can be reduced. Recognition used in the description of biometric systems like facial recognition, finger print or iris recognition relating to their fundamental function, “Recognizing” as the biometric input is valid or not. The Recognition confirms the input is valid Fingerprint or Face or Iris. However, the recognition does not include verification. Verification is the process where the biometric system attempts to confirm an individual’s claimed identity by comparing the input to one or more previously enrolled data. Identification is the process where the biometric system searches a database for a reference finding a match for the enrolled biometric data; a biometric data is collected and compared to all the templates in the database. In ATM’s such a concept could be used to replace the existing system will allow you to access your banking details. Secure authentication is what people need and Biometric is the solution for them, since the biometrics is one hard thing to hard to replicate.

Facial detection is so natural to human people that even newborns can tell family and friends apart. However, computers have a hard time with face detection. In the inaugural automated face identification system, an extracted features is built by labelling the locations of facial landmarks like the eyeballs, eyebrows, chin, etc., and faces are identified by measuring the Euclidean distance between extracted features from different photos. In order to characterize the architectural aspects of facial photographs in a big database, most methods employ feature maps of varying dimensions. While others characteristic face recognition methods simplify the categorization work by treating the face region as a juncture and representing it in a lower dimensions environment that is generated from the multidimensional space input images.

Facial identification is considered one of the most reliable methods of establishing a person’s identification, which has been the topic of a great deal of research over the last numerous years. Face recognition from photographs is a popular

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area of study in biometrics. Among the most useful applications of facial recognition and identification technologies is evaluating images for interpretation. Mental health professionals, neuroscientists, and machine learning experts have all taken an interest in facial recognition software since advances in the field may provide light regarding how the natural brain processes. Despite the prevalence of biometric identification methods like fingerprint as well as retinal scanners, they still rely on human verification. Nevertheless, it is not necessary while utilizing face pictures for person authentication. Facial recognition technology plays a crucial part in establishing a person's identity since it does not truly entail human cooperation that is a considerable benefit above all other biometrics approaches.

II. LITERATURE SURVEY

For our project we are surveying some reports and references which are helping us to make it easy and simplest and they are as follows

Yang Tan [1] According to research by Chaoyou Fu [1], a novel Double Variational Regeneration Face architecture have been designed to enhance the efficacy of Heterogeneous Face Recognition by generating large numbers of paired diverse images from playback. The very first stage is painstakingly building a double variational encoder that really can train with both associated huge datasets and imbalanced visible information. The addition of this feature greatly broadens the scope of possible identifications from the resulting images. A bilateral identification conservation decline is then applied to the generated images to guarantee that they retain their original consistency. This new set of unidentified images may be utilized to train up the Heterogeneous Face Recognition models using descriptive learning, capitalizing on both the identification persistence and identification dispersion features.

Using face recognition technology, KanjanaEiamsaard [2] developed the Smart Warehouse Accessibility Management System. Smart Warehouse Accessibility Monitoring Program was validated using a confusion matrix experimental process. The system as a whole performed as expected in terms of accessible surveillance. Crime investigations may be sped up and made more efficient with the help of the Smart Warehouse Accessibility Surveillance System. Upgrading the Smart Warehouse Accessibility Management System to include item identification might allow for constant tracking of stolen goods and immediate notification in the event of a breach.

Feng Liu [3] Explain a novel regression-based approach to face identification and face recognition reconstitution from a single 2D image, allowing for any expression or pose. It takes a 2D image of a face and uses those cues as clues to rebuild the 3D face, subsequently utilizing those revised 3D faces to further enhance the 2D characteristics. In order to do both tasks simultaneously in real time, the proposed method alternates between employing feedforward landmark regression model and 3D shape coefficient of determination. The proposed approach outperforms state-of-the-art 3D face remediation tools by automatically recreating both pose- and affirmation and expressive 3D shapes from a single face photo of arbitrary postures and expressions.

