Brute-forcing Monte Carlo Simulation

Radu Briciu

BSc Finance (Hons)
University of Westminster

City, University of London
Faculty of Finance
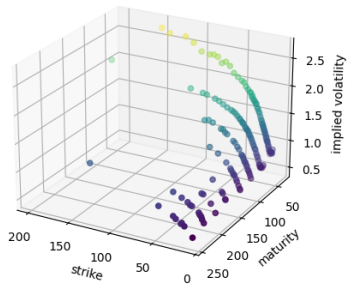
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Overview

In this session we explore a proposed method for estimating nonlinear stochastic functions in the context of path dependent financial derivatives

1. Some a priori content

Financial Derivatives

What are financial derivatives?

The Heston Model

$$dS_t = \left(r - \frac{v_t}{2}\right) dt + \sqrt{v_t}\left(\rho dW_t + \sqrt{1-\rho^2} dB_t\right) \tag{1}$$

$$dv_t = \kappa(\theta - v_t)dt + \eta\sqrt{v_t}dW_t \tag{2}$$

Asian Options

$$C_t^{\text{Arithmetic}} = e^{-r(T-t)} \times \frac{1}{m} \sum_{i=1}^{m} (S_T^{\text{Arithmetic}} - K)^+ \tag{3}$$

$$C_t^{\text{Geometric}} = e^{-r(T-t)} \times \frac{1}{m} \sum_{i=1}^{m} (S_T^{\text{Geometric}} - K)^+ \tag{4}$$

References

[1]   Radu Briciu. "Estimating non-linear stochastic functions from generated structured data using multi-layer perceptron models with applications to pricing path-dependent financial derivatives". In: (Jan. 2025). DOI: 10.2139/ssrn.5104328. URL: https://papers.ssrn.com/abstract=5104328 (visited on 01/21/2025).

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