A Proposed Technique for Preventing Criminal Attack

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Abstract
Today, visitors of bank systems are growing and securing its important buildings and their staffs are become very essential. Although, all banks have different rigid physical security systems with the support of many men's security bodyguards with monitoring cameras but there are large numbers of attacks, crimes, and victims. Moreover, crime's execution doesn't need more time to happen. So, this paper introduces a proposed technique in order to prevent any bank teller from suddenly dead. The proposed technique converts the bank teller's predefined face emotion (secret key) into a silent alert and sending a warning/alert message such as an SMS message to the bank security staff. The proposed technique is based on Artificial Neural Network (ANN) that will be used to detect the known bank teller's face emotion (secret key) and convert it into a silent alert with the assistance of high capabilities of the smart cameras that will be used as a pattern recognition system. The proposed technique will be helpful, more secured rather than the existing model. It will be used to prevent crime execution in all bank systems and securing their bank staffs.

Keywords:
Criminal Attack, Face emotion, ANNs, Smart Camera, Bank system.

1. Introduction

Criminal attack means an illegal act for which someone does something activity against the law to set upon in a forceful, violent, hostile, or aggressive way , with or without a weapon [1]. The execution time of any crime is approximately less than one minute and it is a free-time and independent to happen. The malicious attackers are still thinking of new ways for executing their new crimes. On the other hand, researchers' duties should be oriented to serve the society against these crimes happens by proposing and applying new innovations those are based on the new trends of Information and Communication Technologies (ICTs). **Federal Bureau of Investigation** (FBI) includes an important event inside its yearly statistical report for crime Bank which focused on our point. It showed that more than 45 employees died on 2015 because the criminal attack has been done for different banks [2].

The content of this paper is organized as follows: Section 2 review the related work and existing template of protection schema. Section 3 introduces the importance of ANN in biometrics system. Section 4 presents the usage of smart cameras in pattern detection with the three common phases. The proposed technique workflow, block diagram and a software prototype of the proposed technique is depicted and discussed in section 5. A comparative study between existing model and proposed model is presented at section 6. Finally, the conclusions are drawn in section 7.

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2. Related Work and Existing Template of Protection Schemas

There is no such thing as 100 per cent secure bank – unless it is a closed bank. For this reasons, we must look carefully at existing template controls and traditional ways of physical security characteristics for bank systems including:

- A strong gate or electronic door
- Heavy walls to withstand objects thrown or projected against them
- A surrounding moat , to control access
- A drawbridge, to limit access to authorized people
- Gatekeepers, to verify that only authorized customers could enter the bank
- Security Cameras, to monitor the overall workflow of banks
- Men 's security guard

3. Importance of ANN in Biometrics System

As well, a soft-computing technique will be used in the novel technique related to ICT disciplines; especially ANN. ANN is a black box that solves non-linear/linear computational problem. It converts the known inputs into the determined outputs this done by calculating/training the desired weight. There are different types of ANN such as multilayered perceptron (MLP). It is one of the most ANN architectures which used in biometrics system. Its structure consists of hidden layers along with two layers (input, output). The hidden layers might be one or more according to the problem's types. Finding the accurate weights are the core of ANN training; those are represented the measurement of learning rate [3].

Additionally, the proposed technique will base on the biometric data of the bank teller in order to determine a bank teller's characteristic/action/motion/secret key. Moreover, it will be used as an automated method of recognizing an individual (bank teller) that is based on measurable & behavioral characteristics.

The face is one of the most acceptable biometrics because it is one of the most common of identification which humans use in their visual interaction. The bank teller can use his face with easy manner in order to create a special action/ unknown secret key. In fact, there are different types of biometric data such as (face-emotion, nose touch, eye movement, ear touch). Biometrics is typically collected by using a device called a sensor. This sensor called (smart camera) that is used to capture acquire the needed biometric visual interaction data. Smart cameras are not simply cameras for taking photos or recording videos and include different pattern recognition algorithms. Smart Camera can be used in our novel technique as a sensor in order to detect bank teller motion, measure, match his biometrics' object. It used for detecting the known action/secret code recognition and convert it into an SMS alert [4-5]. Figure 1 shows the basic component of any biometric system; it contains four major steps:

1) Acquiring biometric data from a person,
2) Extracting a feature set from the acquired data, and
3) Recording the feature set into a database or/and
4) Matching the feature set against feature set in the database.

