Chapter 76
A New Swarm Intelligence Technique of Artificial Haemostasis System for Suspicious Person Detection with Visual Result Mining

Hadj Ahmed Bouarara
Tahar Moulay University of Saida Algeria, Algeria

Reda Mohamed Hamou
Tahar Moulay University of Saida Algeria, Algeria

Abdelmalek Amine
Tahar Moulay University of Saida Algeria, Algeria

ABSTRACT

In the last few years, the video surveillance system is ubiquitous and can be found in many sectors (banking, transport, industry) or living areas (cities, office building, and store). Unfortunately, this technology has several drawbacks such as the violation of individual freedom and the inability to prevent malicious acts (stealing, crime, and terrorist attack... etc.). The authors' work deals on the development of a new video surveillance system to detect suspicious person based on their gestures instead of their faces, using a new artificial haemostasis system composed of four steps: pre-processing (pre-haemostasis) for digitalization of images using a novel technique of representation called n-gram pixel, and the weighting normalized term frequency; Each image vector passes through three filters: primary detection (primary haemostasis), secondary detection (secondary haemostasis) and the final detection (fibrinolysis), with an identification step (plasminogen activation) to evaluate the malicious degree of the person presents in this image; the results obtained by their system are promising compared to the performance of classical machine learning algorithms (C4.5 and KNN). The authors' system is composed of a visualization tool in order to see the results with more realism using the functionality of zooming and rotating. Their objectives are to help the justice in its investigations and ensure the safety of people and nation.

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INTRODUCTION AND BACKGROUND

In the last decade a new paradigm has emerged named the bio-inspired computing, which requires understanding the biological phenomena (properties of adaptation, self-organization...etc.) in order to elaborate a new information processing methodology using the essential properties of living. The aim is to reproduce and use the mechanisms observed in nature in different fields (IT, research, mathematics, robotics...etc.).The first part of our work deliberated on the modelling of a neoteric approach called artificial haemostasis system (AHS) by mimicking the functioning of a natural physiological mechanism (haemostasis), which provides protection against blood loss for stopping the external haemorrhage. The AHS is composed of successive steps (primary haemostasis, secondary haemostasis, and fibrinolysis).

In recent years, the crimes against person and property and the bombings perpetrated by terrorist groups, are the main reasons invoked to justify the installation of surveillance cameras. Some events like September 11 or the attacks in the London subway in July 2005 urging the public authorities and political to act and retighten surveillance in public places in manner to secure the population. Nowadays, there are cameras everywhere in (streets, shops, museums, metro stations, ticket ma-chines, shops, airports, and banks....etc.) with the intent to detect the malicious persons (thieves, criminals, terrorists) and prevent crimes. Merely, the employment of surveillance-video to ensure the social safety, and the identification of dangerous persons by facial recognition collides with several drawbacks:

1. The inability to identify persons who hide their faces (disguises).

Figure 1, which was taken in a Jewellery store in the city of Messina on the island Italian of Sicilequi, shows a thief wearing a balaclava who enters the store and steals all the jewels. The policeman visualizes the act of burglary and analyses the video recording by surveillance camera located in this store. The problem is that it is impossible to detect the identity of this thief because he hides his face.

Figure 1. Thief with hidden face in jewelry store