Since there is a limit to the number of Eigen faces that can be used in Principal Component Analysis transformation, Gurlove Singh [4] reports that the method was not more successful than other techniques, which includes traditional and digitalized face recognition. More work is needed to perfect the fully automated front-view facial recognition technology that shows off pinpoint accuracy in demos. There is going to be substantial improvement in the system's precision when used in practice. To achieve a high degree of precision, the mechanism was badly conceived and built. One contributing factor would be that the face detection and recognition platform's component is not always sensitive enough to subtle changes in consistency with respect to dimensionality or orientation.

An end-to-end learning strategy for pose-invariant facial expression recognition and face picture reconstruction using geometric information is described by Feifei Zhang [5]. In order to help in the training of a deep neural binary classifier, it may generate face images with fabricated expressions and postures. Extensive experiments on three most commonly used datasets show the effectiveness of this method. Facial features may also be transmitted using this method.

According to Zhang Jianxin [6], detecting face traits for identification has been among the most difficult tasks. This article's authors offer a novel technique for recognizing people's faces by using the Two-Dimensional Adaptive Directional Wavelet Transform and indeed the Latent Semantic Feature space Methodology. Therefore, for the very first instance, researchers apply the adaptable directional wavelet transform to the face identification issue in two dimensions. Two-dimensional adaptable directed wavelet decomposition is used to make an iterative forecasting and

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refresh step that takes into account the local features connecting individual pixels. Both of the forecasting and refresh controls in this study use a set of nine orientations with 8 fading occurrences. The ideal orientation for performing the hoisting wavelet decomposition is determined by applying a thread segmentation technique to the data.

Using Eigen Face, fisher face, and Local Binary pattern approaches from the Open source domain, Limei Fu [7] offers a system for recognizing and identifying people's faces on Linux. The minimization strategies are therefore put out via a validation process, and investigation is utilized to analyses their pros and cons as well as the conditions in where they could be applied. The development of reliable software that recognizes faces is a complex issue. Without using many methods, achieving a respectable identification outcome is difficult. By merging local and worldwide data, facial features may be accurately characterized. Increasing identification effectiveness in tandem with the use of numerous features and classifiers may be achieved via the use of the strategy of combining both.

III. METHODOLOGY

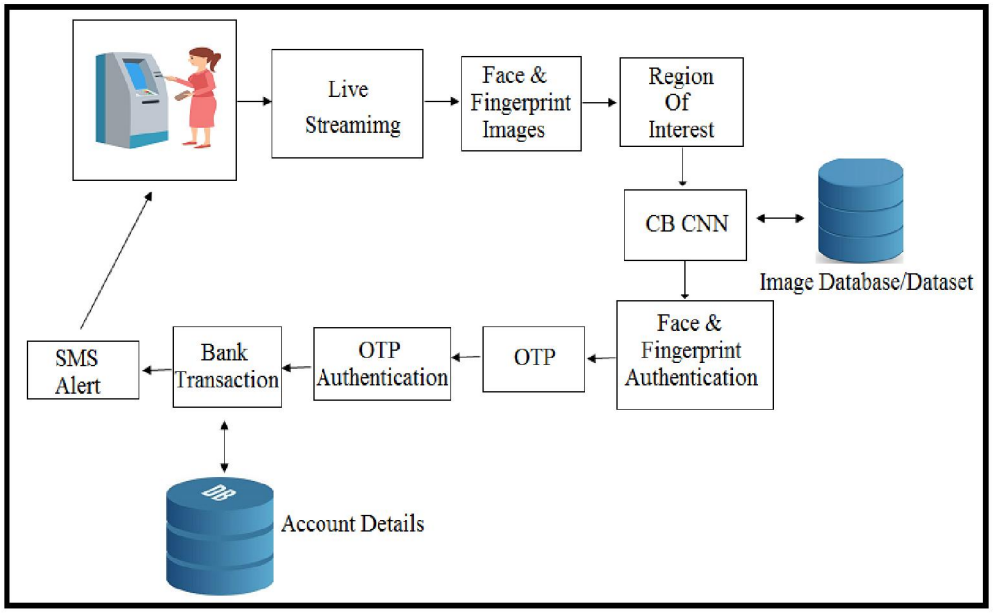

Fig. 1. Block Diagram

Module Description

Module A:

