9°

Πρόγραμμα Μεταπτυχιακών Σπουδών

ΤΕΧΝΟΛΟΓΙΕΣ ΠΛΗΡΟΦΟΡΙΚΗΣ ΣΤΗΝ ΙΑΤΡΙΚΗ ΚΑΙ ΤΗ ΒΙΟΛΟΓΙΑ

ΔΙΕΠΙΣΤΗΜΟΝΙΚΟ ΣΕΜΙΝΑΡΙΟ

ICA and IVA:

Theory, Connections, and Applications to Medical Imaging

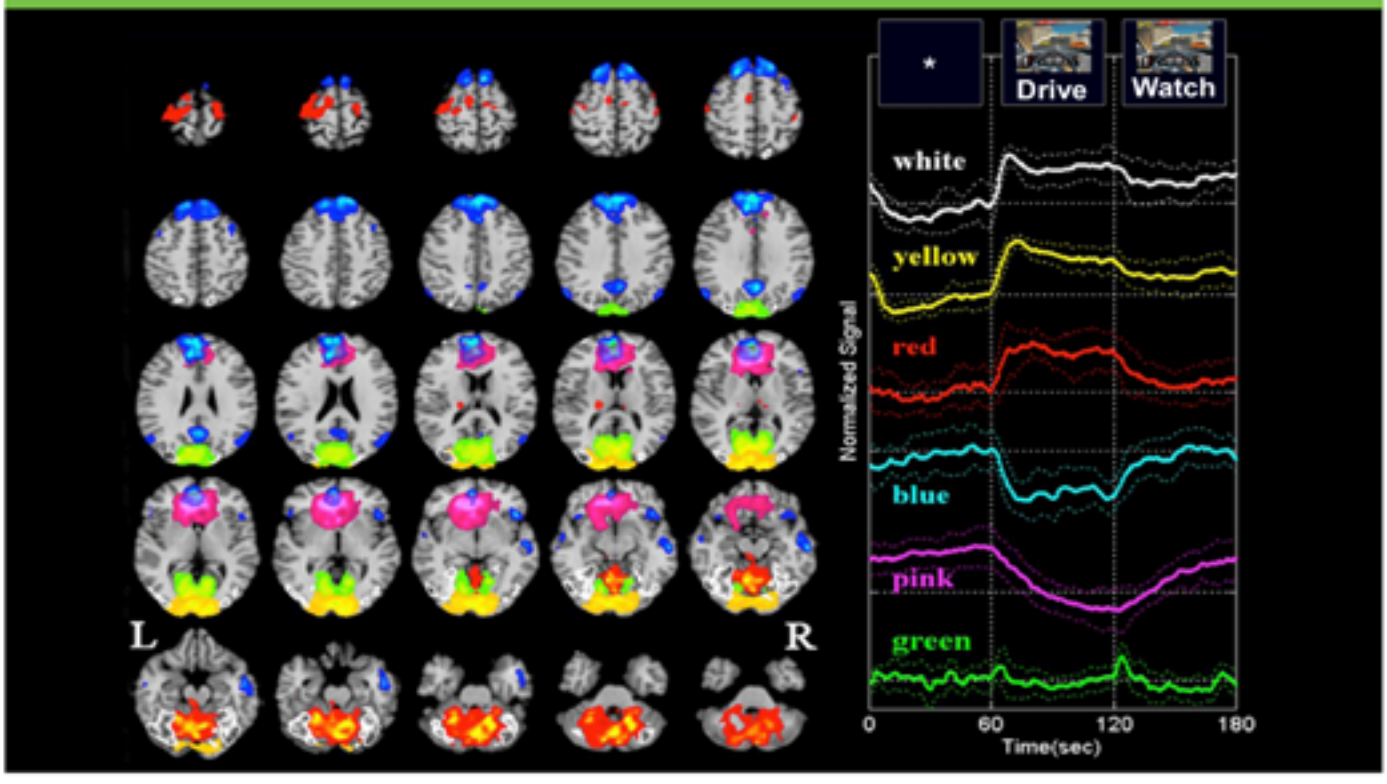
-- Prof. Tulay Adali --

IEEE Signal Processing Society Distinguished Lecturer

Monday, April 29th 2013

at 11:00, Room A2

Department of Informatics and Telecommunications, University of Athens



Abstract:

Data-driven methods are based on a simple generative model and hence can minimize the assumptions on the nature of data. They have emerged as promising alternatives to the traditional model-based approaches in many applications where the underlying dynamics are hard to characterize.
Independent component analysis (ICA), in particular, has been a popular data-driven approach and an active area of research. Starting from a simple linear mixing model and imposing the constraint of statistical independence on the underlying components, ICA can recover the linearly mixed components subject to only a scaling and permutation ambiguity. It has been successfully applied to numerous data analysis problems in areas as diverse as biomedicine, communications, finance, geophysics, and remote sensing.

This talk reviews the fundamentals and properties of ICA, and provides a unified view of two main approaches for achieving ICA, those that make use of non-Gaussianity and sample dependence. Then, the generalization of ICA for analysis of multiple datasets, independent vector analysis (IVA), is introduced and the connections between ICA and IVA are highlighted, especially in the way both approaches make use of signal diversity. Examples are presented to demonstrate the application of ICA and IVA to analysis of functional magnetic resonance imaging data as well as fusion of data from multiple imaging modalities.

Short CV:

Tulay Adali received the Ph.D. degree from North Carolina State University, Raleigh, in 1992 in electrical engineering and joined the faculty at the University of Maryland Baltimore County (UMBC), Baltimore the same year where she currently is a Professor in the Department of Computer Science and Electrical Engineering. She has held visiting positions at Ecole Superieure de Physique et de Chimie Industrielles, Paris, France, Technical University of Denmark, Lyngby, Denmark, Katholieke Universiteit, Leuven, Belgium, and University of Campinas, Brazil.

Prof. Adali assisted in the organization of a number of international conferences and workshops including the IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), the IEEE International Workshop on Neural Networks for Signal Processing (NNSP), and the IEEE International Workshop on Machine Learning for Signal Processing (MLSP).
She was the General Co-Chair, NNSP (2001--2003); Technical Chair, MLSP (2004--2008); Program Co-Chair, MLSP (2008 and 2009), 2009 International Conference on Independent Component Analysis and Source Separation; Publicity Chair, ICASSP (2000 and 2005); and Publications Co-Chair, ICASSP 2008.

Prof. Adali chaired the IEEE Signal Processing Society (SPS) MLSP Technical Committee (2003--2005, 2011--2013), served on the SPS Conference Board (1998--2006), and the Bio Imaging and Signal Processing Technical Committee (2004--2007). She was an Associate Editor for IEEE Transactions on Signal Processing (2003--2006), IEEE Transactions on Biomedical Engineering (2007--2013), IEEE Journal of Selected Areas in Signal Processing (2010-2013), and Elsevier Signal Processing Journal (2007--2010). She is currently serving on the Editorial Boards of the IEEE Proceedings and Journal of Signal Processing Systems for Signal, Image, and Video Technology, and is a member of the IEEE SPS MLSP and Signal Processing Theory and Methods Technical Committees.

Prof. Adali is a Fellow of the IEEE and the AIMBE, recipient of a 2010 IEEE Signal Processing Society Best Paper Award, 2013 University System of Maryland Regent's Award for Research, and an NSF CAREER Award. Her research interests are in the areas of statistical signal processing, machine learning for signal processing, and biomedical data analysis.