

Transforming the Finance Industry in China with ChatGPT"

Ziyue Jiang

Beijing National Day School, Beijing, 100039, China

Abstract: This paper reviews how ChatGPT is transforming the finance industry in China. We discuss the fundamental principles of NLP and ChatGPT, and explain the comparative advantages of ChatGPT over traditional NLP models. The paper highlights the applications of ChatGPT in China's finance industry, such as the applications in customer service, financial forecast and analysis, financial risk management, and financial research. The paper also addresses the challenges and limitations associated with the application of ChatGPT, such as the issues related to real-time database update, fine tuning the model, data leakage and ethical problems. We propose a few potential solutions including establishing relevant laws and regulations, educating financial professionals, and exploring future applications. These recommendations are aimed at facilitating the responsible and efficient integration of ChatGPT within the Chinese finance sector.

Keywords: Natural Language Processing (NLP), ChatGPT, Transformer, Finance, China.

1. Introduction

Natural Language Processing (NLP) enables computers to perform natural language understanding and natural language generation. Chat GPT is the latest and most powerful large language model that has been revolutionizing various industries in China. It is a transformer-based NLP model, which is pre-trained on a massive amount of pre-processed data. This paper explores ChatGPT's applications in China's financial industry.

In section 2 and section 3, we discuss the fundamental principles of NLP and ChatGPT, and explain the comparative advantages of transformer model over traditional NLP models. The transformer model is highly parallelizable, can capture long-term dependencies in text, and is more flexible and scalable.

In section 4, we explore ChatGPT's application in China's financial industry. First, in customer service, ChatGPT represents a significant step from traditional chatbots. Second, in financial forecasting and analysis, ChatGPT's key strength is its ability to process and make sense of large amounts of information and provide insights and explanations in a clear and concise manner. Third, in financial risk management, ChatGPT can help discover risks and improve financial risk control process. Finally, in financial research, ChatGPT can be applied in a number of ways, including generation of simulations and scenarios for financial models, identification of trends and patterns, and perform of literature review.

In section 5, we address the challenges and limitations associated with ChatGPT's application in China's financial industry. First, ChatGPT cannot network in real time to update the database. Second, ChatGPT needs to be fine-tuned before it can be fully used in the finance industry and the data needed is hard to access. Third, data leakage and ethics issues are also important concerns when ChatGPT is applied in financial sector.

In section 6, we provide a few potential solutions and advices. The regulators need to establish and improve the laws and regulations related to ChatGPT. The financial institutions and individual financial professionals both need to strengthen the education of ChatGPT. In addition, the

whole industry need to further explore future applications of ChatGPT.

2. NLP

Natural Language Processing (NLP) represents a branch of artificial intelligence that enables computers to read, understand, interpret, and generate human language.

By applying various techniques from fields of linguistics, computer science, and statistics, NLP can process, analyze, and understand vast amounts of unstructured text data, and perform various language-related tasks. The two core tasks of NLP are natural language understanding and natural language generation. The understanding of natural language is the hope that machines can understand human languages in its natural form. The generation of natural language is to convert non-linguistic data into human language format to achieve the purpose of human-computer communication.

One important step in NLP is to preprocess and clean text data for further training. It generally includes the followings: segmentation, remove stop words, stemming, lemmatization, tokenizing, embedding, part of speech tagging, named entity tagging. After performing the above preprocessing steps, the resultant data then can be given to a machine learning algorithm such as neural network, to create the NLP applications.

The core of natural language processing is human-machine language interaction, which reflects human language with language models generated by algorithms based on statistics. A language model is a probability distribution of a sequence of words. Through language models, the probability of the existence of a string of words can be evaluated quantitatively. During the process of text generation, the probability of each word needs to be generated individually, and the product of the probabilities of all words can be used to evaluate the probability of the text's appearance.

From the early traditional machine learning methods to the current mainstream deep learning methods, the language models have been updated from basic models such as NNLM, to CNN-based model, RNN-based model, attention-based model, and transformer-based model. Different models can be applied in different scenarios such as information extraction,

text generation, knowledge graph, sentiment analysis, etc.