- Preprocessing
- Image Scaling
- Image Sharing
- Image Restoration
- Dataset list formation

Module B:

- Image Normalization
- Pixel Position
- Color Model
- Model Features
- Region Estimation

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Module C:

- Convolution Neural Network
- ROI Extraction
- First Layer Convolutional
- Fully Connected Layer
- Prediction Score

Module D:

- Transaction Completion
- Protocol Setting
- IF-Then Rules
- OTP Matching
- Transaction Completion For Virtual ATM.

Proposed Methodology with relevant Diagrams and Figures

DFT Level 0

The DFD 0 diagram for the data flow diagrams describes the flow of the approach. The DFD diagram provides the simplest flow where in the user provides the live image in which face & fingerprint authentication and bank transaction is deployed after which the alert generated

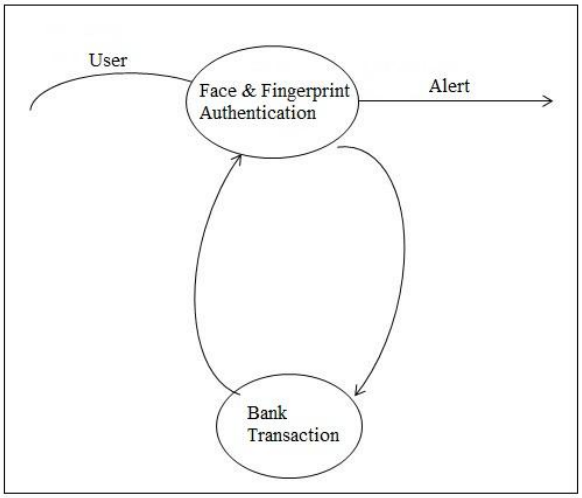

Fig. 2.DFT Level 0

DFT Level 1

The DFD 1 diagram provides even more details wherein the user provides the live image for live streaming. The streaming is performed and then provided to the frame grabbing which is then utilized by the CB-CNN which perform region of interest. Following this the ATM Transaction is done which is implemented to achieve the alert generation.

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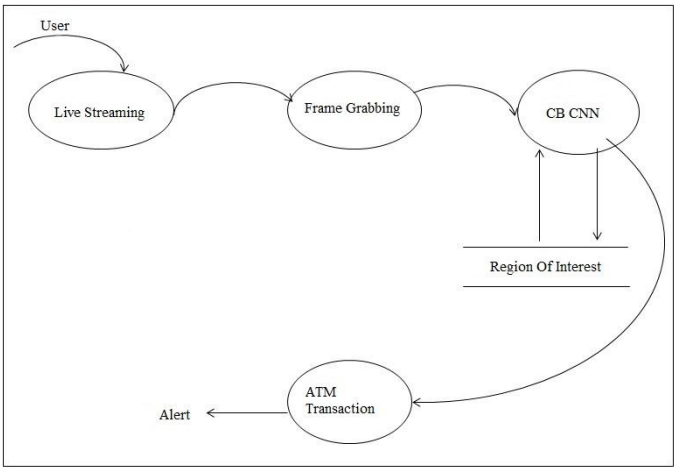

Fig. 3.DFT Level1

DFT Level 2

The DFD 2 diagram is the most detailed wherein the user provides the live image for live streaming. The streaming is performed before the frame grabbing procedure after which the region of interest. Followed by the region of interest , pixel modulation and image enhancement is then provided to the CB-CNN module which is then utilized face and fingerprint authentication. Following this the ATM transaction based on account details is implemented to achieve the transaction updating which leads to alert generation