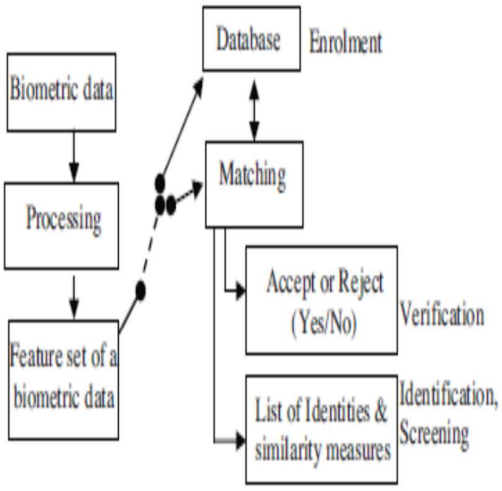

Figure 1: A generic biometric system

ANN can be used to extract patterns and detect trends that are too complex to be noticed by either humans or other computer techniques. A trained neural network can be thought of as an "expert" in the category of information it has been given to analyze. The advantages of ANN include:

- Adaptive learning: An ability to learn how to do tasks based on the data given for training or initial experience.
- Self-Organization: ANN creates its own organization or representation of the information it receives during learning time.
- Fault Tolerance via Redundant Information Coding: However, some network capabilities may be retained even with major network damage [6].

4. Smart Cameras Usage in Pattern Recognition

A smart camera is defined as a vision system in which the primary function is to produce a high-level understanding of the imaged sense and generate applications-specific data to be used in an intelligent system. A smart means it performs application-specific information processing (ASIP) which is usually not to provide better quality images for human viewing but to understand and describe what is happening in the images.

Smart cameras contain one or more highly performance microprocessors to run intelligent ASIP algorithms. There are different types and classification of vision systems and smart cameras such stand-alone, embedded and networked smart cameras. Our proposed technique will be based on a networked smart camera because it allows a digital image of any bank teller to be transferred directly from cameras to a PC [7].

Pattern recognition is the process of classifying input (e.g. image/data/pattern) based on the key feature in order to determine each object belongs to any one of several classes. Pattern recognition consists of three main phases as illustrated in figure 2, each including four levels. They are 1-signal level processing 2-feature level processing, 3-object level processing and 4-semantic-level processing [8].

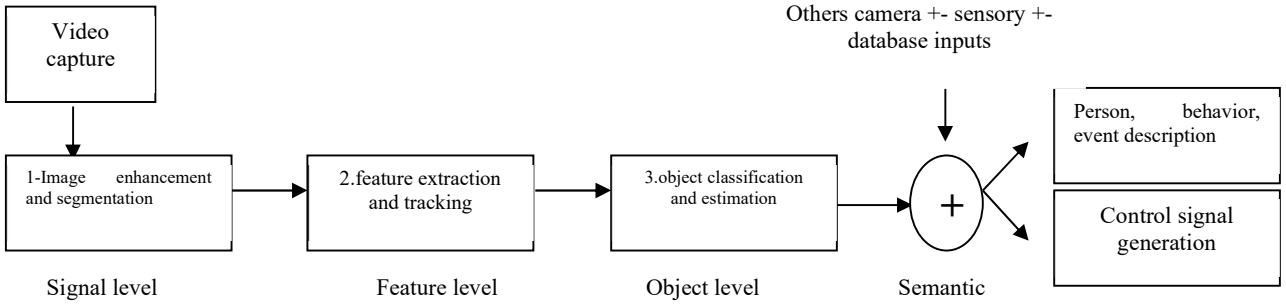

Figure 2: Processing flow of algorithms for pattern recognition inside smart cameras

5. The proposed Technique

The workflow of the proposed technique is initiated by firstly identify the type of biometric data such as (face-emotion, nose touch, eye movement, ear touch) that will be stored and learned to the proposed system. Secondly, it will be stored the agreement /determined action/hidden key/secret code for the intended bank teller that we need to protect him. Just the bank teller do the determined/unknown/secret action hence, the proposed technique start working to convert its input into programmable functions which include sending SMS as an emergency help/warning and calling the security departments or the existing bodyguard moreover taking a snapshot of the infected person or calling police office without his consideration or doing another backup/escape issues. Figure 3 depicts the block diagram of the proposed technique. It contains five essential parts. The steps of the proposed technique are summarized in figure 4.