3. Chat GPT

On November 30, 2022, OpenAI released a large language model called Chat GPT. Within five days of its release, the number of users exceeded 1 million, and within two months the number of active users exceeded 100 million, making it the fastest growing app to date.

GPT, short for Generative Pre-training Transformer, is a transformer-based model, pre-trained on a massive amount of pre-processed data, including a broad range of texts, such as publications and websites. To prevent bias, duplicate and low quality data was excluded from the training dataset, which enables Chat GPT to learn from a wide and diverse set of contents.

One notable advancement of Chat GPT is that it is based on the transformer model, WHICH represents a novel architecture that surpasses traditional NLP models in several aspects. Unlike its predecessors, which rely on recurrent neural networks (RNNs) for sequential processing, the transformer model employs a self-attention mechanism. This mechanism allows the model to capture contextual relationships between words more effectively, resulting in improved understanding and generation of human-like responses.

The transformer model brings several key advantages over traditional NLP models. Firstly, the transformer model is highly parallelizable, meaning that it can process multiple parts of a sequence at the same time, which significantly speeds up training and inference. Secondly, the transformer model is able to capture long-term dependencies in text, which allows it to better understand the overall context and generate more coherent text. Furthermore, the transformer model is also more flexible and scalable, making it easier to adapt it to different domains and tasks.

4. Application of Chat GPT in China's Financial Industry

Chat GPT is the latest and most powerful large language model that has been revolutionizing various industries in China. Notably, it has also emerged in the past year in the financial sector, such as insurance, banking, cooperate finance, investment and so on.

4.1. Application in customer service

Intelligent customer service is a set of industry-oriented applications which can provide professional services by performing large-scale knowledge processing, natural language understanding, knowledge management, automatic question answering and reasoning, etc. It not only establishes a quick and effective channel for companies to communicate with massive customers and users based on natural language, but also provides companies with professional knowledge management and statistical analysis information.

Currently, China's five state-owned banks and 12 national joint-stock commercial banks all have intelligent customer service system layout on the online channels. Those intelligent customer service can provide general information and solve some simple and straightforward problems for the customers. But in terms of complexity, such as contextual connections, there still is a lot of room for improvement. With the rapid growth of ChatGPT, many financial institutions in China are exploring its chatbot application in customer

service. ChatGPT represents a significant step from the traditional Chatbot technology, due to the following reasons.

First, ChatGPT is able to handle complex financial queries and provide personalized advice based on a customer's unique needs and circumstances. On one hand, ChatGPT is trained on a large corpus, which provides it with solid knowledge base. In addition, it is also capable of continuously learning from new data, and can be fine-tuned to specific finance domains. There are many technical terms and complicated processes in financial sectors, which makes it difficult for customers to understand and use financial products. With the help of ChatGPT generated chatbots, customers can gain easier access to the understanding and usage of financial products. On the other hand, ChatGPT can analyze individual customer data to provide customized recommendations, based on historical transactions and conversations. For example, if a client inquires about investment options, ChatGPT can analyze their financial history and risk tolerance and provide personalized recommendations and advice. This level of customization sets ChatGPT apart from traditional chatbots, which may only provide generic responses or fail to understand the nuances of a customer's financial situation fully.

Second, in terms of building knowledge base, ChatGPT has advantages in knowledge initialization and management. For current chatbot knowledge base, it generally requires manual annotation, classification and maintenance, which is repetitive and inefficient. ChatGPT, by contrast, allows operators to directly generate knowledge through existing resources, and shifts operators from writing questions and answers to reviewing and tuning models. In addition, in terms of frequently asked questions, ChatGPT can put together a database within a short amount of time and update it in a timely manner, helping customers better solve problems by themselves.

