Center for Optimization & Statistical Learning

McCORMICK SCHOOL OF ENGINEERING

Extracting governing equations in chaotic systems from highly corrupted data

Tuesday, **May 10**, 2016
Tech M228
11:00 a.m.
Refreshments Served

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Abstract: Learning the governing equations for time-varying measurement data is of great interest across different scientific fields. When such data is moreover highly corrupted, for example, due to the recording mechanism failing over unknown intervals of time, recovering the governing equations becomes quite challenging. In this work, we show that if the data exhibits chaotic behavior, it is possible to recover the underlying governing nonlinear differential equations even if a large percentage of the data is corrupted by outliers, by solving an l1 minimization problem which assumes a polynomial representation of the system and exploits the joint sparsity in the variable representing the corrupted data. Theoretical reconstruction guarantees are obtained by combining recent results on central limit theorems for time-1 maps of chaotic flows with results from compressive sensing theory. This is joint work with Giang Tran, UT Austin.

Biography: Rachel Ward obtained her BS in Mathematics from University of Texas at Austin, and her PhD in Applied and Computational Mathematics from Princeton University. She is currently an Assistant Professor in the Department of Mathematics and ICES member at University of Texas at Austin.