

The Study of Evolution and Application Related to the Chat-GPT

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Abstract. Chat-GPT has become increasingly popular and has provided tremendous help to people in their daily life. The fundamental working principle of Chat-GPT involves the incorporation of various methods such as Natural Language Processing (NLP), Recurrent Neural Network (RNN), Long Short-Term Memory (LSTM), Transformer and Reinforcement Learning from Human Feedback model (RLHF). These methods assist Chat-GPT in understanding, predicting and computing the desired outcomes for the users. NLP is used to help machines understand and process human language. RNN is employed to facilitate the machine in comprehending the input's logic. LSTM enables the control of memory elements, allowing the machine to combine unrelated elements in memory. RLHF serves as a switch button, controlling the machine's output and improving the accuracy of results. Chat-GPT can be used for image editing, coding, translation, paper editing and other tasks. However, it is critical to exercise caution while using Chat-GPT and not to become overly reliant on it, given the potential problems it may create.

Keywords: Natural language processing, Chat-GPT, Artificial Intelligence.

1. Introduction

Chat-GPT is the most popular AI application in people's daily lives [1-3]. After the publishing of Chat-GPT3, there are many news from different companies reported that the Artificial Intelligence Revolution is Coming. For example, BBC, CNN, People's Daily and so on. The mainstream media in many different countries rushed to report about the Chat-GPT. The reason why people are focus on the Chat-GPT is, it can chat with people in-text and give the answers to the users. Not only for the simple questions, but it can also create the sheets by user's requests. What's more, it can generate some models, similar to infrastructure construction, financial investment, risk analysis, etc. And people are using the products from Chat-GPT during the daily lives. What is even more unbelievable is that its user registrations exceeded 100 million within three months of its launch. So, Chat-GPT has become promising nowadays. Not only the companies in the United States are working on this part, But also the companies in China are planning to publish their own vision of Chat-GPT. Such as Tencent, Baidu and even Kaifu Li plans to set up a A global company dedicated to building a new AI 2.0 platform and AI-first productivity applications. According to the situation, author considers that to do the research about how Chat-GPT works, the underlying logic and how it will develop in the future is very important, necessary, and critical.

Natural Language Processing (NLP) starts 1950s, it is an information processing technology based on natural language understanding and natural language generation. In recent years, Recurrent Neural Network (RNN) and Long-Term Short-Term Memory (LTSM) models occur, with these models the artificial intelligence developed rapidly. People use these models to predict how the stocks develop and make the decision with the results they provide. Not only for the NLP and RNN, but there are also some better visions of models based on them appear. For example, Bert, a method of pre-training language representations, and "The ability to attend to different positions of an input sequence to compute a representation of that sequence. The Transformer creates a stack of multiple self-attention layers, as explained in the Scaled Dot-Product Attention and Multi-Head Attention sections below." According to the Transformer model, people create a new model that can help them to pick and recognize the target fruit in the orchard. But Chat-GPT combines their functions, and at the same time

improves various performances to achieve the most advanced in-context model, which is a huge improvement for the development of AI.

This article is going to be a review to give a general explanation, and at the same time let readers know some knowledge and development about Chat-GPT. The second part will cover some introduction to the basic model of Chat-GPT. Part III will cover some of their application scenarios. In the fourth part, some development prospects and future analysis of Chat-GPT will be discussed.

2. Method

2.1. Natural Language Processing

NLP is a subfield of Artificial Intelligence (AI) concerned with the automatic processing and analysis of human language [4, 5]. NLP algorithms are designed to enable machines to understand, interpret, and generate natural language text or speech. This is accomplished by breaking down language into constituent parts, such as words and phrases, and analyzing their meanings and relationships to extract useful information. Techniques such as tokenization, stemming, and part-of-speech tagging are employed to facilitate this process. Once the text is processed and analyzed, contextual information is utilized to provide meaning and coherence to the extracted information. The ability to process, analyze, and generate natural language is fundamental to the development of AI applications, such as virtual assistants and chatbots.

2.2. Recurrent Neural Network

RNN represent a critical machine learning approach for reading, comprehending, and predicting sequential or time series data [6, 7]. RNNs have been applied to numerous tasks, including language translation, NLP, voice recognition, and image captioning. Through extensive training, an RNN can learn to generate predictions based on previously input data. The salient feature of an RNN is that its outputs are mutually independent, with each result being contingent solely upon the series data elements leading up to it. Furthermore, all elements in an RNN are shared across each layer, yielding unstable outputs.

