Exploration of Quant Trading Talents’ Training Mode of University Education Based on Artificial Intelligence

Jiaxuan Chen*
Fuzhou University of International Studies and Trade, Fuzhou 350202, Fujian, China
*Corresponding author e-mail: chenjiaxuan@fzu.edu.cn

Abstract. In recent years, the topic of artificial intelligence has become more and more popular, especially machine learning has become a hot issue in academia. Quant trading ability has been an important quality of financial market in recent years, but quant trading talents training mode is still facing some practical problem. It is of great significance to set up quant trading simulation experiment to cultivating financial talents. In view of it, this paper discusses the specific content of quant trading simulation experiment, analyzes the necessity to cultivate quant trading courses and professional teachers.

Keywords: Quant Trading, University Education, Artificial Intelligence

1. Introduction
In recent years, artificial intelligence has been a hot topic. In the past five years, the number of research articles on "artificial intelligence" and "machine learning" related published papers have been increasing. (Figure 1) Artificial intelligence refers to the universal use of computers imitating human cognition. The scope of machine learning is smaller than the scope of artificial intelligence. Machine learning means that the action can be determined based on historical experience data. Therefore, the current use of artificial intelligence is more common, the scope of application is wider than machine learning. It was truly a significant conversation recently. Artificial intelligence in the financial field has been existed for a long time. Western countries have been widely used for several years. They build models through econometric then execute transaction orders according to the models [1].
2. Status of Quant Trading in Finance

Quant trading plays an important role in the entire financial transaction process. During the 2020 epidemic, the real reason for the four trading curb in American financial history was that the United States used artificial intelligence for quantitative transactions. The financial transaction process is roughly divided into three stages: pre-trade, execution and post-trade (Figure 2). In first stage, pre-trade, before trading, a large amount of historical data needs to be used to predict performance and expected returns, while the costs and risks of the transaction must be considered. After the analysis, the code is written and executed according to the trading program. In the financial market, pre-trade analysis can be artificial intelligence or manual. Because investment managers must fully consider the client's risk appetite when conducting risk assessments during investment. The execution process of the trading program is an artificial intelligence stage to ensure low cost and low risk. The last stage is the post-trade re-analysis, through the performance to adjust the transaction into the code, at this stage will also involve manual. In the three stages, the pre-trade analysis and the execution of the transaction based on the transaction procedure all involve algorithmic trading, which requires more complex analysis and calculations [2].

![Figure 1. Number of Published Papers about AI&ML, 1996-2018](image)

![Pre-trade](image)

Pre-trade
AI uses data to generate a provisional trading list
Risks and costs involved in trading are estimated to select feasible trades.

![Post-trade](image)

Post-trade
Realized trade and market outcome data are analyzed
Risk in trading positions is monitored continuously.

![Execution](image)

Execution
Strategies generated in the previous stage are executed
AI uses data to determine optimal execution strategies, minimizing transaction costs.

![Figure 2. Quant Trading with AI](image)
3. The Current Situation in Quant Trading Talents Training

3.1. Artificial Intelligence Replace Labor
A new round of scientific and technological revolution and industrial transformation are ready to take place. Modern technologies such as artificial intelligence, cloud computing, big data, and so on have profoundly changed human thinking, production and lifestyle. Financial technology, blockchain technology, Internet finance, intelligent wealth management, and other related financial technology changes include a brand-new thinking and mode of providing financial supply-side services and financial intermediaries. The use of machines to gradually realize the tasks currently completed by human intelligence is the mid-to-long-term trend of technological development. Compared with artificial investment, artificial intelligence almost completely avoids the influence of personal emotions, executes accurately and strictly, and can fully and timely discover the massive information disclosed by the market. In the future, new finance will be deeply integrated with technology and become an ecosystem of each other. How to use technological capabilities to facilitate the innovation of financial products, the improvement of risk control capabilities, and the improvement of consumer services and rights protection is a huge opportunity for the development of new finance.

