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Computer Vision – ACCV 2010 Workshops

ACCV 2010 International Workshops
Queenstown, New Zealand, November 8-9, 2010
Revised Selected Papers, Part II

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Preface

During ACCV 2010 in Queenstown, New Zealand, a series of eight high-quality workshops were held that reflect the full range of recent research topics in computer vision. The workshop themes ranged from established research areas like visual surveillance (the 10th edition) and subspace methods (third edition) to innovative vehicle technology (From Earth to Mars), from vision technology for world e-heritage preservation and mixed and augmented reality to aesthetic features in computational photography and human computer interaction.

From a total of 167 submissions, 89 presentations were selected by the individual workshop committees, yielding an overall acceptance rate of 53%. The reported attendance was quite attractive, between 40 and 60 participants in each of the workshops, sometimes over 70.

The two-volume proceedings contain a short introduction to each workshop, followed by all workshop contributions arranged according to the workshops.

We hope that you will enjoy reading the contributions which may inspire you to further research.

November 2010

Reinhard Koch
Fay Huang

Introduction to the 10th International Workshop on Visual Surveillance

Visual surveillance remains a challenging application area for computer vision. The large number of high-quality submissions is a testament to the continuing attention it attracts from research groups around the world. Within this area, the segmentation of the foreground (moving objects) from the background (residual scene) remains a core problem. Approximately half of the papers accepted for publication propose innovative segmentation processes. These include the modeling of photometric variations using local polynomials, the exploitation of geometric and temporal constraints, and the explicit modeling of foreground properties. The segmentation of foregrounds consisting of slowly moving objects is explored and there are two investigations into the improvements in segmentation that can be obtained using feedback from a subsequent tracking process.

Nonetheless, there is also an increasing interest in the detection of pedestrians, faces and vehicles using methods that do not rely on foreground-background segmentation. Several enhancements to the histogram of gradients method for pedestrian detection are proposed, leading to an improved efficiency and invariance of the results under rotations of the image. A method to improve the efficiency of the boosted cascade classifier is also proposed. A key problem for visual surveillance scene understanding is the tracking of pedestrians in arbitrarily crowded scenes across multiple cameras: there are several papers that offer contributions to the solution of this problem, including the modeling of pedestrian appearance as observed from multiple cameras in a network.

In the 12 years in which the Visual Surveillance workshops have been running, algorithms have become more sophisticated and more effective, more data sets have become available and experimental techniques and the reporting of results have improved. In spite of these advances, many of the classic problems in computer vision, such as optic flow estimation, object detection and object recognition, are still as relevant to the visual surveillance community as they have ever been.

The Workshop Chairs would like to thank the Program Committee for their valuable input into the reviewing process, and Reinhard Koch and Fay Huang for providing efficient liaison on behalf of the ACCV. The Chairs would also like to thank Graeme Jones, who dealt with many of the organizational aspects of this workshop.

November 2010

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Introduction to the Second International Workshop on Video Event Categorization, Tagging and Retrieval (VECTaR)

One of the remarkable capabilities of the human visual perception system is to interpret and recognize thousands of events in videos, despite a high level of video object clutter, different types of scene context, variability of motion scales, appearance changes, occlusions and object interactions. As an ultimate goal of computer vision systems, the interpretation and recognition of visual events is one of the most challenging problems and has increasingly become very popular in the last few decades. This task remains exceedingly difficult because of several reasons:

1. There still remain large ambiguities in the definition of different levels of events.
2. A computer model should be capable of capturing a meaningful structure for a specific event. At the same time, the representation (or recognition process) must be robust under challenging video conditions.
3. A computer model should be able to understand the context of video scenes to have meaningful interpretation of a video event. Despite these difficulties, in recent years steady progress has been made toward better models for video event categorization and recognition, e.g., from modeling events with a bag of spatial temporal features to discovering event context, from detecting events using a single camera to inferring events through a distributed camera network, and from low-level event feature extraction and description to high-level semantic event classification and recognition.

This workshop served to provide a forum for recent research advances in the area of video event categorization, tagging and retrieval. A total of 11 papers were selected for publication, dealing with theories, applications and databases of visual event recognition.

