Circuits, Systems and Signal Processing

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Special Issue on Advanced Machine Learning Algorithms and Signal Processing

Signal processing research has significantly widened its scope compared to what it was just a few years ago. Much of modern statistical and adaptive signal processing relies on learning algorithms of one form or another. This approach is especially important in signal and image processing where sets of sensors, usually large and heterogeneous, provide large amounts of data, usually noisy and corrupted with various sources of interference. Moreover, considering the large amount of diverse data (image, video, time series, 1-D signals, text, etc.) generated and stored by modern “smart” systems, the need for efficient and accurate machine learning algorithms has become increasingly important.

Machine learning adequately fits the constraints and solution requirements posed by digital signal processing problems (e.g. computational efficiency, online adaptation, learning with limited supervision, combination of heterogeneous information, incorporation of prior knowledge about the problem, and interaction with the user to achieve improved performance). Many machine learning techniques have already been applied to address the relevant problems. For example, convolutional neural networks have demonstrated superior performance on large-scale image classification. Semi and weakly-supervised learning methods have significantly improved the performance when only a small amount of annotated data is available. Correlation analysis, transfer learning, and multi-task learning have shown the potential in integrating severely heterogeneous data. Sparse representation and clustering approaches have been exploited in denoising and selecting exemplary samples from raw data. This special issue aims to demonstrate the contribution of machine learning techniques to the research and development of advanced signal processing.

The following is a non-exhaustive list of topics considered for this special issue:

- Machine learning algorithms for signal detection and synchronization
- Learning theory (supervised/unsupervised) for signal processing
• Deep learning for signal processing
• Multimodal learning algorithms for signal processing
• Incremental learning for signal processing
• Structure learning for signal processing
• Cognitive systems for signal processing
• Machine learning algorithms for audio, video and image processing
• Signal transformations using machine learning
• Mathematical foundations of machine learning for signal processing
• Distributed, decentralized, and cooperative signal processing using machine learning algorithms

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Important dates

• Manuscript submissions due February 1, 2019
• First round of reviews completed & authors notified May 15, 2019
• Revised manuscripts due June 30, 2019
• Second round of reviews completed August 15, 2019
• Notification of acceptance August 30, 2019
• Final manuscripts due September 15, 2019
• Target publication date January 2020