3.2. Cultivate Localized Financial Technology Talents
The rapid development of financial industry makes professional construction and development more difficult. In financial industry, most enterprises need the talents not only obtaining financial knowledge but also obtaining computer technology skills. Cultivate localized financial technology talents has been an important issues.

Active optimize the school-enterprise cooperation platform, promote the integration of industry and education, and explore a financial technology quantitative investment talent training model that meets the needs of the times. It is of great significance to cultivate localized financial technology talents under the background of artificial intelligence.

4. Design Quant Trading Investment Simulation Experiment

4.1. Quantitative Stock Selection Experiment
Quantitative stock selection is to select suitable stocks for investment through quantitative analysis. There are many specific strategies for quantitative stock selection, including models such as multi-factor, style rotation, industry rotation, capital flow, momentum reversal, consensus expectation, trend tracking, and chip stock selection [3].

Quantitative stock selection refers to the process of using computer technology and adopting certain mathematical models to implement investment concepts and implement investment strategies. Therefore, quantitative investment naturally has a scientific and technological basis.
Quantitative stock selection experiment usually includes 5 stages (figure 3): (1) Obtain a large amount of data; (2) Use machine learning to clean and process data; (3) Build a rich and intelligent factor database; (4) Quantitative stock selection; (5) Automated transaction execution [4].

Figure 3. Quantitative stock selection experiment includes 5 stages

4.2. Quantitative Timing Experiment
Quantitative timing is to judge the market trend through quantitative analysis and further point out the buying and selling points. The methods to quantify timing include trend tracking timing, market sentiment timing, effective capital model, bull and bear line, Hurst index, SVM classification, SWARCH model and abnormal index model, etc. In experimental teaching, you can focus on the timing of trend tracking. The idea of trend tracking and timing is derived from technical analysis. Using these indicators, you can find the direction of the trend, and then follow the trend. Common technical indicators for trend tracking include MA, MACD, DMA, etc. The trend tracking timing experiment can use the above-mentioned traditional technical indicators to conduct empirical research, or it can first conduct new technical indicator design and empirical testing, and innovate trend tracking timing methods. The latter is discussed in detail. Quantitative timing experiments should focus on the innovation design of new technical indicators. Before the launch of margin trading and securities lending, the basic data of my country’s securities market transactions included opening price, closing price, highest price, lowest price, trading volume, trading value, etc. With the development of margin trading and securities lending in my country's securities market, a large amount of basic data on margin trading and securities lending has been accumulated. The basic data of financing transactions include the current day’s financing balance, the current day’s financing purchase amount, and the current day’s financing repayment amount. The basic data of securities lending transactions include the current day’s securities lending balance, the current day’s securities selling amount, and the same day’s securities lending repayment. Transaction amount, etc. These basic data on margin trading and securities lending can be further processed into new technical indicators, and trend tracking and timing method innovation can be carried out based on the new technical indicators [5].

4.3. Statistical Arbitrage Experiment
According to Morgan Stanley’s definition, statistical arbitrage is based on a investment model Without relying on economic implications, quantitative means are used to construct a portfolio of assets, and a securities investment portfolio is constructed based on the comparison of securities prices [6]. In order
to avoid market risks, obtain a stable α (excess rate of return). Pair trading is the most important strategy for statistical arbitrage. The specific implementation of the matching trading strategy includes the distance trading method and the cooperative whole set of profit method. Based on the distance trading method, paired trading find stocks with several similar historical stock price trends from the market. When the stock price difference deviates from the historical average of the price difference, the stock with the higher stock price is sold and bought at the same time. Buy stocks with lower stock prices, and when the price difference between the two stocks returns to the historical average level, close the positions of the two stocks respectively to complete the transaction, thereby earning the return of the convergence of the two stock prices [7].

4.4. Algorithmic Trading Experiment
Designed experimental program trading, also called algorithmic trading. It means completing combined trading instructions through pre-programmed trading program codes under the support of computer and network technology [8]. The basic principle is from simple to complex. First to learn the design, implementation and testing of simple models of programmatic trading, and then complete the design, implementation and testing of more complex programmatic trading models. Finally, you can design multiple models to form a model portfolio.

