



The Hong Kong University of Science and Technology

Department of Mathematics

PhD THESIS EXAMINATION

Deep Learning for Financial Market Simulation

By

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ABSTRACT

In this thesis, our target is to build a model which can simulate intra-day financial market movement by generating tick-level high frequent data based on historical information (either real or simulated). Such a model can be very useful in the research of market dynamics and practical areas such as risk management and trading strategy generation. Previous studies of financial market simulation usually focus on the settings of hypothesis on micro market dynamics. Instead, we apply deep learning techniques to build a totally data-driven market simulation model which is made up by two sub-models. The first one is a summarization-prediction model, which can predict multi-time-scope future stock price movement based on historical transaction information with arbitrary length of period. We also consider the connection between different stocks within the same market. The second one is the core part of this thesis. It uses outputs from the summarization-prediction model to generate order data thus simulate future transaction movement and order book. Our designed model can make generated orders not only reflect micro market dynamics, but also contain some sights about longer-term market movement information. Besides, the generation process is variational, which means even given identical historical data, the simulated future market movement can be quite diverse.

Date: 01 Aug 2019, Thursday

Time: 2:00 p.m.

Venue: Room 3494 (near lifts 25-26)

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(Open to all faculty and students)

The student's thesis is now being displayed on the reception counter in the General Administration Office (Room 3461).