

Special Issue on Human-Centric Applications of Distributed Camera Networks

Call for Papers

In a camera network, access to multiple sources of visual data often allows for making more comprehensive interpretation of events and activities. Vision-based sensing fits well within the notion of pervasive sensing and computing environments, enabling novel user-centric applications. In such applications, the actions of the users and their interactions with the environment are detected and interpreted by the network of cameras, and proper services or responses are offered based on the context.

Gesture recognition problems have been extensively studied in human computer interactions (HCIs), where often a set of predefined gestures is used for delivering instructions to machines. However, passive gestures predominate in behavior descriptions in many applications. Some traditional application examples include surveillance and security applications, while novel application classes arise in emergency detection in elderly care and assisted living, video conferencing, creating human models for gaming and virtual environments, and biomechanics applications analyzing human movements. Through pervasive visual sensing and collaborative processing, distributed camera networks offer the potential of a generalized HCI environment, in which the network reacts to various intentional gestures of the users stated, for example, via hand movements or gazing at a region of interest, as well as to unintentional posture changes caused by events such as accidental falls in assisted living applications.

Application development based on visual information obtained via multiple cameras requires new methodologies to efficiently fuse the data in the network. In a multi camera network, the option to employ local processing of acquired video at the source camera facilitates operation of scalable vision networks by avoiding transfer of raw images. Embedded processing utilizes the increasingly available computing power at the source to extract features from the images, which are exchanged with other cameras. Additional motivation for distributed processing stems from an effort to preserve privacy of the network users while offering services in applications such as assisted living. In a distributed processing framework, data fusion can occur across the three dimensions of 3D space (multiple views), time, and feature levels.

The goal of this special issue is to provide a coverage of the various approaches to human-centric application development in a multi camera setting. In particular, approaches based on the distributed processing of acquired video sequences, model-based approaches for human behavior monitoring, vision-based information fusion and collaborative decision making, and interfaces between the vision network and high-level reasoning modules that provide interpretative deductions will fit well within the scope of the special issue. The special issue also aims to provide insight into algorithm and system development topics pertaining to real-world application design for smart environments.

Original papers, previously unpublished and not currently under review by another journal, are solicited to cover one or more of the following topics:

- Distributed and collaborative vision algorithms for human-centric applications
- Model-based human gesture recognition in camera networks
- Motion analysis and spatial reasoning for behavior models
- Spatiotemporal data and estimate fusion techniques
- High-level interpretation of human activities
- Activity monitoring in crowds
- Environment discovery
- Detection of abnormal behavior
- Applications in smart homes and other environments

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Manuscript Due	March 1, 2008
First Round of Reviews	June 1, 2008
Publication Date	September 1, 2008

EURASIP Journal on Image and Video Processing

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