Machine Vision Sensors

Sergiyenko, Oleg; Tyrsa, Vera; Flores-Fuentes, Wendy; Rodriguez-Quinonez, Julio; Mercorelli, Paolo

Published in:
Journal of Sensors

DOI:
10.1155/2018/3202761

Publication date:
2018

Document Version
Publisher's PDF, also known as Version of record

Hindawi
Journal of Sensors
Volume 2018, Article ID 3202761, 2 pages
https://doi.org/10.1155/2018/3202761

Editorial

Machine Vision Sensors

Oleg Sergiyenko,[1] **Vera Tyrsa**,[2] **Wendy Flores-Fuentes**,[1] **Julio Rodriguez-Quiñonez**,[1] **and Paolo Mercorelli**[3]

[1]*Autonomous University of Baja California, Mexicali, BC, Mexico*
[2]*Automobile and Highway University, Kharkiv, Ukraine*
[3]*Leuphana University, Lueneburg, Germany*

Correspondence should be addressed to Oleg Sergiyenko; srgnk@uabc.edu.mx

Received 8 January 2018; Accepted 9 January 2018; Published 27 February 2018

The advances in mechatronics and robotics in the last 50 years have been improved by the sensory inputs to systems, providing them with the sight capacity, when the machine visual interpretation is carried out, it increases systems intelligence. While visual perception to machines promises the greatest improvement, at the same time, it presents the greatest challenge, particularly when they are in the real-world situations.

This special issue is intended to present and discuss breakthrough technological developments which are expected to revolutionize contributions to sensors, signal processing, and algorithms in machine vision, control, and navigation. It provides a reference on machine vision supporting techniques and 3D reconstruction for researchers and engineers. These contributions are focused on sensors for vision systems, intelligent navigation algorithms, and machine motion controllers, particularly on applications of unmanned aerial vehicle, drones, and autonomous and mobile humanoid robots. We received several submissions, and after two rounds of rigorous review, 10 papers were accepted.

In the first paper "A Review of Deep Learning Methods and Applications for Unmanned Aerial Vehicles," A. Carrio et al. perform a thorough review on recent reported uses and applications of deep learning for UAVs, including the most relevant developments as well as their performances and limitations. Also, a detailed explanation of the main deep learning techniques is provided.

In the paper "An Efficient Calibration Method for a Stereo Camera System with Heterogeneous Lenses Using an Embedded Checkerboard Pattern," P. Rathnayaka et al. present two approaches to calibrate a stereo camera setup with heterogeneous lenses: a wide-angle fish-eye lens and a narrow-angle lens in left and right sides, respectively. Instead of using a conventional black-white checkerboard pattern, they design an embedded checkerboard pattern by combining two differently colored patterns.

In the paper "Automatic Detection Technology of Sonar Image Target Based on the Three-Dimensional Imaging," W. Kong et al. present a set of sonar image automatic detection technologies based on 3D imaging. The process consists of two steps, approximate position of the object by calculating the signal-to-noise ratio of each target and then the separation of water bodies and strata by maximum variance between clusters (OTSU).

In the paper "Vision System of Mobile Robot Combining Binocular and Depth Cameras," Y. Yang et al. propose a 3D reconstruction system combining binocular and depth cameras to improve the precision of the 3D reconstruction. The whole system consists of two identical color cameras, a TOF depth camera, an image processing host, a mobile robot control host, and a mobile robot; finally, double thread processing method is applied to improve the efficiency of the system.

In the paper "Aphid Identification and Counting Based on Smartphone and Machine Vision," S. Xuesong et al. present a design of counting software that can be run on smartphones for real-time enumeration of aphids, the counting accuracy in the greenhouse is above 95%, while it can reach 92.5% outside.

In the paper "Multisource Data Fusion Framework for Land Use/Land Cover Classification Using Machine Vision," S. Qadri et al. present the design of a novel framework for multispectral and texture feature-based data fusion to identify the land use/land cover data types correctly. The study describes the data fusion of five land use/cover types, that is, bare land, fertile cultivated land, desert rangeland, green pasture, and Sutlej basin river land derived from remote sensing. The obtained accuracy acquired using multilayer perceptron for texture data, multispectral data, and fused data was 96.67%, 97.60%, and 99.60%, respectively.

In the paper "A Nonlocal Method with Modified Initial Cost and Multiple Weight for Stereo Matching," S. Gao et al. present a new nonlocal cost aggregation method for stereo matching, a modified initial cost is used, and a robust and reasonable tree structure is developed. The proposed method was tested on Middlebury datasets and, experimental results show that the proposed method surpasses the classical nonlocal methods.

In the paper "Global Measurement Method for Large-Scale Components Based on a Multiple Field of View Combination," Y. Zhang et al. propose a noncontact and flexible global measurement method combining a multiple field of view (FOV); the measurement system consists of two theodolites and a binocular vision system with a transfer mark. The authors also propose a new global calibration method to solve the coordinate system unification issue of different instruments in the measurement system.

In the paper "Automated Recognition of a Wall between Windows from a Single Image," Y. Zhang et al. propose a method to recognize the wall between windows from a single image automatically. The method starts from detection of line segments with further selection. The color features of the two sides are employed to detect line segments as candidate window edges. Finally, the images are segmented into several subimages, window regions are located, and then the wall between the windows is located.

In the paper "Visual Vehicle Tracking Based on Deep Representation and Semisupervised Learning," Y. Cai et al. propose a semisupervised tracking algorithm that uses deep representation and transfer learning. A 2D multilayer deep belief network is trained with a large number of unlabeled samples. The nonlinear mapping point at the top of this network is subtracted as the feature dictionary. Then, the feature dictionary is utilized to transfer train and update a deep tracker. The positive samples for training are the tracked vehicles. Finally, a particle filter is used to estimate vehicle position.

Acknowledgments

The guest editorial team would like to thank the authors of all the papers submitted to this special issue. We also want to thank the institutions to which we are affiliated, specially the Autonomous University of Baja California. Finally, the editors also wish to thank the anonymous reviewers, some of whom helped with multiple review assignments. We hope that you will enjoy reading this special issue focused on machine vision.

Oleg Sergiyenko
Vera Tyrsa
Wendy Flores-Fuentes
Julio Rodriguez-Quiñonez
Paolo Mercorelli