Third, ChatGPT can provide better customer experience in multiple rounds of conversation which requires some level of reasoning to understand users' intent and answer questions. Current chatbots are not good at natural language reasoning. As the conversation progresses, the system may encounter difficulties in maintaining coherence and consistency, and generate answers that jump, repeat, or digress. As a result, customers may request service from customer representative more frequently. In contrast, ChatGPT is based on the transformer architecture, which uses a self-attention mechanism that allows the model to capture long distance dependencies in the input sequence, which helps to better understand the interconnections between complex sentences and user needs. These characteristics allow ChatGPT to capture a certain span of context information, to understand a certain degree of complex dialogue structure, and to handle multiple rounds of conversation. In addition, in terms of recognizing customers' sentiments, current chatbots still have much room for improvement. For example, when a customer shows emotions such as anger, disappointment, or sarcasm, the system may not be able to understand and respond accordingly. In contrast, ChatGPT can recognize and analyze sentiment, capture the emotional risks in time, give early warning, and set reception priority or direct to more experienced service personnel.

Finally, using ChatGPT can help financial institutions reduce costs associated with customer service while providing 24/7 service to customers with a minimum wait time. By automating customer support with ChatGPT,

financial institutions can reduce the need for human customer service, resulting in significant cost savings.

4.2. Application in financial forecast and analysis

For financial analysis, professionals generally collect and analyze data from a variety of sources, such as financial reports, market data, and news articles. This information can then be used to create financial models to predict future performance.

ChatGPT is trained in a wide range of texts from a variety of sources, which means it has a broad understanding of financial concepts, techniques and market data. This enables it to assist in financial forecasting and analysis by providing information and insights on a wide range of financial topics. In addition, ChatGPT's natural language processing capabilities enable it to understand and answer complex questions, making it easier for financial professionals to access the information they need to make decisions.

Therefore, ChatGPT's key strength in financial forecasting and analysis is its ability to process and make sense of large amounts of information and provide insights and explanations in a clear and concise manner. For example, ChatGPT can analyze and process a large amount of financial texts, such as news reports, company announcements, analysts' reports, financial statements, etc., to help financial analysts identify market sentiment and assess a company's financial position, profitability, solvency, and other indicators more accurately, and then generate a report to predict its financial status, future trends and stock price.

4.3. Applications in financial risk management

ChatGPT can help discover risks and improve financial risk control process. Risk analysis is a critical process in the financial service industry, as it helps assess and manage potential risks of a business. Traditionally, risk analysis has been a manual process of analyzing large amounts of data, which requires a lot of human labor. ChatGPT can be used to automate those tasks and make the process more efficient and the results more accurate.

For example, a fund can use ChatGPT to analyze the market trends, evaluate a company's financial condition, and consider macroeconomic factors to identify the risks of an investment portfolio. A bank can identify the potential risks of a bank loan by using ChatGPT to analyze the financial reports and news reports of a borrower. A company can use ChatGPT to analyze the customer transactions of its business and detect suspicious activities in real-time, including risk of fraud and financial losses. In addition, ChatGPT can build strong knowledge base of financial regulations and make sure a financial institution is in compliance with applicable laws and regulation during its daily operation.

4.4. Application in financial research

ChatGPT can be applied in financial research in a number of ways.

First, ChatGPT can generate simulations and scenarios for financial models. Given parameters and constraints, ChatGPT can generate realistic scenarios to test the performance of different financial models.

Second, ChatGPT can be trained to analyze large datasets, and identify trends and patterns. For example, ChatGPT could analyze demographic data of a region to identify patterns that may affect the market size of a product, which might not be

immediately apparent to human researchers. This in turn can help with the prediction of the industrial growth rate.

Third, ChatGPT can help researchers perform literature review, get to know a field quickly, write code, and generate summaries. Those all can save researchers' time and make their job easier.

5. Challenges and Limitations

Although ChatGPT is very promising in various areas of finance, there are still challenges and limitations associated with its application in financial industry of china, such as the issues related to real-time update of database, fine tuning the model, data leakage and ethical problems.

First, ChatGPT cannot network in real time to update the database. The functions currently opened by ChatGPT are all realized on the basis of the corpus data training collected by OpenAI. Timeliness is an extremely important feature in financial field. Various events that constantly occur during the operation of society will have an impact on the financial market. If ChatGPT is not tracking and learning the latest events, it will be unable to give effective or right answers. This obviously cannot meet the requirements of financial applications.