4.5. Professional Courses Related To Quant Trading
Basic courses and professional courses related to quant trading [9]. For students in the direction of quantitative investment, they can build the general cognition of future financial market. There should be changed with the traditional courses of finance majors, such as principles of economics, finance, securities investment, corporate finance, in addition to compulsory course of the "statistics", "financial metrology", "applied mathematics", "python programming", "introduction to machine learning". Then the students firmly master the theoretical knowledge and necessary realization skills of quant trading investment. Professional courses for chemical investment require college professional teachers and industry majors. People co-wrote course materials and handouts, the content of which should include arbitrage strategy design, quantitative stock selection experiment, quantitative timing experiment, statistical arbitrage experiment, programmatic trading experiment and risk analysis [10].

4.6. The Provision of Professional Teachers
Professional teachers must master finance, mathematics, statistics, computer programming skills. The teachers can invite industry professionals to co-teach courses. The course include real trading and quantitative investment experience. The cooperation between teachers and industry financial institutions can help teachers gain practical experience. It is a good way to build a professional quant trading teacher team. At the beginning, in the early stage, we can rely on financial institutions to establish a quantitative trading teacher team, later it must establish own teacher team. It can be beneficial to the long-term development of professional construction.

5. Conclusion
In recent years, the topic of artificial intelligence has become more and more popular, especially machine learning has become a hot issue in academia. Quant trading ability has been an important quality of financial market in recent years, but quant trading talents training mode is still facing some practical problem. With the development of computer technology, quant trading investment has gradually become an important analysis method. There is a gap in nowadays application-oriented universities. Some universities cultivate the financial talent who only know traditional theories. It makes the training of financial professionals out of social needs. It is necessary to build quant trading investment courses for financial majors in universities. The courses should focuses on quantitative stock selection experiment, quantitative timing experiment, statistical arbitrage experiment, algorithmic trading experiment. The construction also should focus on teaching staff and courses. In the AI era, it is very important to train professionals with quant trading investment skills. It is of great
significance to set up quant trading simulation experiment to cultivating financial talents. Quant trading talents' training mode based on artificial intelligence plays an important role in university finance education.

References
[1] Bartram S M, Jürgen Branke, Motahari M. Artificial Intelligence in Asset Management. SSRN Electronic Journal, 2019.3-14.
[2] Nuti G, Mirghaemi M, Treleaven P, et al. Algorithmic Trading. Computer, 2011, 44(11):61-69.
[3] Corgnet B, Desantis M, Porter D. What Makes a Good Trader? On the Role of Quant Skills, Behavioral Biases and Intuition on Trader Performance. Working Papers, 2015.
[4] Yi Weidong, Zheng Jixiang, Zhao Doudou, Deng Wei,Qu Tao. Fintech empowers investment management-the financial technology practice of China Merchants Securities Investment Service System. China Securities Association. Innovation and Development: China Securities Industry Proceedings of 2019: Securities Industry Association of China, 2020: 9.
[5] Leshik. E.A, Cralle. J Introduction to Algorithmic Trading. 2012, 10.1002/9781119206033: i-viii.
[6] Mcgroarty F, Booth A, Gerding E, et al. High frequency trading strategies, market fragility and price spikes: an agent based model perspective. Annals of Operations Research, 2019, 282(1-2):217-244.
[7] Xu Ming. China's quantitative investment will show three major development trends. Securities Times, 2019-08-16 (A04).
[8] Gao Xiangbao. Exploration of Innovative Experimental Teaching of Quantitative Investment. Laboratory Research and Exploration, 2016(8):281-284.
[9] Yang Tingting, Xu Botong. Analysis of Quantitative Investment Talent Training Mode in Colleges and Universities. Financial Theory and Teaching, 2020(04): 111-112+115.
[10] Tao Shou qiang. Research on the application status and development prospects of quantitative investment. Fortune Life, 2019(20): 65-66.