Introduction to the special section on Artificial Intelligence and Computer Vision

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Background

The integration of artificial intelligence and computer vision technologies has become a topic of increasing interest for both researchers and developers from academia and industry worldwide. It is foreseeable that artificial intelligence will be the main approach to the next generation computer vision research. The explosion of artificial intelligence algorithms and rapidly growing computational power have significantly expanded the possibility of computer vision. New challenges have also been brought to the vision community. The aim of this special issue is to provide a platform to share up-to-date scientific achievements in this field.

From a total of 46 papers submitted to this special section, 10 high-quality articles were selected, resulting in an acceptance rate of 21.7%. Each paper was peer reviewed by three or more experts during the assessment process. The selected articles have exceptional diversity in terms of artificial intelligence and computer vision techniques and applications. They represent the most recent development in both theory and practice. The contributions of these papers are briefly described as follows.

Papers in this special section

The papers in this special section can be grouped into six main areas: Theoretical Foundations of Artificial Intelligence, 3D Scene Reconstruction, Computer Vision, Object Tracking, Big Multimedia Learning, and Underwater Imaging.

Theoretical Foundations of Artificial Intelligence: Artificial intelligence is changing our lives, from smart phones to smart homes. In this special issue, D. Meng et al. [1]

proposed an optimized genetic algorithm (GA) based fuzzy controller for smart hybrid electric vehicles. The experimental results showed that the proposed control strategy can reduce fuel consumption and emission, balance charging and discharging of the battery. In [2], the problem of sub-tasks scheduling in a formalized manner is presented, that is task scheduling mechanism, winner coalition formation mechanism and payment sharing mechanism. Experimental results suggest that the proposed scheme processes task execution efficiency.

3D Scene Reconstruction: J. Zhu et al. [3] proposed a spanning tree for multi-view registration of range scans. Based on this tree, pairwise registration can be sequentially used to align the root scan and its directly connected scans. Through experimental and theoretical analysis, this work confirmed that the proposed method can achieve multi-view registration with excellent performance.

Computer Vision: Extenics-based methods were applied in [4] for MRI brain tissue classification. The standard deviation target generation process (SDTGP) and particle swarm optimization (PSO) were used in the extenics-based correlation function. Finally, FMRIB's automated segmentation tool (FAST) were adopted to segment the tissues. Quality assessment indexes show the outstanding performance of the proposed approach. Adaboost and Contour Circle (ACC) algorithm were developed by M. Wang et al. [5]. The correct ratio of the blink detection was 96.6%, and the fatigue blink recognition accuracy was 91.5%.

Object Tracking: S. Nakashima et al. [6] proposed a slit-type one-dimensional brightness distribution sensor and computational imaging techniques for object tracking. The effectiveness of the proposed sensor to detect, localize and track falls was verified by the experiments. W. Chen et al. [7] proposed an image processing technology for automatic indication of the electrode path location of Automated External Defibrillator (AED). Experimental results demonstrate that the proposed scheme is an effective and accurate method.

Big Multimedia Learning: H. Chen et al. [8] proposed an intelligent annotation-based image retrieval system for social media searching. The proposed system enables creation of semantic links between concepts, counting objects and identification of same concepts. Twitter has become one of the largest social network services for users to broadcast burst topics. G. Dong et al. [9] investigated burst topic

user graph model for solving the issue of mining patterns in burst topics. Experimental results show the effectiveness of the proposed model for multimedia learning.

Underwater Imaging: D. Rizzini et al. [10] described the stereo vision system developed within MARIS. Experiments in an outdoor water pool in different light conditions show that the adopted algorithm performs well for detection of target pipes.

In conclusion, we would like thank the authors for their contributions to the special issue and all the reviewers for their careful reviews. We also appreciate the support and help from the editorial staff and the Editor-in-Chief, Manu Malek.

Guest Editors

Huimin Lu received a B.S. degree in Electronics Information Science and Technology from Yangzhou University in 2008. He received M.S. degrees in Electrical Engineering from Kyushu Institute of Technology and Yangzhou University in 2011. He received the Ph.D. degree in Electrical Engineering from Kyushu Institute of Technology in 2014. From 2013 to 2016, he was a JSPS research fellow at Kyushu Institute of Technology. Currently, he is an Assistant Professor in Kyushu Institute of Technology. He also serves as the excellent young researcher of MEXT-Japan. His research interests include computer vision, robotics, artificial intelligence, and ocean observing.

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Donald Dansereau joined the Stanford Computational Imaging Lab as a postdoctoral scholar in September 2016. Dr. Dansereau completed B.Sc. and M.Sc. degrees in electrical and computer engineering at the University of Calgary in 2001 and 2004. In 2014 he completed a Ph.D. in plenoptic signal processing at the Australian Centre for Field Robotics, University of Sydney, and in 2015 joined on as a research fellow at the Australian Centre for Robotic Vision at the Queensland University of Technology, Brisbane. His research is focused on computational imaging for robotic vision.

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