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Editorial

Video Tracking in Complex Scenes for Surveillance Applications

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Tracking moving objects is one of the basic tasks performed by surveillance systems. The current position of a target and its movements over time represent relevant information that enables several applications, such as activity analysis, objects counting, identification, and stolen object detection. Although several tracking algorithms have been applied to surveillance applications, when the scene or the object dynamics is *complex*, then their performance significantly decreases thus affecting further surveillance functionalities.

In surveillance applications, a scene is considered *complex* depending on the interrelationships between three factors, namely, the targets (their number, their behaviour, their appearance, and so on), the scene (its complexity, presence of dynamic texture, the illumination), and the sensor setup (when the scene is observed by multiple sensors). In real scenarios, a large number of distracting moving targets may appear, there might be a number of static and dynamic nonstationary occlusions, and the surveillance system might be requested to work outdoor 24/7 in all-weather conditions. In particular, the typologies of the scenes under surveillance should be taken into account with respect to the type of complexity they are associated with, such as environmental conditions, spatial density of the objects with respect to the field of view or coverage of the sensors, and the temporal density of the events. To address these issues, a new generation of video tracking algorithms is appearing that is characterized by new functionalities. Examples are collaborative trackers, and robust and fast multiobject trackers. The scope of this special issue of the EURASIP Journal on Image and Video Processing is to present original contributions in the field of video-based tracking, and especially for complex scenes and surveillance applications.

This special issue is organized in four parts. The first two papers address the low-complexity segmentation and tracking problem by simultaneously segmenting and tracking multiple objects using graph cuts or by localizing objects from unreliable estimate coordinates. Bugeau and Perez combine predictions and object detections in an energy function that is minimized via graph cuts to achieve simultaneous tracking and segmentation of multiple objects. The paper by Park et al. describes an approach to localize objects using multiple images via a parallel projection model that supports zooming and panning. An iterative process is used to minimize localization error.

The second group of papers deals with the problem of defining an appropriate target model using weighted combinations of feature histograms, contour, or shape information. Bajramovic et al. compare template- and histogram-based trackers, and present three adaptation mechanisms for weighting combinations of feature histograms. Miller et al. represent the contour of a target with a region adjacency graph of its junctions, which are considered its signature. The paper by Asadi et al. presents a feature classification and a collaborative tracking algorithm for shape estimation with multiple interacting targets.

The third group of papers addresses tracking issues in multicamera settings. Velipasalar et al. present a peer-to-peer multicamera multiobject tracking algorithm that does not use a centralized server and a communication protocol that incorporates variable synchronization capabilities to account for processing delays. The paper by Jin and Qian describes a multiview 3D object tracker and its use in interactive

environments characterized by dynamic visual projection on multiple planes.

The fourth and last group of papers covers performance evaluation and validation issues. Bernardin and Stiefelhagen present two performance measures for target tracking that estimate the object localization precision and the accuracy of the results, and evaluate them on a series of multiple object tracking results. Finally, the paper by Baumann et al. presents an overview of performance evaluation algorithms for surveillance, the definition and generation of the ground truth, and the choice of a representative benchmark data set to test the algorithms. Performance evaluation and validation is still an important open problem in target tracking, due to the lack of commonly accepted test sequences and performance measures. To help overcome this problem, the SPEVI initiative has set up a web site (http://www.spevi.org/) whose aim is to distribute datasets and evaluation tools to the research community. This initiative is supported by the UK Engineering and Physical Sciences Research Council (EPSRC), under grant EP/D033772/1. The aim of this initiative is to allow a widespread access to common datasets for the evaluation and comparison of algorithms that will in turn favor progress in the domain.

To conclude, we would like to thank the authors for their submissions, the reviewers for their constructive comments, and the editorial team 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 allow you to get an insight in the recent advances on object tracking for video surveillance.

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