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DIGITAL SIGNAL PROCESSING

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Special Issue on "Bayesian Source Separation"

Guest Editors: Ercan E. Kuruoğlu and Kevin H. Knuth

Source separation problems occur in many real-life situations, the most common being the separation of speech signals of various speakers in a room (known as the cocktail party problem). It is increasingly being recognized by the scientific community at large that source separation problems are pervasive across all fields of science. This includes examples such as the separation of functional signals in a magnetic resonance image, the separation of bio-dome types in Earth observing satellite images, the separation of Raman spectra of a chemical sample, and the separation of economic factors in financial time-series data. It is no surprise that this problem has been one of the most active fields of research in signal processing.

At this point in time, most of this research has focused on *blind* separation of linear mixtures of independent sources. While satisfactory results are obtained for the scenarios that meet the conditions assumed by blind source separation techniques, the challenge remains to perform precise separation of signals in real-life problems of scientific and social importance. An important drawback of the blind approaches is that they cannot take into account the mass of prior information the sources or the mixing process that forms the background of each specific problem. It is only natural to make use of this information and it is the objective of Bayesian Source Separation, which approaches the problem in a Bayesian framework using this *a priori* information to effectively regularise the ill-posed source separation problem.

Unfortunately, until the present time, research in Bayesian Source Separation were dispersed in various journals specialized to the application rather than the technique making it difficult to follow the developments in this area. In this special issue we wish to provide a common ground for presenting the state-of-the-art research in the theory and applications of Bayesian source separation. All aspects of Bayesian Source Separation such as techniques, applications, and foundations, are of interest. Techniques could include computational methods such as Markov chain Monte Carlo, particle filters, and other methods that enable model selection. Applications are welcome from diverse fields such as telecommunications, astronomy, geophysics, medical imaging, chemistry, and economics as well as speech image and audio signal decomposition. Foundational issues can include investigations of signal and noise models (i.e. likelihood functions), prior probability derivations, marginalization methods, and model selection.

Scheduling of the Special Issue

Deadline for paper submission: 26 June 2006

End of refereeing process and acceptance notification: 4 August 2006

Submission of the final manuscript: 15 September 2006

Please submit the electronic copy to:

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Signals and Images (SI)

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