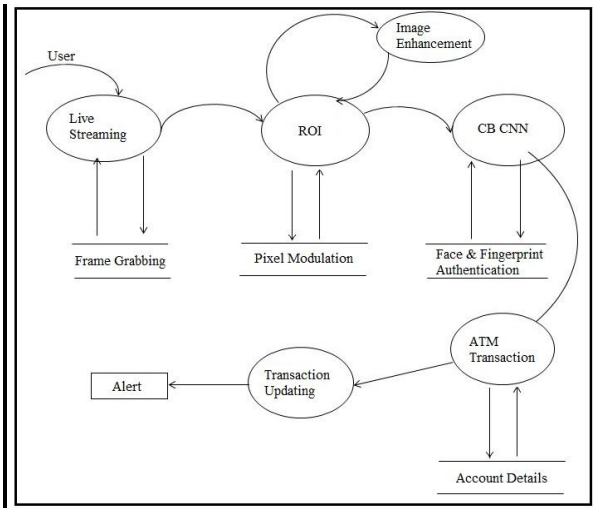

Fig. 4.DFT Level 2

Activity Diagram

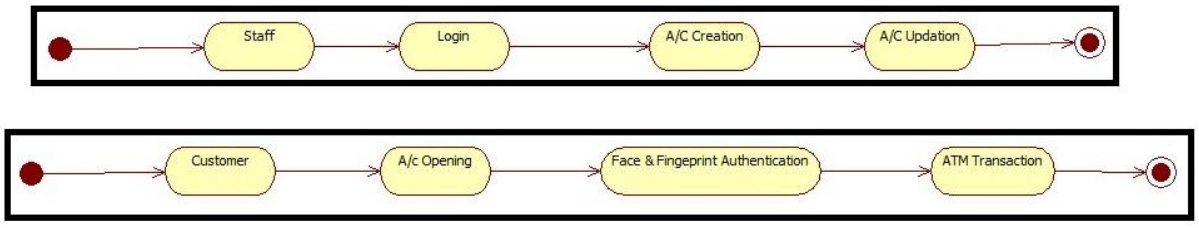

Fig. 5. Activity Diagram

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The activity diagram lists the various activities that are performed in the proposed methodology. In the first activity diagram the start state is initiated and the staff is provide which leads login, account creation, account updating which leads to the stop state.

In second activity diagram the start state is initiated and the customer is provide which leads account opening, face & fingerprint authentication, ATM transaction which leads to stop state.

Usecase Diagram

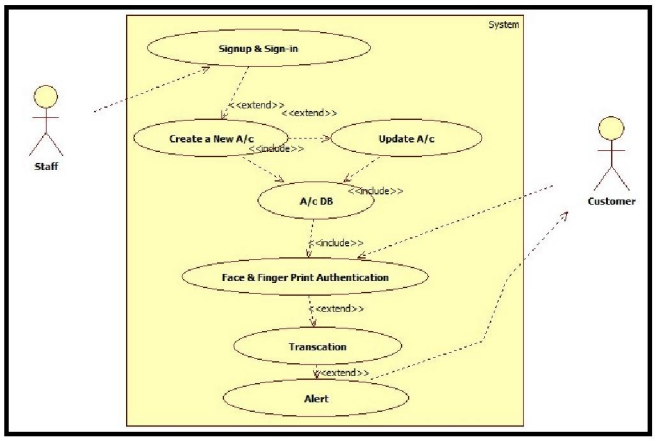

Fig. 6.Usecase Diagram

The Use case Diagram depicts the various use cases that are performed by the user in the proposed model. The use cases include feeding the live image, frame extraction, pre-processing, image normalization, CNN for Face and Finger print identification to complete ATM Transactions.

IV. CONCLUSION

The execution of ATM protection by availing fingerprint also has the traditional verifying methods that we're inputting the client's fingerprints that is sent by the administrator and checked correctly. The protection feature was improved highly for the firmness and solidity of the client's identity. The complete system was constructed on a fingerprint system that makes the mechanism safe, dependable and effortless to avail. This shall be the most favorable technology in electronic or digital money transactions.

- Successful authentication of faces
- Successful authentication of finger prints
- Accurate handling of multi- threads to maintain sequence of authentication to enhance Virtual ATM process

V. FUTURE SCOPE

- Deployed model van be enhance to work in real time kiosks
- The model can be enhance to work for the authentication of emails and in other areas

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