SEMINAR

You are invited to attend the School of EET seminar

Orthogonal AMP and Iterative Signal Processing

Time: 1:00 pm-3:00 pm, May 1, 2019

Location: EE Building G09

Title:
Orthogonal AMP and Iterative Signal Processing

Speaker:
Prof. Ping LI, (Fellow, IEEE), City University of Hong Kong

Abstract:
Approximate message passing (AMP) is a low-cost iterative signal recovery algorithm for linear system models. When the system transform matrix has independent identically distributed (IID) Gaussian entries, the performance of AMP can be asymptotically characterized by a simple scalar recursion called state evolution (SE). However, SE may become unreliable for other matrix ensembles, especially for ill-conditioned ones. This imposes limits on the applications of AMP. In this paper, we propose an orthogonal AMP (OAMP) algorithm based on de-correlated linear estimation (LE) and divergence-free non-linear estimation (NLE). The Onsager term in standard AMP vanishes as a result of the divergence-free constraint on NLE. We develop an SE procedure for OAMP and show numerically that the SE for OAMP is accurate for general unitarily-invariant matrices, including IID Gaussian matrices and partial orthogonal matrices. We further derive optimized options for OAMP and show that the corresponding SE fixed point coincides with the optimal performance obtained via the replica method. Our numerical results demonstrate that OAMP can be advantageous over AMP, especially for ill-conditioned matrices.

Bio:
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LI PING (S'87–M'91–SM'06–F'10) received the Ph.D. degree from Glasgow University in 1990. He was a Lecturer with the Department of Electronic Engineering, Melbourne University, from 1990 to 1992. He was a Research Staff with Telecom Australia Research Laboratories from 1993 to 1995. Since 1996, he has been with the Department of Electronic Engineering, City University of Hong Kong, where he is currently a Chair professor of Information Engineering. He received the IEEE J J Thomson premium in 1993, the Croucher Foundation Award in 2005, and the British Royal Academy of Engineering Distinguished Visiting Fellowship in 2010. He served as a member of the Board of Governors for the IEEE Information Theory Society from 2010 to 2012.

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