



Neural Network Based Approximation Algorithm for Nonlinear PDEs with Application to Pricing in Finance

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Abstract

In this talk, we first introduce the mathematical concept of neural networks and its universal approximation property. Then we show how one can combine neural networks together with tools from Stochastic Calculus, particularly the Feynman-Kac representation, to build a neural network based algorithm that can approximately solve high-dimensional nonlinear PDEs in up to 10'000 dimensions with short run times. We apply this algorithm to price high-dimensional financial derivatives under default risk.

Biography

Ariel Neufeld is a tenure-track Nanyang Assistant Professor at the Division of Mathematical Sciences at the School of Physical and Mathematical Sciences, Nanyang Technological University, Singapore. He did his Bachelor and Master in mathematics at ETH Zurich where he obtained the Willi Studer Award for the best ETH Zurich master in mathematics. Then he did his PhD at ETH Zurich and Columbia University in mathematics with emphasize on model uncertainty in financial markets under the supervision of Prof. Martin Schweizer (ETH Zurich) and Prof. Marcel Nutz (Columbia University) where he graduated from ETH Zurich in 2015. Then he continued as a PostDoc at ETH Zurich in the Department of Mathematics and at the RiskLab in the groups of Prof. Halil Mete Soner, Prof. Patrick Cheridito, and Prof. Arnulf Jentzen.

For his research, he obtained the Young Researcher Prize of the Financial Mathematics Program at Bar-Ilan University for Outstanding Papers in Financial Mathematics and Risk Management as well as the first prize for the contribution at the 10th Conference in Actuarial Science and Finance in Samos, organized by the University of Aegean, Katholieke Universiteit Leuven, University of Copenhagen, and New York University. Recently, he was awarded with the NAP Grant, which he gratefully acknowledges.

His research focuses on Machine Learning Algorithms in Finance and Insurance, Model Uncertainty in Financial Markets, Annuity Contract Theory, Financial and Insurance Mathematics and Stochastic Analysis and Stochastic Optimal Control.

Stay in touch!  

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