



THE UNIVERSITY OF
CHICAGO

Department of Statistics

STATISTICS COLLOQUIUM

HAU-TIENG WU

Department of Mathematics
University of Toronto

Medical Challenges Meet Time Series Analysis and Manifold
Learning

MONDAY, April 17, 2017, at 4:00 PM
Eckhart 133, 5734 S. University Avenue
Refreshments before the seminar at 3:30PM in Jones 111

ABSTRACT

Adaptive acquisition of correct features from massive datasets is at the core of modern data analysis. One particular interest in medicine is the extraction of hidden dynamics from an observed time series composed of multiple oscillatory signals. The mathematical and statistical problems are made challenging by the structure of the signal which consists of non-sinusoidal oscillations with time varying amplitude and time varying frequency, and by the heteroscedastic nature of the noise. In this talk, I will discuss recent progress in solving this kind of problem. Based on the cepstrum-based nonlinear time-frequency analysis and manifold learning technique, a particular solution will be given along with its theoretical properties. I will discuss the application of this method to two medical problems – (1) the extraction of a fetal ECG signal from a single lead maternal abdominal ECG signal; (2) the simultaneous extraction of the instantaneous heart rate and instantaneous respiratory rate from a PPG signal during exercise. If time permits, another application to the single channel atrial fibrillation analysis will be discussed.

For further information and inquiries about building access for persons with disabilities, please contact Courtney Tillman at 773.702.8333 or send her an email at cmtillman@galton.uchicago.edu. If you wish to subscribe to our email list, please visit the following website:
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