2.3. Long Short-Term Memory

LSTM is a type of neural network designed to address the memory problem of RNN [8, 9]. In cases where RNN has long and numerous inputs, LSTM provides a mechanism to store and delete information from memory, thereby freeing up space. The LSTM model achieves this through the use of three gates: Forget gate, which facilitates information deletion; Input gate, which decides whether to add new input; and Output gate, which governs the output. The precise control of these gates is critical to ensuring the proper functioning of the LSTM and ultimately the RNN. The LSTM model has found application in various fields, such as speech recognition, natural language processing, and image captioning.

2.4. Transformer

The Transformer model is a neural network that enables context learning and meaning comprehension by tracing relationships within sequential data [10]. The Transformer model utilizes a mathematical technique known as self-attention, which enables the machine to detect relationships between two elements, even if they are distant from each other in memory. The Transformer model is capable of real-time translation of recorded voice or media, making it ideal for computer translation applications where input and output must be delivered immediately. The Transformer model's ability to overcome problems that the RNN cannot handle has led to its wide-ranging applications in speech recognition, natural language processing, and image captioning.

2.5. Chat-GPT

Chat-GPT is using the Reinforcement Learning from Human Feedback model (RLHF). Like what it called, the Chat-GPT is using the model based on the feedback from the human. For RLHF, it needs a lot of input and corrective training. (Open AI) In this model, the researchers set the rewards and punishment mechanism. If the machine provides the correct and useful output based on the user's input, the machine will get some rewards, if not, the machine will keep trying to figure out the correct one that is needed. After more and more training, the RLHF can learn faster and faster to reach the correct answers, and it can remember and choose the correct answers to provide to the users. With the help from human, the machine learns more about the human's thoughts and can provide more information based on users' input. And this makes Artificial Intelligence smarter.

3. Application and discussion

Due to the establishment of the Chat-GPT, people can complete many kinds of work with the help of the Chat-GPT. For example, if people want to make a worksheet, the user should know all steps and details the user needs. Such as mathematics functions, insert steps and input the details and requirements. But now, if user uses the Chat-GPT, just type in the context box and tell what user wants to do and style user needs, the Chat-GPT will give the user results and ask for the next step. All the things' users need to do is give more details about the worksheet they want, type the information it holds, and give Chat-GPT a little bit of time to process the result the user asked. This saves a lot of time and leaves the user more energy to deal with other work. Not only for the worksheet, Chat-GPT can help with translation. Before the beginning of translation, the user can set the Chat-GPT as a profession translator in any field. After doing these sets, the user can input all the information that need to be translated and the Chat-GPT will provide the user a profession result to the user that they asked. Even the drawing will not beat the Chat-GPT. If the user tells Chat-GPT to draw a picture, all the user needs to do is provide more details about the picture they want. Based on the methods Chat-GPT use, the more details provided, the more perfect result the user will get. And people can use Chat-GPT to edit their paper, for example, correct the grammar, paraphrase the sentences, and modify the format. There are many functions that Chat-GPT has, and all the users need is to develop and try to find something helpful for them.

In conclusion, Chat-GPT represents a significant breakthrough in the field of artificial intelligence, as it has the ability to generate coherent and fluent human-like text responses. The underlying methods employed by Chat-GPT, including Natural Language Processing, Recurrent Neural Networks RNNs, LSTM models, Transformers, and Reinforcement Learning with Hybrid Forward models RLHF, have transformed the way machines can understand and interact with human language. The applications of Chat-GPT are diverse and far-reaching [11-14], ranging from enhancing communication in the workplace to improving machine translation and generating creative writing.

However, the use of Chat-GPT also raises ethical concerns [15, 16], including potential copyright infringement, dissemination of fake news, and the loss of jobs as automation increases. Additionally, there are concerns about the moral implications of using machines to generate text that could be harmful or offensive. Therefore, it is crucial for researchers and developers to consider these issues and work towards developing ethical guidelines for the use of Chat-GPT and other AI technologies.

The development of Chat-GPT and its underlying methods represents a significant advancement in the field of artificial intelligence and natural language processing. It has the potential to transform various industries and improve the quality of human-machine interaction. However, it is essential to address the ethical concerns associated with its use and ensure that its development and deployment align with human values and ethics.

4. Conclusion

In this study, the author introduces several methods employed by Chat-GPT, along with their underlying principles, development, and applications in daily life. These methods include Natural NLP, RNN, LSTM, Transformer, and RLHF. Among them, the RLHF method is particularly significant as it involves extensive training and can produce optimal matching results. Chat-GPT's diverse applications encompass office work, digital images, coding, and translation, to name a few. However, concerns surrounding humanistic morality, copyright infringement, and job loss remain controversial issues to be addressed.

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