

Preface

Intelligent multimedia surveillance concerns the analysis of multiple sensing inputs including video and audio streams, radio-frequency identification (RFID) and depth data. These data are processed for the automated detection and tracking of people, vehicles and other objects. The goal is to locate moving targets, to understand their behavior and to detect suspicious or abnormal activities for crime prevention. Despite numerous benefits of this technology, there is a natural societal apprehension regarding the use of intelligent multimedia surveillance to infringe privacy. An important challenge in this research area is therefore to balance two contradictory goals: public safety and privacy. This book presents in nine chapters recent findings in the field of intelligent multimedia surveillance and covers various aspects such as privacy, surveillance as a service, crowded scene understanding, performance evaluation, and active vision.

In the chapter “Intelligent Video Surveillance as a Service”, Prati et al. present a paradigm called *VSaaS* that considers video surveillance technology as a service. Distributed cloud resources are used to handle the storage and processing of large amounts of video data. The authors also describe a case study on the integration of computer vision algorithms in a *VSaaS* platform.

Current solutions, for video analysis of crowds are discussed by Thida et al. in the chapter “A Literature Review on Video Analytics of Crowded Scenes”. A systematic comparison and critical review of existing methods and technologies for the automated analysis of complex and crowded scenes are presented. The authors divide the literature into two broad categories, namely the macroscopic and microscopic modeling approaches. The merits and weaknesses of these approaches are discussed and a recommendation for how existing methods can be improved is finally provided.

The next three chapters cover privacy issues in intelligent multimedia surveillance. In the chapter “Privacy and Security in Video Surveillance”, Winkler and Rinner motivate the need for the integration of security and privacy features in video surveillance systems. The authors first present a comprehensive review of the state of the art and then describe a prototype system, the TrustCAM, where a dedicated hardware security module is integrated in a camera system to achieve a high-level

of security. A summary of open research issues and an outlook to future trends conclude the chapter. Privacy is also addressed by Qureshi in the chapter “Object Video Streams: A Framework for Preserving Privacy in Video Surveillance”. The author introduces a framework that decomposes raw video footage into background and one or more object-video streams. The framework is used to preserve privacy (i.e., identity of people) in the video by representing object-video streams as blobs, by coding foreground objects in different colors, and by rendering the scene partially (i.e., revealing the identities of only some individuals). The approach is evaluated in a virtual train station environment and on real video footage. In the chapter “Surveillance Privacy Protection”, Gulzar et al. further investigate privacy and present an evaluation of various aspects, such as what types of protection measures are being implemented in surveillance systems, how information is being used, and what rights individuals have over them. In addition, the authors also emphasize the importance of tools, data sets and databases that are being developed to give protection to surveillance privacy.

Next, in the chapter “RFID Localization Improved by Motion Segmentation in Multimedia Surveillance Systems”, Ljubojević et al. discuss the use of passive RFID technology for localization of objects indoors. The authors describe the use of motion segmentation algorithms on the region of interest extracted using the information collected from RFID, which allows the reduction of the position estimation error and variance compared to the conventional RFID-based position estimation methods. A related topic is covered by Mahapatra and Saini in the chapter “A Particle Filter Framework for Object Tracking Using Visual-Saliency Information”. The authors use neurobiology-saliency for object detection and tracking using particle filters. In this work, low-level features such as color, luminance and edge information along with motion cues are used to track a person under varying lighting conditions.

These concepts are extended by Kumar et al. in the chapter “Multiresolution Depth Map Estimation in PTZ Camera Network”. In this chapter, the authors propose an active stereo vision system composed of two pan-tilt-zoom (PTZ) cameras. The proposed system is used for estimating the multiresolution depth map for a large and complex scene.

Finally, in the chapter “Performance Evaluation in Video-Surveillance Systems: The EventVideo Project Evaluation Protocols”, SanMiguel et al. emphasize the need to automate the performance evaluation process for video surveillance systems. The authors describe the evaluation protocols for various analysis stages such as video object segmentation, people detection, video object tracking and event recognition, within the scope of the EventVideo project.

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