
DSP2009 – 16th International Conference on Digital Signal Processing

SPECIAL SESSION:

GRAPHS AND COMPLEX NETWORKS FOR REPRESENTATION,
CHARACTERIZATION AND MODELING OF GEOMETRIC COMPLEX SYSTEMS

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The remaining challenges in science and technology are to a large extent related to *complex systems*, which include image understanding, the Internet, systems biology, and neuroscience. Graphs and complex networks – i.e. graphs exhibiting particularly intricate connectivity – allow a natural means for *representing, analyzing and modeling* complex systems underlain by several interconnected parts. For instance, the pixels or salient points in a given image can be represented by nodes, while the similarity and relative position/adjacency between pairs of such nodes can be expressed by weighted edges. Similarly, the neurons in a neuronal module can be represented by nodes, while their synaptic connections are mapped as directed edges in the respective graph.

Once such graph/network representations have been obtained, several respective measurements can be obtained at the node, subgraph or whole network level, being subsequently analyzed by multivariate analysis and pattern recognition methods. In this way, comprehensive information can be gathered about the patterns of interconnection in each analyzed system. In addition, given the network representation of a complex system, it is possible to simulate respective dynamics (e.g. diffusion or integrate-and-fire) taking place under that specific connectivity. Therefore, graphs and networks provide a natural means for investigating the *relationship between structure (connectivity) and dynamics in complex systems*.

The current *Special Session* focuses state-of-the art advances in several aspects of the theory and application of the areas of graph theory and complex networks to representation, characterization, and modeling of geometrical complex systems, i.e. intricate systems involving geometrical organization. Such systems include images, movies, biological structures (e.g. neuronal networks, bone canals, vascularization), as well as natural systems (e.g. highway networks, hydrographic systems, climate), human-made systems (e.g. spatial transportation and communication) as well as geographical disease transmission. *Special emphasis is given to contributions involving cross-fertilization between the areas of graph theory/complex networks and signal processing image analysis, and pattern recognition.*

Original, high-quality contributions are sought regarding theoretical and applied aspects of graph theory and/or complex networks in the following non-exclusive areas:

- Image processing analysis;
- Image segmentation;
- Graph-based pattern recognition;
- Community finding in geometric networks;
- Movies and movement analysis;
- Texture characterization and recognition;
- Shape and function in neuronal systems;
- Cortical topology;
- Structure and dynamics in geometric networks;
- Geographical aspects of communications and transportation;
- Geographical disease transmission.

All accepted contributions will be published in the conference proceedings and become available for online access via IEEE Xplore.

<i>Important Dates:</i>	
Deadline for paper submission (Special Session)	February 15, 2009
Notification of decision	March 15, 2009

Prospective authors should submit original contributions, not exceeding eight pages, including figures, tables and references. The submission instructions and format are available from **www.dsp2009.org**. Please note that all submissions will be peer-reviewed. The authors should submit full camera-ready manuscripts by accessing:

<http://www.dsp2009.org/default.asp?pg=submission&lng=en>

A copy of the manuscript should also be sent as an e-mail attachment (in PDF format) to luciano@if.sc.uspb.br.

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