University of Connecticut

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UTC Institute for Advanced Systems Engineering
Seminar Series

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PROBABILISTIC SIGNAL PROCESSING ON GRAPHS

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Abstract: Belief propagation on graphs is emerging as a powerful paradigm to address, in a unified way, many signal processing problems. Factor graphs, especially in their normal form, can be manipulated as probability pipelines for inference and learning. Information fusion from heterogeneous sources can be easily achieved when the graph architecture has been fixed and it is cycle-free. When the problem can be reduced to a tree, belief propagation provides exact marginalization. Much research effort is devoted to find the right architectures for given applications since the graph structure reflects our intrinsic knowledge about a problem. Even if open issues remain about the accuracy of inferences when the graph has loops, often the bare application of standard belief propagation may already provide satisfactory results (loopy belief propagation). In this talk, we address some general issues about using beliefs propagated on graphs and how this can be seen as a generalization of standard Turing machines' memory access. We discuss the issue of propagation and learning in factor graphs with reference to both discrete and continuous densities in various applications scenarios: 1. Learning a convolutional graph in a layered structure, 2. Learning a nonlinear function from examples, 3. Fusing visual information from tracking cameras.

Speaker Bio: Francesco Palmieri received his degree in Electrical Engineering with honors from the University of Naples Federico II, Italy, in October 1980. In 1983, he was awarded Fulbright scholarship to conduct graduate studies at the University of Delaware, Newark, where he received a MS degree in applied sciences and a Ph.D. in electrical engineering in 1985 and 1987 respectively. He was appointed Assistant Professor in Electrical and Systems Engineering at the University of Connecticut, Storrs, in 1987 where he was awarded tenure and promotion to associate professor in 1993. In the same year, he became an Associate Professor at the Department of Electrical Engineering and Telecommunications at the University of Naples Federico II, Italy. In February 2000 he was nominated Professor of Telecommunications at the Department of Information Engineering, Second University of Naples in Aversa, Italy. His research interests are in the areas of signal processing, communications, information theory and neural networks.