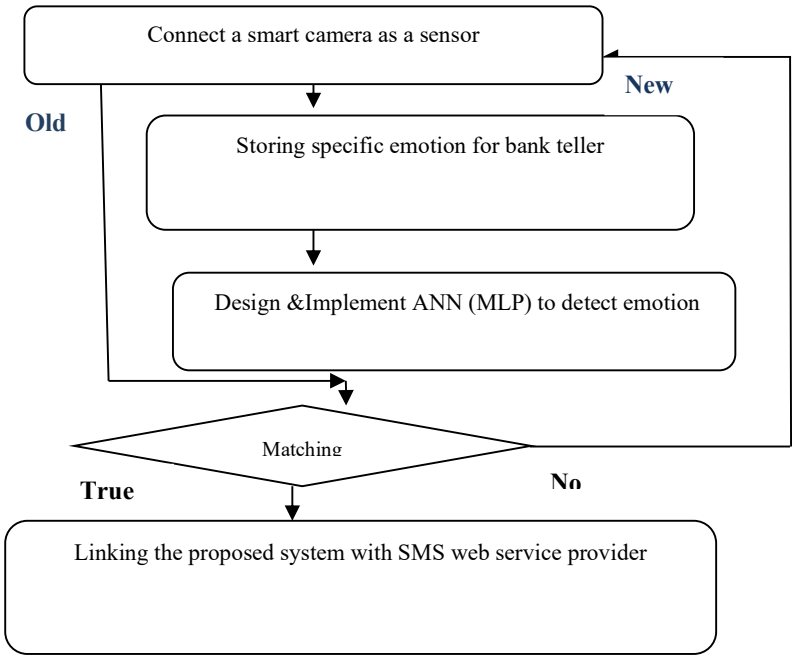

Figure 3 Block diagram of the proposed technique

Step1: Create a new account to the Bank teller
Step2: Select the biometrics object (Ear, Nose, mouse, etc)
Step 3: Connect a high quality smart camera
Step 4: Determine the protected text of SMS and SMS terminated
Step 5: Record and capture video from 1:2 seconds
Step 6: Design and Implement a MLP neural network (I/O)
Step 7: Train and Learn the MLP
Step 8: If the bank teller does the learned video then the proposed system directly connected to SMS web service provider and send a silent protected message to the bank

Figure 4 Steps of the proposed technique

Smart cameras have great advantages for applying the proposed technique. It embeds pattern recognition techniques that have a reflection for the security and preventing attacks. The role of ANN and its type MLP has an importance part of learning the desired neural network. A designed prototype is presented to support the proposed technique with a friendly and easily graphical user interface as shown in figure 5. Figure 5 contains the user interface of the proposed technique. It presented as a GUI prototype of the proposed model. The proposed system should connect the IP of the smart camera for the intended bank teller. The bank teller should create a new account that store his video as a secret code/ hidden action based on the face emotion/biometrics (ear, nose, mouth ... etc).The input of MLP is the video of the bank teller. The MLP neural network should train itself by determining the desired weight.

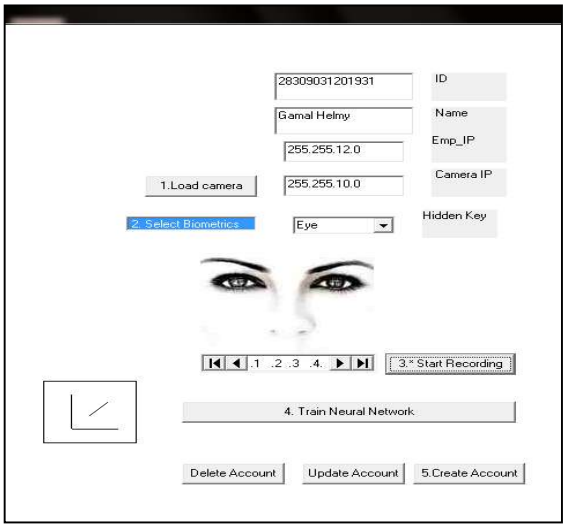

Figure 5 GUI for the proposed technique

6. Comparison of Existing Model and Proposed Model

Table 1 and Table 2 show the comparison of existing methods of preventing and proposed model.

Table 1. A comparative study between the existing model and the proposed model

Method/Model	Cost	Fast Execution	Technical features	Prevent crime
Existing Models	High	Low	Semi	Half Secured
Proposed Model	Low	High	Fully Automation	Fully Secured

Table 2 comparison between the security level of existing models and proposed model

Method/Model	Security Level	ANN	Smart Camera	Face Recognition	Secret Key
Existing Models	Half secured	NA	Limited	N/A	NA
Proposed Model	Fully secured	Applicable	Fully Applied	Applicable	Applied

7. Conclusion

The proposed model has been developed for securing physical banking system with face recognition of bank teller face emotions. A novel technique is presented to prevent crime execution and makes the bank system more secure than others existing models. The integration of modern smart camera capabilities with MLP neural network is better than existing models and faster to take a critical decision from bank security guards. The death ratio will be decreased if all banks applied this proposed technique and preventing crime execution would be 100% approximately secured model. The piece of advice now for all bank systems is to embed their security systems with our proposed technique in order to get secured and safety surrounding environment.

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