

Hidden Markov Model for Financial Limit Order Book and Its Application to Algorithmic Trading Strategy

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Abstract : This study models the intraday asset prices as driven by Markov process. This work identifies the latent states of the Hidden Markov model, using limit order book data (trades and quotes) to continuously estimate the states throughout the day. This work builds a trading strategy using estimated states to generate signals. The strategy utilizes current state to recalibrate buy/ sell levels and the transition between states to trigger stop-loss when adverse price movements occur. The proposed trading strategy is tested on the Stevens High Frequency Trading (SHIFT) platform. SHIFT is a highly realistic market simulator with functionalities for creating an artificial market simulation by deploying agents, trading strategies, distributing initial wealth, etc. In the implementation several assets on the NASDAQ exchange are used for testing. In comparison to a strategy with static buy/ sell levels, this study shows that the number of limit orders that get matched and executed can be increased. Executing limit orders earns rebates on NASDAQ. The system can capture jumps in the limit order book prices, provide dynamic buy/sell levels and trigger stop loss signals to improve the PnL (Profit and Loss) performance of the strategy.

Keywords : algorithmic trading, Hidden Markov model, high frequency trading, limit order book learning

Conference Title : ICCFHFT 2021 : International Conference on Computational Finance and High-Frequency Trading

Conference Location : Lisbon, Portugal

Conference Dates : September 20-21, 2021