

Preface

On May 11–12, 2009, the University of California, Riverside, hosted a two-day workshop on “Distributed Video Sensor Networks—Research Challenges and Future Directions.” The workshop was attended by researchers from academia, industrial labs, and government, and was sponsored by the US National Science Foundation (NSF), the US Army Research Office (ARO), and the US Office of Naval Research (ONR). This book is a collection of articles authored by the leading researchers who attended this workshop, outlining their vision in this emerging, interdisciplinary research area.

Large-scale video networks are becoming increasingly important for a wide range of critical applications such as video surveillance, the monitoring of disaster zones and traffic, elderly care, the tracking of people and vehicles in crowded environments, and the acquisition of more realistic images for consumer electronics and entertainment. In most of these applications, multiple sensors such as video cameras, infrared (IR), or range sensors gather data from various points of view, which are then sent to a central processing unit. In most existing systems, there is no intelligent processing of the data locally at each camera, and the monitoring stations, which are staffed with people, generally observe and oftentimes store multiple video streams with very limited automated processing. Many fundamental problems need to be solved before these networks can be used more effectively.

It is extremely challenging to develop automated techniques for aggregating and interpreting information from multiple video streams acquired by large-scale networks of camera sensors in real-life scenarios. Research in video sensor networks is highly interdisciplinary, requiring expertise in a variety of fields, among them sensor networks, video analysis, cooperative control, communications, sensor design, real-time and embedded processing, graphics and simulation, and the development of real-world applications. However, these disciplines have their own core sets of problems, and it is not easy for researchers to address critical challenges that demand advanced knowledge from multiple areas.

This volume is a collection of chapters contributed by leading researchers from these different areas, offering an in-depth understanding of the state-of-the-art, current research directions, and future challenges in distributed video sensor networks. Its objective is to address critical interdisciplinary problems at the intersection of

large-scale video camera networks and related disciplines. Starting with an overview of distributed video sensor networks and research opportunities, the subsequent parts of the book discuss issues pertinent to: (a) Video Processing and Video Understanding, (b) Simulation, Graphics, Cognition, and Video Networks, (c) Wireless Video Sensor Networks, Communications, and Control, (d) Embedded Cameras and Real-Time Video Analysis, (e) Applications, and (f) Educational Opportunities and Curriculum Development.

We hope that this book will catalyze a research agenda and interdisciplinary collaborations in large-scale camera networks, an emerging field with many exciting scientific and technological opportunities, thereby setting the stage for potentially transformative breakthroughs.

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