PROBABILITY SEMINAR
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Change-Point Analysis of Processes Based on Weak Invariance Principles

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We consider the problem of detecting changes in the drift or the scaling structure of a stochastic process $\{Z_T(t) : 0 \leq t \leq T\}$, that can be observed over a long time interval $[0, T]$. It is assumed that the process has the form,

$$Z_T(t) = \begin{cases} a_T t + b_T Y_T(t) & : \quad 0 \leq t \leq T^* \ , \\ Z_T(T^*) + a_T^*(t - T^*) + b_T^* Y_T^*(t - T^*) & : \quad T^* < t \leq T \ , \end{cases} ,$$

with unknown *model parameters* $a_T, b_T, a_T^*, b_T^*, T^*$, and cumulative error processes $\{Y_T(t) : 0 \leq t \leq T^*\}$ and $\{Y_T^*(t) : 0 \leq t \leq T - T^*\}$ that satisfy certain weak invariance principles (with rates). Examples included are partial sums of independent (or dependent) observations, renewal counting processes, or linear processes in time-series analysis.

We will review some recent results concerning the asymptotic change-point analysis of $\{Z_T(t) : 0 \leq t \leq T\}$ based on statistics that take into account the increments of the process. In particular, we discuss:

- Weighted embeddings of generalized CUSUM statistics.
- A-posteriori tests for (fixed or gradual) changes.
- Truncated sequential change-point procedures.
- Estimation of the change-point T^* and of other model parameters.

Distributional asymptotics under the null hypothesis of no change as well as under certain alternatives will be presented.

Wednesday September 11; 4:05 p.m.–5:00 p.m.; JWB 208