ATM Terminal Design Based on Fingerprint Recognition, Face Recognition and Eye Scan

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Abstract- *Fingerprint recognition has been utilized for cell-phone authentication, airport security and beyond. Many different features and algorithms have been proposed to improve Fingerprint, face and iris recognition. In this paper, we propose an end-to-end deep learning framework for fingerprint, face and iris recognition which can jointly learn the feature representation and perform recognition. We train our model on a large-scale fingerprint, face and iris recognition dataset, and improve over previous approaches in terms of accuracy. Our proposed model is able to achieve a very high recognition accuracy on a well-known fingerprint, face and iris dataset. We believe this framework can be widely used for biometrics recognition tasks, making more scalable and accurate systems possible. We have also used a visualization technique to highlight the important areas in an input fingerprint image, that mostly impact the recognition results.*

I. INTRODUCTION

To make an application more secure and less accessible to undesired people, we need to be able to distinguish a person from the others. There are various ways to identify a person, and biometrics have been one of the most secure options so far. They are virtually impossible to imitate by anyone other than the desired person. They can be divided into two categories: behavioral features, which are actions that a person can uniquely create or express, such as signature and walking rhythm; and physiological features, which are characteristics that a person possesses, such as fingerprint and iris pattern. Many works revolve around recognition and categorization of such data including, but not limited to, fingerprints, faces, palm prints and iris patterns.

Although many of the previous works achieve highly accurate performances, they involve a lot of pre-processing and using several hand-crafted features, which may not be optimal for different fingerprint datasets (collected under different conditions). In recent years, there have been a lot of focus on developing models for jointly learning the features, while doing prediction. Along this direction, convolutional neural networks (CNNs) [9] have been very successful in various computer vision and natural language processing (NLP)tasks in recent years [10]. Their success is mainly due to three factors: the availability of large-scale manually labeled datasets; powerful processing tools (such as GPGPUs); and good regularization techniques (such as dropout, etc.) that can prevent the over fitting problem.

Deep learning have been used for various problems such as classification, segmentation, super-resolution, image captioning, emotion analysis, face recognition, and object detection, and significantly improved the performance over traditional approaches. It has also been used heavily for various NLP tasks, such as sentiment analysis, machine translation, name entity recognition, and question answering. More interestingly, it is shown that the features learned from some of these deep architectures can be transferred to other tasks easily, i.e. one can get the features from a trained model for a specific task and use it for a different task, by training a classifier/predictor on top of it. However, having a large-scale dataset (with several examples for each class of label) is crucial for the success of most of the current deep learning-based models. For fingerprint recognition, there are several public datasets with a reasonable size, but most of them come with a limited number of images per class (usually less than 20 fingerprint images per person),which makes it more challenging to train a convolutional neural network from scratch on these datasets. In this work, we propose a deep learning framework for fingerprint recognition for the case where only a few samples are available for each class (few shots learning). It can get the fingerprint images and perform recognition directly. Previously there have been works using the features extracted from a pre-trained convolutional network [25], and used along with various classifiers (such as SVM) to perform biometrics recognition, but in this work, we train a model for fingerprint recognition directly.

II. PROPOSED FRAMEWORK

ATM Terminal Design Based on fingerprint recognition, facial recognition and retina eye scan.

Ditch that debit card, eye scanning technology is coming to the next generation of ATM's. To withdraw cash user's simply approach the ATM machine's and scans their

fingerprint on the ATM machine. After authentication he further proceeds for the the facial recognition process, after which the user should undergo retina scan authentication, only then the user can access his\her bank account. There are three authentication's/verification's which will take place before giving out an individual's bank details along with withdrawing of cash. All the three phases are very crucial which provides extensive security and protection to ones personal bank account detail's.

This will be the future of hard cash withdrawal's which will provide very good privacy to individual's account. Better than today's ATM's which are subjected to theft in many forms. Theft of cash from ATM's will reduce radically, it will improve Customer experience, the password cannot be forgotten or lost since the human face, retina and fingerprint is only the password. Reduced operational cost, cost cutting is done on ATM cards and improved security in terms of 3-phase authentication.

In general, Pre-processing deals with the operation of images with low intensity. The images obtained from the sensors are the input to the pre-processing techniques. The main objective of the pre-processing technique is to improve the image data by suppressing the unwanted distortions and enhancing the image features which are used for further processing techniques. In fingerprint recognition the input image consists of lots of redundant information such a s scars, excessive dryness and moist, dust, variable pressures etc. To overcome these redundancies pre-processing technique is used..

III. EXPERIMENTAL RESULTS

ATM Terminal Design Based on fingerprint recognition, facial recognition and retina eye scan will result in improved customer experience in ATM's, reduced operational cost with regard to ATM cards, improved security via three phase authentication and password cannot be forgotten since the human fingerprint, face and retina acts as password.

This secures each and every individuals data from theft, every individual should pass three phases. 1st is the fingerprint recognition followed by face recognition and retina eye scan, this secures individuals personal bank account details, hence security is improved. The cost spent on manufacturing and distributing of ATM cards is cut-down, hence reduces operational cost's.

IV. CONCLUSION

In this work we propose a deep learning framework for fingerprint recognition, by fine-tuning a pre-trained convolutional model on ImageNet. This framework is applicable for other biometrics recognition problems, and is especially useful for the cases where there are only a few labeled images available for each class. We apply the proposed framework on a well-known fingerprint dataset, PolyU, and achieved promising results, which outperforms previous approaches on this dataset.

We train these models with very few original images per class. We also utilize a visualization technique to detect and highlight the most important regions of a fingerprint image during fingerprint recognition.

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