Bahadir Karasulu · Serdar Korukoglu

Performance Evaluation Software

Moving Object Detection and Tracking in Videos

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Dedicated to Karasulu and Korukoglu families…

Preface

Moving object detection and/or tracking (D&T) is a wide-scope research domain in the computer vision area. This book introduces a software approach for the real-time evaluation and performance comparison of the methods specialized for moving object D&T in video processing. Digital video content analysis is an important item for multimedia content-based indexing (MCBI), content-based video retrieval (CBVR), and visual surveillance systems. There are some frequently used generic algorithms for video object D&T in the literature, such as Background Subtraction (BS), Continuously Adaptive Mean-shift (CMS), Optical Flow (OF), etc. An important problem for performance evaluation is the absence of any stable and flexible software for comparison of different algorithms.

In this frame, we have designed and implemented the software for the performance comparison and evaluation of well-known video object D&T algorithms at the same platform. This software is able to compare them with the same metrics in real-time and at the same platform, and works as an automatic and/or semi-automatic test environment in real-time, which uses the image and video processing essentials, e.g., morphological operations and filters, and ground-truth (GT) XML data files, charting/plotting capabilities, etc. Along with the comprehensive literature survey of the above-mentioned video object D&T algorithms, this book also covers the technical details of our performance benchmark software as well as a case study on people D&T for the functionality of the software.

This book is organized into six chapters. Chapter 1 introduces our study and its main contribution to the literature. Chapter 2 reviews the commonly implemented object D&T algorithms (i.e., methods) and their applications in the literature. Chapter 3 represents the details of our software approach to performance evaluation of moving object D&T, and architecture overview for our software. Chapter 4 provides detailed information about performance evaluation and metrics used in the proposed software approach. Chapter 5 declares the details of video datasets used in our study and the experimental results. Furthermore, Chap. 5 shows the analysis of quantitative performance results both using statistical and algorithmic analysis. The final chapter of the book provides the conclusions.

Serdar Korukoglu is a full-time professor of Computer Engineering Department at Ege University, Izmir, Turkey. He received his B.S. degree in Industrial Engineering, M.Sc. in Applied Statistics, and Ph.D. in Computer Engineering from

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Bahadir Karasulu is a full-time assistant professor of the Computer Engineering Department at Canakkale Onsekiz Mart University, Canakkale, Turkey. In 2003, he graduated from the Science and Arts Faculty—Physics Department at Kocaeli University, Kocaeli, Turkey. Afterwards, in 2006, he completed an M.Sc. thesis study titled 'Application of Parallel Computing Technique to Monte Carlo Simulation' in the Computer Engineering Department of Maltepe University, Istanbul, Turkey. In 2010, he obtained his Ph.D. degree in Computer Engineering Department of Ege University, Izmir, Turkey. His Ph.D. thesis study is titled 'A Simulated Annealing based Performance Optimization Approach for Moving Object Detection and Tracking in Videos'. His research interests include artificial intelligence, computer vision, pattern recognition, as well as distributed and parallel computing, simulation, and optimization.

Much of the essential material in this book is based on the Ph.D. dissertation of Bahadir Karasulu and a subsequent journal article, which is published in the journal of Multimedia Tools and Applications, i.e., a comprehensive international journal of Springer Science+Business Media LLC (DOI: 10.1007/s11042-010-0591-2).

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