LAB for AI-POWERED FINTECH

香港城市大學 City University of Hong Kong

COLUMBIA UNIVERSITY IN THE CITY OF NEW YORK

Joint Seminar by AIFT and Columbia University

Policy Gradient is Essentially Policy Evaluation

by Prof. Xunyu ZHOU

Liu Family Professor of Financial Engineering
Director of Nie Center for
Intelligent Asset Management
Columbia University

Abstract

We study policy gradient (PG) for reinforcement learning (RL) in continuous time and space under the regularized exploratory formulation developed by Wang et al. (JMLR 2020). We represent the gradient of the value function with respect to a given parameterized stochastic policy as the expected integration of an auxiliary running reward function that can be evaluated using samples and the current value function. This effectively turns PG into a policy evaluation (PE) problem, enabling us to apply the martingale approach recently developed by Jia and Zhou (JMLR 2022) for PE to solve our PG problem. Based on this analysis, we propose two types of the actor-critic algorithms for RL, where we learn and update value functions and policies simultaneously and alternatingly. Joint work with Yanwei Jia.

Biography

Prof. Xunyu Zhou is the Liu Family Professor of Financial Engineering and the Director of the Nie Center for Intelligent Asset Management at Columbia University. He was the Nomura Professor of Mathematical Finance at University of Oxford before joining Columbia in 2016. His research covers stochastic control, dynamic portfolio selection, asset pricing, behavioral finance, and time inconsistency. Currently his research focuses on continuous-time reinforcement learning and applications to optimization broadly and to wealth management specifically. He is a recipient of the Wolfson Research Award from The Royal Society, the Outstanding Paper Prize from SIAM, the Alexander von Humboldt Research Fellowship, and the Croucher Senior Research Fellowship. He was an invited speaker at the 2010 International Congress of Mathematicians, a Humboldt Distinguished Lecturer at Humboldt University and an Archimedes Lecturer at Columbia. He is both an IEEE Fellow and a SIAM Fellow.
Prof. Xunyu Zhou received his PhD in Operations Research and Control Theory from Fudan University in 1989.

Date and Time

Jun 23, 2022 (Thu) at 9-10pm (US Eastern Time)

Option Pricing by Neural Stochastic Differential Equations: A Simulation Optimization Approach

by Prof. L. Jeff HONG

Fudan Distinguished Professor
Chair of Department of Management Science
School of Management
Fudan University

Abstract

The classical option pricing models rely on prior assumptions on the dynamics of the underlying assets. Though empirical evidence shows that these models may partially explain the option prices, their performance may be poor when the actual situations deviate from the assumptions. Neural network models are capable of learning the underlying relationship through the data. However, they require massive amount of data to avoid over-fitting, which is typically not available for option pricing problems. Thus, we propose a new model by integrating neural networks to a classical stochastic differential equation pricing model to balance the model flexibility and the data requirement. Besides, some more specific models are also constructed by using neural network as a model calibration method of the classical models. Furthermore, we show that the training of the model can be formulated into a simulation optimization problem and can be solved in a way that is compatible to the training of neural networks as well. Preliminary numerical results show that our approach appears to work better compared with some existing models. This is a joint work with Shoudao Wang and Nifei Lin.

Biography

Prof. Jeff Hong received his bachelor's and doctoral degrees from Tsinghua University and Northwestern University, respectively. He is currently with School of Management and School of Data Science at Fudan University in Shanghai, China, holding the positions of Fudan Distinguished Professor, Hongyi Chair Professor, Chair of Department of Management Science in School of Management, and Associate Dean of School of Data Science. He was Chair Professor of Management Sciences at City University of Hong Kong, and Professor of Industrial Engineering and Logistics Management at the Hong Kong University of Science and Technology. Prof. Hong's research interests include stochastic simulation, stochastic optimization, financial risk management and supply chain management. He is currently the Associate Editor-in-Chief of *Journal of Operations Research Society of China*, *the Simulation Area Editor of Operations Research*, an Associate Editor of *Management Science and ACM Transactions of Modeling and Computer Simulation*, and the President of INFORMS Simulation Society.

Date and Time

Jun 24, 2022 (Fri) at 9-10am (Hong Kong Time)

Venue: AIFT Meeting Room
Units 1101-1102 & 1121-1123
19W, Hong Kong Science Park
URL: https://cityu.zoom.us/j/3560816699
Meeting ID: 356 081 6699
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