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IEEE Signal Processing Society

Special Issue
IEEE SIGNAL PROCESSING MAGAZINE

Special Issue on Signal Processing for Big Data

Aims and Scope

We live in an era of data deluge. Pervasive sensors collect massive amounts of information on every bit of our lives, churning out enormous streams of raw data in various formats. Mining information from unprecedented volumes of data promises to limit the spread of epidemics and diseases, identify trends in financial markets, learn the dynamics of emergent social-computational systems, and also protect critical infrastructure including the smart grid and the Internet's backbone network. While Big Data can be definitely perceived as a big blessing, big challenges also arise with large-scale datasets. The sheer volume of data makes it often impossible to run analytics using a central processor and storage, and distributed processing with parallelized multi-processors is preferred while the data themselves are stored in the cloud. As many sources continuously generate data in real time, analytics must often be performed "on-the-fly" and without an opportunity to revisit past entries. Due to their disparate origins, the resultant datasets are often incomplete and include a sizable portion of missing entries. In addition, massive datasets are noisy, prone to outliers, and vulnerable to cyber-attacks. These effects are amplified if the acquisition and transportation cost per datum is driven to a minimum. Overall, Big Data present challenges in which resources such as time, space, and energy, are intertwined in complex ways with data resources. Given these challenges, ample signal processing opportunities arise. This special issue seeks to provide a venue for ongoing research in novel models applicable to a wide range of Big Data analytics problems, as well as algorithms and architectures to handle the practical challenges, while revealing fundamental limits and insights on the mathematical trade-offs involved.

Topics of interest include (but are not limited to):

- **Theoretical foundations and algorithms for Big Data analytics**
  - Compressive sampling, matrix completion, low-rank models, and dimensionality reduction
  - Graph, latent factor, tensor, and multirelational data models
  - Robustness to outliers and misses; convergence and complexity issues; performance analysis
  - Scalable, online, active, decentralized, deep learning and optimization
  - Randomized schemes for very large matrix, graph, and regression problems
  - Human-machine learning systems with limited labeled and massive unlabeled data
- **Architectures and applications for large-scale data analysis and signal processing**
  - Scalable, distributed computing, e.g., Mapreduce, Hadoop
  - Streaming for real time-analytics and graph processing, e.g., Pregel, Giraph
  - Systems biology; genomics; bioinformatics; semantics; sentiment and natural language processing
  - Green energy and smart power grid analytics; climate; astronomical; geoscience; multimodal sensing
  - Social and information networks; financial and e-trading; now-casting
  - Preference measurement; recommender systems; targeted advertising

Submission Process

Articles submitted to this special issue must contain significant relevance to signal processing. All submissions will be peer reviewed according to the IEEE and Signal Processing Society guidelines for both publications. Submitted articles should not have been published or under review elsewhere. Manuscripts should be submitted online at http://mc.manuscriptcentral.com/sps-ieee using the Manuscript Central interface. Submissions to this special issue of the IEEE SIGNAL PROCESSING MAGAZINE should have significant tutorial value. Prospective authors should consult the site http://www.signalprocessingsociety.org/publications/periodicals/spm/ for guidelines and information on paper submission.

Important Dates: Expected publication date for this special issue is **September 2014.**

IEEE Signal Processing Magazine	Time Schedule
White paper due	September 1, 2013
Invitation notification	October 1, 2013
Manuscript due	December 15, 2013
Review results and decision notification	March 1, 2014
Revised manuscript due	April 1, 2014
Final acceptance notification	May 1, 2014
Camera-ready paper due	May 9, 2014
Publication date	September 2014

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