GRAPHICAL MODELS AND MESSAGE PASSING IN COMPRESSED SENSING

PROFESSOR ALEKSANDRA PIZURICA,
GHENT UNIVERSITY, BELGIUM

Her talk reviews some ideas and practical examples of using graphical models and message passing for the reconstruction of sparse signals. Graphical models offer an elegant way to encode signal structure. We discuss a particular case of using Markov Random Field (MRF) models to improve sparse reconstruction in Magnetic Resonance Imaging (MRI). Another aspect of using graphical models in compressed sensing is designing fast iterative reconstruction algorithms based on belief propagation and related message passing principles. We discuss a class of iterative recovery algorithms inspired by low-density parity check (LDPC) coding and the so-called approximate message passing (AMP) algorithms in compressed sensing.

Aleksandra Pižurica is a professor in statistical image modelling at Ghent University. She received the Diploma Degree in Electrical Engineering from the University of Novi Sad, Serbia (1994), the M.Sc. degree in Telecommunications from the University of Belgrade, Serbia (1997) and the Ph.D. degree in Engineering from Ghent University, Belgium (2002). She was a postdoctoral fellow with the Fund for Scientific Research in Flanders – FWO (2005-2011). Since 2009, she is professor at Ghent University, where she has founded a Statistical Image and Vision Modelling team within the research group Image Processing and Interpretation. In 2009, she was also appointed as principal investigator within Belgian inter-University research department Future Media and Imaging (FMI) at the Institute of Broadband Technology (IBBT), where she is leading the research unit Video and Image Content Analysis (VICA).

Aleksandra Pižurica has authored and co-authored more than 200 publications in international journals, conferences and book chapters. She has published mostly on multiresolution statistical image modelling with applications to image and video restoration, especially in the area of wavelet domain noise reduction. Her current research interests include efficient representations of multidimensional signals and hierarchical statistical models of visual perception.