

Multicamera Information Processing: Acquisition, Collaboration, Interpretation and Production

Editorial

Video acquisition devices have significantly gained in resolution, quality, cost-efficiency and ease of use during the last decade. This trend is expected to continue in the future and it will likely foster the deployment of rich acquisition systems that can effectively capture multiple views, sounds, pictures, and 3D information at high spatiotemporal resolution. Because of their capability of offering richer experience, multiview imaging systems are expected to develop rapidly in many different areas of industry, health-care, education, and entertainment.

Since different views of the same scene or extended views with a large coverage become available, multicamera imaging systems provide a practical approach to support robust scene interpretation, integrated situation awareness, as well as interactive and immersive experience. On the one hand, cognitive supervision and event analysis have a strong impact on applications ranging from smart home, supporting independent living, to industrial plants surveillance or sport events monitoring as considered in the APIDIS project¹. On the other hand, immersive and/or interactive visualization services pave the way to novel 3D rendering experiences, including for example telepresence, video conferencing, cinema and clinical treatment of some pathological fears in virtual worlds.

This special issue presents some recent advances that take advantage of multiview processing to improve 3D scene understanding and rendering.

A first set of contributions considers the design of stereo vision sensors, with an emphasis on the exploitation of those sensors for 3D reconstruction. In the first paper (Yi-ping TANG et al., Design of Vertically-aligned Binocular Omnistereo Vision Sensor), several types of omnidirectional stereo sensors are designed based on the combination of hyperbolic and regular resolution mirrors. In the second paper (Gilles Besnard et al., Characterization of necking phenomena in high speed experiments by using a single camera), a single ultra-high speed film camera is mounted on a revolving mirror to capture high-resolution stereo images at about 500000 frames per second. The third paper (Abdelkrim Belhaoua et al., Error evaluation in a stereovision-based 3D reconstruction system) proposes a methodology to quantify the error in a stereovision-based 3D reconstruction system. Edge detection errors are estimated and propagated up to the final 3D reconstruction.

The second set of papers addresses information processing problems in multicamera systems. The fourth paper of the special issue (Masato Ishii et al., Joint Rendering and Segmentation of Free-Viewpoint Video) studies the problem of free viewpoint rendering in arrays of cameras. The approach is original in that it jointly performs synthesis and segmentation of the free-viewpoint video. Hence, the method enables to extract a 3D

¹ See www.apidis.org.

object from one real scene, and to superimpose it onto another real or virtual 3D scene. The next paper (Hoang Thanh Nguyen et al., Design and Optimization of the VideoWeb Wireless Camera Network) addresses the practical deployment issues raised by large scale networks of cameras in wireless environments. Finally, the last paper (Yang Bai et al., Feature-Based Image Comparison for Semantic Neighbor Selection in Resource-Constrained Visual Sensor Networks) investigates methods for supporting efficient collaboration between the multiple visual sensors via clustering neighbor cameras that are likely to provide correlated information. Several image features detectors and descriptors have been considered and compared with respect to their power consumption as well as their clustering ability.

Finally, we would like to thank the authors for their submissions, the reviewers for their constructive comments, and the administrative and publication staff of the EURASIP Journal on Image and Video Processing for their effort in the preparation of this special issue. We hope that this issue will offer an interesting insight in the plurality and recent advances of multiview sensing and processing.

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