JRTIP's Special Issue

on

SPECTRAL IMAGING

Real-Time Processing of Hyperspectral Data

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Guest Editorial

A series of international workshops on Spectral Imaging [1-3] were held in the last three years where scientists from different research fields including spectroscopy and image processing met and exchanged their experience and results. The last two events in May 2006 in Graz (in conjunction with ECCV) and in September 2005 in Villach with a dedicated exhibition of equipment and solutions provided the most recent developments in the field of spectral imaging covering algorithms, sensors and special purpose hardware components, and various applications of spectral imaging vision systems.

Two special issues on spectral imaging [4,5] enfiladed these workshops focusing on the real-time aspects, capabilities and performance of spectral vision systems and solutions as coordinated actions to compensate this fragmented arena noting that many researchers act independently with low adhesion in an inhomogeneous community. The potential impact of this emerging technology, the real-time performance of first solutions and the attention of the preceding special issues during the past three

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years encouraged the editors to have a special issue on spectral imaging for the newly established *Journal of Real Time Image Processing* [6]. The presentation of different application fields that can be subsumed under the headline of spectral imaging is presented in [7] to demonstrate the wide variety of spectral image processing and its real-time perspectives.

The second issue of JRTIP has thus been organized as a **Special Issue on Spectral Imaging** because it fits well in the framework of past workshops and preceding specialized journal issues emphasizing the presentation of "hot spots" of current state of the art in a fast developing application-oriented branch of real time image processing that has become mature.

Additionally, this special issue is intended to stimulate dialogues among experts coming from either spectroscopy or image processing but sharing common interests in spectral imaging with real-time constraints with an up-to-date set of papers giving a snapshot of current research. This special issue is meant to provide a catalyst for cross-fertilization of both research fields helping to overcome the fragmentation of the technical sector of spectral imaging.

The authors who have contributed to this special issue have dealt with both theory and applications within the field of spectral imaging emphasizing the real time aspects for hardware and equipment, real time potential of particular techniques and algorithms and/or real time demands from applications or solutions point of view.

This second issue of JRTIP consists of seven articles, five of which address the spectral imaging theme and two are regular real-time image processing articles. More specifically, the special issue papers start with a study on design of object sorting algorithms in industrial applications using hyperspectral imaging, while the second article presents a new method for sensor band selection of multispectral imaging that combines feature band selection and band redundancy reduction. The following two papers deal with a new correlation technique for cross-spectral image registration and cover the subject of spectral aliasing in the wavelength domain of hyperspectral data. The last special issue paper use spectral feature ratios for improving classification in partially calibrated hyperspectral imagery in a

remote sensing application for vegetation species separation.

The first regular paper deals with the low computational complexity implementation for a real-time enabled Moving-Window Discrete Fourier Transform. The second regular paper, presents an FPGA-based architecture for hardware compression and decompression in real-time for wide format printing applications.

Special thanks are extended to both the authors and the referees, who all contributed to this special issue on spectral imaging. I would also like to acknowledge the management and production departments of Springer.

Looking forward to have this special issue as another milestone leveraging the breakthrough for spectral imaging technology in new and emerging applications by fusing data of material characteristics taken from invisible bands of spectra and merging them with luminance and shape based features, I encourage other authors to submit papers to *Journal of Real-Time Image Processing* focusing on the subject of spectral imaging as related mosaic piece within the scope of this journal.

Guest Editor

Matthias F. Carlsohn

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