



Focused section on robust perception and learning for robots in dynamic environments

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Published online: 2 November 2019
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Intelligent robots can adapt to dynamic and unstructured environments when perception and learning are seamlessly coupled. To break through the bottleneck that limits robot intelligence, it is important to solve the issues of robust perception and learning. Key features of robust perception and learning include multi-modal fusion, active perception, cross-modal learning, lifelong learning and adversarial learning. The primary objectives of this focused section are dedicated to soliciting the state-of-the-art and novel contributions addressing fundamental challenges and practical issues in all aspects of robust perception and learning.

In this special issue, we mainly focus on robust perception, control and learning, addressing both original algorithmic development and new applications. The accepted contributions can be divided into the following three parts:

The first part contains two survey papers. In the first survey *Coverage Optimization of Visual Sensor Networks for Observing 3-D objects: Survey and Comparison*, the authors provide detailed comparison of mainstream coverage optimization methods for visual sensor networks, including the greedy algorithm, genetic algorithm, particle swarm optimization, binary integer programming and differential evolution algorithm. In the second one, *Survey of Imitation Learning for Robotic Manipulation*, the authors provide the survey of imitation learning of robotic manipulation and explore

the future research trend, from the aspects of demonstration, representation and learning.

The second part contains four papers which focus on the intelligent planning and control. In the paper *A Bilevel Optimal Motion Planning (BOMP) Model with Application to Autonomous Parking*, the authors treat motion planning as an optimal control problem, in which the upper level is designed for vehicle nonlinear dynamics, and the lower level is for geometry collision-free constraints. In *Research on Attack Angle Tracking of High Speed Vehicle based on PID and FLNN Neural Network*, the authors addressed the problem of a kind of pitch channel dynamic model of hypersonic aircraft considered with both the model of engine and the model of elastic shape. In *A Distributed Approach for Road Clearance with Multi-Robot in Urban Search and Rescue Environment*, the authors utilize the RoboCup rescue simulation for disaster management where heterogeneous field agents (fire-brigade agent, ambulance agent, and police force agent) collaborate to manage a mimicked calamity situation. In *Universal Output Feedback and Nussbaum Gain Adaptive Control of Supersonic Missiles with Unknown Control Direction*, the authors develop two kinds of novel universal output feedback controllers to solve the unmeasurable states problem for an uncertain missile system.

The third part contains four papers which focus on the intelligent planning and control. In *Machine-Learning-based Hand Motion Recognition System by Measuring Forearm Deformation with a Distance Sensor Array*, the authors focus on forearm deformation which is an alternative source of information for hand motion recognition. In *Object Detection Based on Colour and Shape Features for Service Robot in Semi-Structured Indoor Environment*, the authors developed a new visual object detection method based on color and shape features. In *Structural Constraint Deep Matrix Factorization for Sequential Data Clustering*, the authors propose structural constraint deep matrix factorization which captures the ordered structure information into the deep matrix factorization process to improve data representation.

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In *A Computer Vision and Artificial Intelligence based Cost-Effective Object Sensing Robot*, the authors present an enhanced object detection system incorporating a few well-known computer vision techniques, machine learning algorithms, as well as smart sensors in a more organized way. In *Spatial Attention Model Based Target Detection for Aerial Robotic Systems*, the authors develop a novel target detection method based on spatial attention model, which changes the existing methods to enhance the features of target areas by enhancing global semantic information.

We are glad to see that the papers included in this special issue cover different aspects of theoretical algorithm, technology and applications. During the review process, reviewers contributed a lot to the quality of this special issue by thoroughly evaluating the papers and providing a great deal of constructive comments. Last, but not the least, the completion of this special issue cannot be separated from the strong support from the Editor-in-Chief, Prof. Kok-Meng Lee. We would like to thank him for his great support.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.



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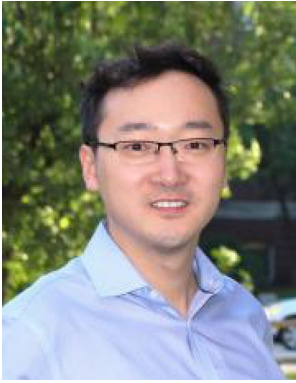
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