



THE UNIVERSITY OF  
CHICAGO

Department of Statistics

SCIENTIFIC AND STATISTICAL COMPUTING SEMINAR

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High-Dimensional Changepoint Estimation via Sparse Projection

THURSDAY, September 29, 2016 at 4:30 PM  
Jones 226, 5747 South Ellis Ave.

#### ABSTRACT

Changepoints are a very common feature of Big Data that arrive in the form of a data stream. In this paper, we study high-dimensional time series in which, at certain time points, the mean structure changes in a sparse subset of the coordinates. The challenge is to borrow strength across the coordinates in order to detect smaller changes than could be observed in any individual component series. We propose a two-stage procedure called 'inspect' for estimation of the changepoints: first, we argue that a good projection direction can be obtained as the leading left singular vector of the matrix that solves a convex optimisation problem derived from the CUSUM transformation of the time series. We then apply an existing univariate changepoint detection algorithm to the projected series. Our theory provides strong guarantees on both the number of estimated changepoints and the rates of convergence of their locations, and our numerical studies validate its highly competitive empirical performance for a wide range of data generating mechanisms.

This is joint work with Tengyao Wang.

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