Second, ChatGPT needs to be fine-tuned before it can be fully used in the finance industry and the data needed is hard to access. The corpus data learned by ChatGPT is different from that of financial field, which is also a barrier to its commercialization in the financial sector. OpenAI uses a large number of public internet knowledge bases to develop and train ChatGPT. However, there are still a lot of financial research reports, expert summaries, performance reviews, etc. that do not appear in the training set of ChatGPT. This problem can be solved through fine tuning the model with financial data.

Third, data leakage and ethics issues are also important concerns when ChatGPT is applied in financial sector. ChatGPT need to collect and process users' data during the application. Although it is following the best practice of data security and privacy, such as data encryption, access control, continuous monitoring, regular security updates, and compliance with regulations, there are still the potential risk of data leakage. Data leakage involves internal data leaking out of the company, companies leaking customer data out of the company, and cross-border data leakage between countries. In addition, since the current version does not completely prevent ChatGPT from learning unethical or incorrect contents in the training pool, it may violate ethics or common sense and generate harmful or false information.

6. Solutions and Advices

6.1. Laws and regulations

The regulators need to establish and improve the laws and regulations related to ChatGPT. Although ChatGPT is powerful, its application carries a lot of legal risks, such as data leakage, AI abuse, provision of false information and saying "nonsense with a straight face". For example, criminals may maliciously "train" ChatGPT to generate phishing websites. Being deceived by the fraudulent information on those websites, the victims' personal and property safety may be damaged. Meanwhile, many legal issues need to be addressed. For instance, if something generated by ChatGPT infringes, who will bear the legal responsibility? All of those need inclusive and prudent laws

and regulations to be established and improved.

On the other hand, the development of new things always go together with the gradual soundness of laws of regulations. For a new breakthrough, it cannot be perfect in the early stage. We should leave enough room for it to develop, and be careful not to stifle it in the cradle in the name of compliance. Therefore, in the face of possible risks, it is necessary to establish fault-tolerant mechanisms, implement sandbox rehearsal and agile governance, and achieve a dynamic balance between norms and development.

With users' feedback, ChatGPT has gradually optimized and matured through establishing technical mechanisms to filter and block related risks such as data leakage and ethical violation. China has excellent network environment, rich experience in content governance, and a sound AI-related regulatory framework. We are confident that the regulators can balance the regulation and development of ChatGPT in China.

6.2. Education to financial professionals

Financial industry is both knowledge intensive and capacity intensive. It requires a lot of expertise and skills, among which the most important one is continuous learning ability.

ChatGPT might replace certain positions in financial sector. But there is no need to panic. It is more like a financial assistant with strong general knowledge and huge amount of data. To make full use of this versatile and ever-improving assistant, finance professionals must keep an open mind to embrace and explore it. On one hand, they need to learn some basic knowledge of ChatGPT, such as NLP, deep learning, machine learning, Python programming, and so on. On the other hand, they also need to learn how to use it properly, such as how to train data sets, how to better fine tune it, and how to find prompts and instruct it in a way to deliver the best results.

7. Conclusion

The purpose of this paper is to explore ChatGPT's application in financial industry of China. We discuss the applications in customer service, financial forecast and analysis, financial risk management, and financial research. First, in customer service, ChatGPT represents a significant

step form traditional chatbots. Second, in financial forecasting and analysis, ChatGPT's key strength is its ability to process and make sense of large amounts of information and provide insights and explanations in a clear and concise manner. Third, in financial risk management, ChatGPT can help discover risks and improve financial risk control process. Finally, in financial research, ChatGPT can be applied in a number of ways, including generation of simulations and scenarios for financial models, identification of trends and patterns, and perform of literature review.

There are certain challenges and limitations associated with the applications, such as the issues related to real-time update of database, fine tuning the model, data leakage and ethical problems. First, ChatGPT cannot network in real time to update the database. Second, ChatGPT needs to be fine-tuned before it can be fully used in the finance industry and the data needed is hard to access. Third, data leakage and ethics issues are also important concerns when ChatGPT is applied in financial sector.

In the future, we suggest that the government establish and improve relevant laws and regulations related to the application of ChatGPT and that the financial institutions keep educating financial professionals and actively explore future applications. We have confidence in China's finance sector, and we believe the application of ChatGPT will bring the whole industry to a higher level.

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