Guest-editorial

In recent years, tremendous advances in the technology of imaging sensors have carried their potential applications from monosensor, specialized application fields, to multisensor, generic applications. Multisensor platforms with color video, omnidirectional vision and mid/long infrared channels, including lidar or range image sensor, etc., are currently in use for instance in ground robotics, remote sensing, automated monitoring of equipment, military applications as well as in various industrial applications. If the performance of a few applications like target detection or medical diagnosis is only just improved by the use of several sensors instead of a single one, the breadth of the applications being considered as mere multisensor problems (like mobile robotics, Search And Rescue or hyperspectral characterization) is significant.

Accordingly, multisensor system designers have had to cope with sets of problems sharing common features. The so-called multisensor image and data fusion discipline benefits from advances in related scientific fields like signal and image processing. This special issue thus aims at publishing carefully selected papers on various aspects of image and data fusion techniques applied to multi-sensor systems and techniques. Each manuscript for this special issue was reviewed by three renowned scientists. The seven papers included in the special issue have passed the journal rigorous review process.

- Le Hégarat-Mascle, Richard and Ottlé's contribution describes the application of classical Dempster-Shafer evidence theory on multi-scale data fusion of remote sensing images. It exemplifies how D-S theory can be used in order to avoid current drastic assumptions on scale modeling.
- Agaian, Tourshan and Noonan's paper is more theoretical. It yields a powerful signal slant transform with low computational complexity that can be used in multispectral classifications. Slant transform has the best compaction performance among non-sinusoidal fast orthogonal transforms.

- Sun, Paik, Koschan and Abidi present a framework for surface modeling from multi-view range and color images. The core of the method includes a novel surface denoising algorithm based on area decreasing flow. Integration into a 3D model is discussed.
- Milisavljević and Bloch propose a Dempster-Shafer theory based method for combining imaging and non-imaging sensors within the context of humanitarian demining. The sensors include an imaging metal detector, a ground penetrating radar and an infrared camera.
- Laporterie and Flouzat describe a new approach called morphological pyramid concept, which can be used either for image analysis or for image fusion in remote sensing. In a few words, this new approach reformulates mathematical morphology within the context of multiresolution analysis.
- Melgani, Serpico and Vernazza's paper deals with multitemporal contextual information fusion. The proposed scheme consists of two stages of multi-layer perceptron neural networks for every image. Experimental results on Landsat TM and ERS-1 SAR multisensor images are given and assessed.
- Woodard and Creekmore's contribution describes the use of an efficient filter bank concept in combination with a high-order prototype filter design. The paper itself provides a comprehensive introduction to the application of such concepts to sonar.

Each of these contributions discusses a new framework for dealing with multiple data. This special issue is thus going to provide the reader a sampling of new and top-of-the-art techniques at the meeting point of multisensor data fusion and image processing.

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Guest Editor