Department Research

A Biologically-inspired Multi-sensor and Multi-modal System for Public Security

Abstract: Security and monitoring systems are more and more demanding in terms of quality, reliability and flexibility especially those dedicated to video surveillance. The recent advances in electronic Computer Aided Design (CAD) tools have led to much advanced hardware devices especially for multimedia and wireless applications. This has resulted in increased deployment worldwide of sensor networks for visual/video surveillance and security purposes which have gained much maturity due to the availability of cost effective distributed sensor nodes. However, despite the tremendous progress already made towards the development of efficient security systems, the existing solutions have limitations especially in complex and cluttered environments such as the environment in a busy soccer stadium or high traffic roads/highways. These difficulties could be alleviated by using multi-sensor and multi-modal surveillance systems by exploiting the redundancy and diversity of data provided by the acquisition system.

This project aims to develop a versatile platform for a security monitoring system incorporating advanced techniques for multisensor signal pre- and post-processing, multi-modal data and information fusion, and intelligent sensor connectivity and secure wireless communications. The overall platform will be tested for video surveillance systems for public security. In such systems, reliability is a key feature that is affected by signal distortions due to the presence of artifacts resulting from technical limitations at different stages of the communication process. We propose to use multidimensional and multi-scale signal processing techniques in order to localize and mitigate the artifacts introduced by environment and system limitations. We will develop biologically-inspired approaches to fuse information collected from different sensors to exploit diversity and redundancy for improving the efficiency of detection, recognition and tracking tasks. The developed techniques will be tested on real scenarios corresponding to very low contrast and noisy data acquired by our multi sensor platform.

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