Statistics Seminar

Department of Mathematical Sciences

DATE:	Thursday, October 9, 2014
TIME:	1:15pm to 2:15pm
PLACE:	OW 100E
SPEAKER:	Grigory Sokolov (Binghamton University)
TITLE:	On the Pre-Change Transition Probability Density of the Generalized Shiryaev–Roberts Change-Point Detection Procedure's Statistic in the Minimax Brownian Motion Setup

Abstract

We consider the problem of quickest change-point detection in continuous time where the observed is a standard Brownian motion that may, at an unknown moment in time, gain a persistent drift of a specified magnitude, and the objective is to as quickly and as reliably as possible detect the onset of the drift. Within this context, the specific focus is on the emerging Generalized Shiryaev-Roberts (GSR) detection procedure. We derive a closed-form formula for the pre-change transition probability density of the diffusion process associated with the GSR decision statistic; the transition probability density formula is found through direct solution of the respective Kolmogorov forward equation (otherwise also known as the Fokker–Planck equation, and closely connected to the Smoluchowski equation and the Schrödinger equation from physics) via the Fourier spectral method. To conclude, we exploit the obtained formulae numerically and offer a brief study of the GSR statistic's behavior in the pre-change regime.

This work (and in particular the methodology employed in it) may help gain greater insight into the characteristics of the GSR procedure in continuous time and thus foster and facilitate further research on both theoretical and applied change-point detection.

This is joint work with Aleksey Polunchenko (SUNY Binghamton).