November 2010

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Introduction to the Workshop on Gaze Sensing and Interactions

The goal of this workshop is to bring researchers from academia and industry in the field of computer vision and other closely related fields such as robotics and human – computer interaction together to share recent advances and discuss future research directions and opportunities for gaze sensing technologies and their applications to human – computer interactions and human – robot interactions. The workshop included two keynote speeches by Ian Reid at the University of Oxford, UK, and Chen Yu at Indiana University, USA, who are world-leading experts on gaze – sensing technologies and their applications for interactions, and seven oral presentations selected from submitted papers by blind review. This workshop was supported by the Japan Science and Technology Agency (JST) and CREST. We would like to thank Yusuke Sugano, Yoshihiko Mochizuki and Sakie Suzuki for their support in organizing this event.

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Introduction to the Workshop on Application of Computer Vision for Mixed and Augmented Reality

The computer vision community has already provided numerous technical breakthroughs in the field of mixed reality and augmented reality (MR/AR), particularly in camera tracking, human behavior understanding, object recognition, etc. The way of designing an MR/AR system based on computer vision research is still a difficult research and development issue. This workshop focuses on the recent trends in applications of computer vision to MR/AR systems.

We were proud to organize the exciting and stimulating technical program consisting of ten oral presentations and five poster presentations. We were very happy to have a distinguished invited speaker, Hideyuki Tamura, who has led the MR/AR research field since the 1990s. Finally, we would like to thank all of the authors who kindly submitted their research achievements to ACVMAR 2010 and all members of the Program Committee for their voluntarily efforts.

ACVMAR 2010 organized in collaboration with SIG-MR(VRSJ) and the GCOE Program at Keio University.

November 2010

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Introduction to the Workshop on Computational Photography and Aesthetics

Computational photography is now well-established as a field of research that examines what lies beyond the conventional boundaries of digital photography. The newer field of computational aesthetics has seen much interest within the realm of computer graphics, art history and cultural studies. This workshop is intended to provide an opportunity for researchers working in both areas, photography as well as aesthetics, to meet and discuss their ideas in a collegial and interactive format.

The papers contained in these workshop proceedings make important contributions to our understanding of computational aspects of photography and aesthetics. The first paper, by Valente and Klette, describes a technique for blending artistic filters together. Their method allows users to define their own painting style, by choosing any point within the area of a triangle whose vertices represent pointillism, curved strokes, and glass patterns. The second paper, by Sachs, Kakarala, Castleman, and Rajan, describes a study of photographic skill whose purpose is to establish whether that skill can be identified in a double-blind manner. They show that human judges who are themselves expert photographers are able to identify up to four skill levels with statistical significance. The third paper, by Rigau, Feixas, and Sbert, applies the information theory of Shannon to model the channel between luminosity and composition. They show how changes in depth-of-field and exposure are reflected in the information channel, and formulate measures for saliency and “entanglement” in an image. The fourth paper, by Lo, Shih, Liu, and Hong, describes how computer vision may be applied to detect a classic error in photographic composition: objects which appear to protrude from a subject’s head. Their method is able to reliably detect protruding objects in a variety of lighting conditions and backgrounds, with a detection rate of 87% and false alarm rate of 12%. The fifth paper, by Constable, shows how traditional drawing methods such as incomplete perimeters, lines that suggest colors, and lines that suggest form, can inform and improve non-photorealistic rendering (NPR). This paper provides a valuable artistic perspective to illustrate how engineering and art work collaboratively in NPR.

The workshop was fortunate to have a keynote presentation by Alfred Bruckstein. He described the problem of emulating classic engraving using non-photorealistic image rendering, and proposed to use level-set-based shape from shading techniques. The problem contains interesting mathematical challenges in connecting essential contours in natural, flowing ways, which Professor Bruckstein described.

