

Statistics Seminar
Department of Mathematical Sciences

DATE:	Thursday, December 10, 2015
TIME:	1:15pm to 2:15pm
LOCATION:	WH 100E
SPEAKER:	Aleksey Polunchenko, Binghamton University
TITLE:	Exact distribution of the Generalized Shiryayev-Roberts Stopping Time under the Minimax Brownian Motion Setup

Abstract

We consider the quickest change-point detection problem where the aim is to detect the onset of a given drift in “live”-monitored standard Brownian motion; the change-point is assumed unknown (nonrandom). The object of interest is the distribution of the stopping time associated with the Generalized Shryayev–Roberts (GSR) detection procedure set up to “sense” the presence of the drift. Specifically, we seek the GSR stopping time's survival function, i.e., the tail probability that no alarm is triggered by the GSR procedure prior to a given point in time, and distinguish two scenarios: (a) when the drift is never in effect and (b) when the drift is in effect ab initio. Under each of the two scenarios we obtain a closed-form formula for the survival function, with the GSR statistic's (deterministic) nonnegative headstart assumed arbitrarily given. The two formulae are found analytically, through direct solution of the respective Kolmogorov forward equation via the Fourier spectral method to achieve separation of the spacial and temporal variables. We then exploit the obtained formulae numerically and offer a brief study to characterize the pre- and post-drift distributions of the GSR stopping time depending on three factors: (1) drift magnitude, (2) time, and (3) the GSR statistic's headstart.

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Last update: **2015/11/23 01:31**

