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## **Two-day Workshop: Artificial Intelligence in Algorithmic Trading**

**Organized by: Centre for Artificial Intelligence, Institute of Collaborative Innovation**

### **Instructors/Speakers:**

Prof. Chengzhong Xu, Chair Professor and Dean of FST, Interim Director of ICI

Prof. Simon Lin, Director of Algo Trading Lab, Tsinghua University, Shenzhen (former head of quant trading, Goldman Sachs)

Prof. Jerome Yen, Head of Centre for Innovation and Entrepreneurship, ICI and Distinguished Professor, FBA

Prof. Deng Ding, Associate Professor and Head of Department of Mathematics, FST

Prof. Jiantao Zhou, Associate Professor of Department of Computer and Information Science, FST, and Interim Head of Centre for Artificial Intelligence, ICI

Prof. Zhi Liu, Associate Professor of Department of Mathematics, FST

Prof. Lawrence Si, Associate Professor of Department of Computer and Information Science, FST

Dr. Yi Long, CTO, DataGo (數行者)

### **Tentative Schedule**

2-3 September 2019

### **Workshop Description**

Program trading, which includes high frequency trading (HFT), has become important that it generated over sixty percent of trading volume at Nasdaq and NYSE as well as close to seventy percent at China A-share. Also, the technologies and models used in algo trading also experienced a huge change in the past five years that AI became the focus spot that several leading hedge funds and banks, such as, Renaissance Technologies, Two-Sigma, and Goldman Sachs, invested significantly on building such AI environment. Where AI technologies can be applied to support algo trading? There are wide range of issues that AI, especially the machine learning, deep learning, or even more specific models like transfer learning, can assist in building solutions, for example, market analysis, market sentiment analysis, trading opportunities identification, market impact and trading cost estimation/optimization, trading strategies selection, order slicing and trade scheduling, capital and exit management, as well as risk management. As a summary, we will discuss how traditional models and AI can be applied to support different stages of algo trading. We will also discuss how to form Algo Trading teams to participate in different competitions.

### **Learning Objectives**

After finishing the workshop, students will be able to

1. Understand the process or operation of algo trading.



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2. Understand the cost structure of algo trading and how they affect the performance of trading.
3. Understand the major traditional and AI technologies in supporting algo trading.
4. Understand how to build a trading system with selected trading strategies.

In summary, after taking this workshop, students not only understand the theories from the textbooks, but also have practical and hand-on experience to develop AI-based trading system.

**Class Size**

Limit to 40

**Target Students**

UM Students with priority to postgraduate students. Other related and interested parties such as market practitioners are welcome to register, subject to university confirmation

**Venue:** N1-1004, UM Guest House N1

**Registration**

**Deadline:** 28 August 2019

**Link:** <https://forms.gle/ym2mFk3v5T8Xcz7G8>

**Announcement:** 30 August 2019

**Certificate:** Participants with attendance reaching 75% and completing the class requirements (including but not limited to forming a team to participate in related Algo Trading Competition) will be awarded a certificate issued by the Institute of Collaborative Innovation

**Tentative Schedule with Content (75 minutes for each session)**

Day 1 - 2 September		
Time	Session	Instructor
9:30	Opening Remark – Impacts of AI on Financial Industry	Prof. Cheng-Zhong Xu
9:45	Session 1 – Application of AI in Algo Trading	Prof. Simon Lin
11:00	Break	
11:15	Session 2 – Process and Frameworks in Algo Trading	Prof. Jerome Yen



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	Case Study: the SPEER System (A stock selection and portfolio management system) and Vol-term Structure based Volatility Trading	
12:30	Light lunch with market practitioners and group discussion	
14:15	Session 3 – AI and Machine Learning in Algo Trading	Prof. Jiantao Zhou
15:30	Break	
15:45	Session 4 – Case Study: Ellman Neural Network and GA as well as Wavelet Neural Network and Particle Swarm Optimization in HSI open price prediction	Prof. Jerome Yen
Day 2 – 3 September		
9:30	Session 5 – Numerical Methods in Option Pricing	Prof. Deng Ding
10:45	Break	
11:00	Session 6 – Volatility Estimation: High Frequency and Market Microstructure	Prof. Zhi Liu
12:15	Light lunch and group discussion (formation of trading team)	
14:00	Session 7 – AI in Market Sentiment Analysis – NLP and Textual Mining	Dr. Yi Long
15:15	Break	
15:30	Session 8 – Key Trading Strategies in Trend, Mean Reversion, and Oscillation Market  Case Study: Chart pattern classification, Trend Following, and transfer learning for time series forecasting	Prof. Lawrence Si
16:45	Closing Remark	Prof. Jiantao Zhou