Mathematical Problems in Engineering

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Special Issue on

Algorithms for Compressive Sensing Signal Reconstruction with Applications

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Compressive sensing appeared recently as a new sensing framework and very quickly became a rapidly growing area of great interest in many research communities and applications. As an alternative to the traditional sampling theory, this modern approach allows acquiring much smaller amount of data, still achieving the same quality (or almost the same) of the final representation. Compressive sensing opens the possibility to simplify acquisition devices and apparatus for data and reduce the number of sensors, acquisition time, and storage capacities. Also, compressive sensing principles have been used for denoising by considering the randomly corrupted data as unavailable. The signal reconstruction from small set of measurements is possible if these are incoherent and the signal itself is sparse in a certain transform domain. The main challenges that arise here are related to the design of measurements process/matrix, exploring signal sparsity over certain transform basis, and design of suitable reconstruction algorithms. Generally, the signal reconstruction problem in CS is formulated as an underdetermined system of linear equations that needs to be solved using sparse priors. Depending on the application of interest, the challenge in signal reconstruction is focused toward the development of fast reconstruction algorithm with high accuracy.

Nowadays, compressive sensing has found the potential applications in many real-world systems showing ability to provide substantial gain over traditional approach. Particularly, the applications range from the radar, sonar and remote sensing systems, biomedical imaging, multimedia systems, communications, and sparse channel estimation.

The objective of this special issue is to bring together novel theoretical developments and modern applications dealing with compressive sensing strategy and thus to promote the state of the art in this attractive research area and to bring new advanced results. Therefore, this special issue welcomes novel contributions, modifications, and extensions in theory, analysis, and algorithms, with the special emphasis on applications.

Potential topics include, but are not limited to:

- CS reconstruction of 1D and 2D signals
- CS based denoising methods
- Exploring signal sparsity in transformation domain
- CS and time-frequency analysis
- Biomedical applications
- Applications in radars
- Applications in multimedia systems
- Compressive sensing techniques for instantaneous frequency estimation
- Applications of compressive sensing and robust signal analysis
- Real-time systems for CS signal acquisition and reconstruction

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