Recent progress and prospects in multimedia, human-computer interaction, visual communications, semantic web, and cognitive vision call for and can benefit from applications of advanced image and video analysis technologies. Adaptive robust systems are required for analysis, indexing, and summarization of large amounts of audio-visual data. Advanced image analysis technologies are needed for next-generation description and browsing services characterized by structured, object-and content-based representations. Automatic extraction of semantic information from still or moving images and the analysis of their content are necessary for automatic annotation, indexing, and categorization.

The aim of this special issue is to bring together contributions from the latest developments in the field of object-oriented and semantic image and video analysis applications. Ten papers have been selected following the reviewing process and appear in this issue, which are briefly described below.

In the first paper, Cavallaro and Ebrahimi tackle semantic video object extraction by interacting between color change detection and region-based processing, achieving high spatial accuracy and temporal coherence. In the second paper, H.-Y. Wang and Ma propose a video object segmentation approach, involving image segmentation and motion estimation; the approach is based on spatial-constrained motion mask generation and motion-constrained spatial region merging.

Video object segmentation is also the topic of the third paper by Porikli and Y. Wang. The authors perform a spatio-temporal decomposition of the data, defining simple homogeneous, in terms of low-level visual descriptors, components; the latter, called volumes, are then expanded and grouped into objects, using hierarchical clustering. In the next paper, Li et al. use a Markov random field model to obtain object-based semantic image segmentation, focusing on remote sensing applications; their approach includes a Wold model decomposition of the original image generating both stochastic and structural texture image components.

The next two papers deal with technologies used in semantic image and video object analysis. In the first paper, Tschepenakis et al. propose a model-based snake approach for object tracking, using a priori shape knowledge;
a probabilistic rule-based approach is thus derived that copes with objects in cluttered and partially occluded scenes. In the second paper, Caldell et al. analyze how estimation of objects’ motion parameters can effectively be obtained, using appropriate MRF modeling and simple motion models.

The following two papers deal with content-based image retrieval. They both start with unsupervised image segmentation. In the first, R. Zhang and Z. Zhang use color object analysis and compute fuzzy color, texture, and shape parameters of the objects of the images. They also use clustering to obtain efficiency in the retrieval. In the second, Mezaris et al. extract similar low-level descriptors, forming a simple object ontology, which is used next for defining semantic objects. Relevance feedback is used here in the retrieval process.

The last two papers deal with specific applications of image and video analysis. In the first, Maragos et al. present an integrated system for the estimation of the biocological quality of soils from analysis of soil section images, focusing on efficient extraction of multiscale geometric features from the data and object-oriented image analysis and using a neurofuzzy inference procedure. In the second paper, M. Kampmann proposes a maximum a posteriori algorithm for efficient chin and cheek contours estimation in video sequences, exploiting a priori knowledge about the shape and position of the contours.

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