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Guest Editorial

Computer vision motion analysis is becoming relevant for a growing number of applications. Most of these applications require real-time performance: video compression, autonomous navigation of vehicles, hand gesture analysis, human body analysis, etc. Thus, motion analysis can be considered as a transversal technique adopted in building multimedia, industrial, and virtual reality applications. Moreover, motion analysis is a general term which also includes low-level techniques for motion estimation, moving object detection, object tracking, etc. Always, motion analysis means acting in spatio-temporal domain and, thus, on image sequences with the corresponding amount of information to be processed. This fact and real-time constraints imposed by applications frequently lead to the need of building specific hardware architectures.

This special issue presents an interesting mixture of papers proposing low-level techniques, applications and some experiences on dedicated hardware and architectures. Jt is comprised of two parts: the first is mainly focussed on motion estimation techniques, while the second presents a collection of applications and theoretical results. This first part reports the findings of the following five papers:

Camus proposes an overtime version of the classical block-matching technique for motion estimation. The quantized velocity vectors estimated are obtained with a lower computational complexity.

The contribution by Chhabra consists of a contour-based optical flow estimation technique derived from the well-known algorithm of Hildreth, but presenting a lower computational complexity.

Kim *et al*. examine the problem of video coding proposing a specific architecture which is suitable for executing both a block matching and a gradient-based algorithm for motion estimation in real-time.

Charot *et al*. present both a comparative analysis about the main motion estimation algorithms and an architecture which can be profitably used for executing their related elementary operations.

Soatto and Perona report a technique for motion estimation by using a sequence of monocular images obtained by fixating a particular point of a moving object during a navigation around itself.

The second part of this special issue on Real-Time Motion Analysis, to be published in a future issue, will include the following:

Daniilidis *et al*. report their experience in designing and implementing a system for tracking moving objects by means of a controlled image acquisition platform.

In '*ASSET-2: Real-Time Motion Segmentation and Object Tracking*', Smith presents a system for detecting, segmenting and tracking moving objects in real-time. The approach proposed is particularly suitable when a moving background is present, such as on autonomous vehicles.

Caplier *et al*. present some hardware solutions for a Markov Random Field-based algorithm for motion detection – i.e., an SIMD machine, a DSP-based board and a resistive network.

Sanchiz *et al*. propose an application consisting of an automatic vehicle for travelling up fields in which small plants must be treated by spraying products.

Accame *et al*. propose a motion estimation technique for video coding which produces an adaptive density of velocity vectors.

Jung addresses the problem of simulation of hierarchically articulated bodies in real-time, interesting for real-time applications of virtual reality and animation in general.

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