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Delta-Gamma like Hedging with transaction cost under reinforcement learning technique

Option hedging is critical in financial risk management. The traditional methods to determine the hedging position require assumptions of a frictionless market and continuous hedging. In this paper, we remove these two assumptions and propose a hedging strategy based on the reinforcement learning technique. Our new strategy maximizes the present value of accounting and realized profits of hedging portfolio, and simultaneously minimizes the sensitivity of hedging position to the changes of the underlying asset. Finally, we test the performance of our method on option trading data of S&P 500, S&P 100, and DIJA from 2004 to 2020.