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Introduction to the Workshop on Computer Vision in Vehicle Technology: From Earth to Mars

Vision-based autonomous navigation of vehicles has a long history which goes back to the success story of Dickmanns in Munich and the Mechanical Engineering Laboratory of MITI in Japan in the 1980th. At the time, DARPA had asked us to compete with autonomous land vehicles in their GRAND Challenges. Today, computer vision techniques provide methodologies to assist in long-distance exploration projects using visual sensing systems such those with the Mars rover project. Modern cars are now driven with the assistance of various sensor data. These assisted driving systems are developed as intelligent transportation systems. Among the various types of data used for driving assistance and navigation, we find visual information as the interface between human drivers and vehicles.

Today, data captured by visual sensors mounted on vehicles provide essential information used in intelligent driving systems. For applications of computer vision methodologies in exploration, evaluation, and quality-control techniques in the absence of ground truth information, it is essential to design robust and reliable algorithms.

In this workshop, we focus on exchanging new ideas on applications of computer vision theory to vehicle technology. In computer vision for driving assistance, tracking, reconstruction, and prediction become important concepts. Furthermore, real-time and on-board processes for these problems are required.

We received 21 papers and selected 11 papers for publication based on the reviews by the Program Committee and by the additional reviewer Ali Al-Sarraf.

November 2010

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Introduction to the Workshop on e-Heritage

Digitally archived world heritage sites are broadening their value for preservation and access. Many valuable objects have been decayed by time due to weathering, natural disasters, even man-made disasters such as the Taliban destruction of the great Buddhas in Afghanistan, or the recent destruction by fire of a 600-year-old South Gate in Seoul. Cultural heritage also includes music, language, dance, and customs that are fast becoming extinct as the world moves toward a global village. Furthermore, most of the sites still face a problem of accessibility. Digital access projects are necessary to overcome those problems.

Computer vision research and practices have, and will continue, to play a central role in such cultural heritage preservation efforts. The proposed Workshop on e-Heritage and Digital Art Preservation aims to bring together computer vision researchers as well as interdisciplinary researchers that are related to computer vision, in particular computer graphics, image and audio research, image and haptic (touch) research, as well as presentation of visual content over the Web and education.

In this workshop, seven contributions to the field of e-heritage were presented, covering the areas of on-site augmented-reality applications, three-dimensional modeling and reconstruction, shape and image analysis, and interactive haptic systems. All submissions were double-blind reviewed by at least two experts. We thank all the authors who submitted their work. It was a special honor to have In So Kweon (KASIT, Korea), Hongbin Zha (Peking University, China) and Yasuyuki Matsushita (Microsoft Research Asia) as the invited speakers at the workshop. We are especially grateful to the members of the Program Committee for their remarkable efforts and the quality of the reviews.

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Hongbin Zha	Peking University, China

Introduction to the Third International Workshop on Subspace Methods

We welcome you to the proceedings of the Third International Workshop of Subspace 2010 held in conjunction with ACCV 2010.

Subspace 2010 was held in Queenstown, New Zealand, on November 9, 2010. For the technical program of Subspace 2010, a total of 30 full-paper submissions underwent a rigorous review process. Each of these submissions was evaluated in a double-blind manner by a minimum of two reviewers. In the end, ten papers were accepted and included in this volume of proceedings.

The goal of the workshop is to share the potential of subspace-based methods, such as the subspace methods, with researchers working on various problems in computer vision; and to encourage interactions which could lead to further developments of the subspace-based methods. The fundamental theories of subspace-based methods and their applications in computer vision were discussed at the workshop.

Subspace-based methods are important for solving many theoretical problems in pattern recognition and computer vision. Also they have been widely used as a practical methodology in a large variety of real applications. During the last three decades, the area has become one of the most successful underpinnings of diverse applications such as classification, recognition, pose estimation, motion estimation. At the same time, there are many new and evolving research topics: nonlinear methods including kernel methods, manifold learning, subspace update and tracking. In addition to regular presentations, to overview these developments, we provided a historical survey talk of the subspace methods.

Prior to this workshop, we successfully organized two international workshops on subspace-based methods: Subspace 2007 in conjunction with ACCV 2007 and Subspace 2009 in conjunction with ICCV 2009. We believe that Subspace 2010 stimulated fruitful discussions among the participants and provided novel ideas for future research in computer vision.

November 2010

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