Approximation Laws for Optimal Stopping Under Generalized-Gamma Uncertainty

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Abstract

This work develops finite approximation laws for a class of optimal-stopping problems under generalized-gamma uncertainty. A finite sequence of candidates is observed sequentially, with each candidate associated with a random performance variable governed by a generalized-gamma distribution. The objective is to determine an optimal stopping rule for accepting a candidate while controlling observation costs and terminal failure risk. By exploiting the flexibility of the generalized-gamma model, we derive tractable expressions for the stopping probability, failure probability, expected stopping time, and expected observation cost. The resulting formulas provide a compact analytical description of the tradeoff between distributional shape, decision quality, and sampling effort. Numerical illustrations validate the proposed approximation laws and show how the generalized-gamma parameters affect stopping behavior.

Keywords: Stochastic optimization, optimal stopping, generalized-gamma distribution, uncertainty modeling, reliability analysis, approximation laws.

Acknowledgement: This publication is based upon work from COST Action Randomised Optimisation Algorithms Research Network (ROAR-NET), CA22137, supported by COST (European Cooperation in Science and Technology).

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