भारतीय प्रबंध संस्थान बेंगलूर
INDIAN INSTITUTE OF MANAGEMENT BANGALORE

The Decision Sciences Area at IIM Bangalore welcomes you to a webinar, titled:

Existence in the inverse Shiryaev problem

By
Dr Yoann Potiron

Date: September 17, 2021
Time: 3:00 p.m. - 4:00 p.m.

Abstract:

In this paper, we consider the inverse first-passage Shiryaev problem, i.e. for $(W_t)_{t\geq 0}$ a standard Brownian motion and any upper boundary continuous function $g: R^+ \to R$ satisfying $g(0) \geq 0$, we define

$$\mathrm{T}_g^W := inf\,\{t \in R^+ : W_t \geq g(t)\},$$

and $f_g^W(t)$ its related density. For any target density function of the form $f: R^+ \to R^+$ satisfying some smooth assumptions and any arbitrarily big horizon time $T > 0$, we show the existence of a related boundary $g_{f,T} : R^+ \to [0, T]$, with $g_{f,T}(0) \geq 0$, which satisfies

$$f_{g_{f,T}}^W(t) = f(t) \text{ for } 0 \leq t \leq T.$$

As an example, the exponential distribution $f(t) = \lambda e^{-\lambda t}$ for $\lambda > 0$ satisfies the assumptions of this paper. As $g_{f,T}$ is exhibited as a limit boundary of a subsequence of a piecewise linear boundary, we do not obtain any explicit formula for $g_{f,T}$ as a function of f, nor the unicity of the solution. The results are also proved in the symmetrical two-dimensional boundary case.