IDCOM Lunchtime Seminar

Tuesday 16 September 1.00pm

Seminar Room 3.01

Alexander Graham Bell Building, King's Buildings, EH9 3JL

Prof Norbert Goertz

Institute of Telecommunications of the Vienna
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Iterative Algorithms for Recovery in Compressed Sensing and Applications in Communications Engineering

Abstract: Iterative algorithms are very efficient methods to recover structured signal vectors in n dimensions from m<n noisy measurements. They are particularly well suited for high-dimensional problems, for which classical methods such as convex recovery or orthogonal matching pursuit are too complex. We discuss fundamentals of iterative recovery, present approximate message passing (AMP) as an advanced method of this type, and apply AMP to recover sparse and non sparse signal vectors from incomplete and noisy observations. The recovery performance as well as the complexity are compared with other recovery schemes, including even simpler iterative methods but also convex recovery. Potential applications of compressed sensing and iterative recovery include a very wide range of topics, particularly in the field of signal and image processing. The concepts can, however, also be very useful in communications engineering. As a new example, we discuss the detection of radio frequency identification (RFID) tags, where the "problem" of collisions is re-interpreted as an incomplete noisy measurement scenario, and iterative methods are used to recover the sparse selection of active tags.

Biography: Norbert Goertz received the Dipl.-Ing. degree in Electrical Engineering from the Ruhr-University of Bochum, Germany, in 1993 and the Dr.-Ing.degree from Christian-Albrechts University, Kiel, Germany, in 1999 for research work on coded speech transmission over noisy channels. In 2004 he received the Habilitation degree from Munich University of Technology, Germany, with a thesis on joint source-channel coding. From 1999 until 2000 he was a postdoctoral researcher at the Institute of Network and Systems Theory of the Christian-Albrechts University Kiel, Germany. After that he was a postdoctoral researcher at the Munich University of Technology, Institute for Communications Engineering until2004. After a 3-months research visit of the IT department at Lund University, Sweden, and a temporary C4 professorship at the University of Kassel, Germany, he went to Scotland in October 2004 where he was a Lecturer and a Senior Lecturer at the Institute for Digital Communications in the School Engineering of The University of Edinburgh. Since September 2008 he has been a full professor for Multimedia Signal Processing at the Institute of Telecommunications of the Vienna University of Technology, Austria .His research interests include Source coding of multimedia signals; Channel coding, LDPC codes in particular; Adaptive modulation; Cross-layer design and scheduling; Multiuser information theory; Source-and channel codes for user cooperation and relaying; Sparse representations and compressed sensing with applications in signal processing and communications.

Pizza from 12.30pm – 2nd floor foyer