THE UNIVERSITY  OF HONG KONG

Institute of Mathematical Research
Department of Mathematics

Numerical Analysis Seminar

Convergence of the Backward Deep BSDE Method with Applications to Optimal Stopping Problems

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Abstract

The optimal stopping problem is one of the core problems in financial markets, with broad applications such as pricing American and Bermudan options. The deep BSDE method [Han, Jentzen and E, PNAS, 115(34):8505-8510, 2018] has shown great power in solving high-dimensional forward-backward stochastic differential equations (FBSDEs), and inspired many applications. However, the method solves backward stochastic differential equations (BSDEs) in a forward manner, which cannot be used for optimal stopping problems that in general require running BSDE backwardly. To overcome this difficulty, a recent paper [Wang, Chen, Sudjianto, Liu and Shen, arXiv:1807.06622, 2018] proposed the backward deep BSDE method to solve the optimal stopping problem. In this paper, we provide the rigorous theory for the backward deep BSDE method. Specifically, 1. We derive the *a posteriori* error estimation, i.e., the error of the numerical solution can be bounded by the training loss function; and; 2. We give an upper bound of the loss function, which can be sufficiently small subject to universal approximations. We give two numerical examples, which present consistent performance with the proved theory. This is a joint work with C.Gao, S.Gao and R.Hu.

Date:	October 30, 2024 (Wednesday)
Time:	3:00 – 4:00pm
Venue:	Room 309, Run Run Shaw Building.

All are welcome