

Research on the development and risks of large language models

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Abstract: Large Language Model (LLM) has great potential and wide application prospects, including improving the degree of intelligence, improving production efficiency, and providing diverse solutions for enterprises, governments, individuals, etc. If the problem of computing power can be overcome, it will have unlimited potential. It has attracted wide attention in the fields of Natural Language Processing (NLP) and Artificial General Intelligent (AGI). However, with the expansion of the scale and capabilities of large language models comes a series of potential risks and challenges. This paper reviews the development and risks of large language models in different research fields. In the future, with the improvement of algorithms, personalized solutions can be developed more efficiently for service, and social productivity can be improved. However, it is also necessary to strengthen the regulatory review of the output of large language models and the correction of data bias to ensure the accuracy of the research content.

Keywords: Large Language Model, Natural Language Processing, Risk Challenge, Application Prospect, General Artificial Intelligence.

1. Introduction

Natural Language Processing (NLP) is a frontier field at the intersection of computer science, Artificial General Intelligence (AGI) and linguistics. The goal is to enable computers to understand, process, and generate natural language, giving computers human-like speech interaction and text understanding capabilities. NLP(Natural Language Processing (NLP)) technology has a wide range of applications, including Large Language Model, LLM is considered as one of the important ways to move towards Artificial General Intelligent (AGI). Researchers only need to pre-train large-scale language models and fine-tune large-scale models to achieve better task performance. This article describes the evolution of large language models, their prospects and risks, as well as their application areas. In this context, this paper summarizes the existing literature, analyzes it, and compares its application in various fields, so as to provide more useful references for researchers in the field of large language models.

2. The Basis of the Development and Evolution of Large Language Models

A large language model is a natural language processing model based on deep learning techniques, capable of generating coherent, meaningful sentences based on input text. The basis for its development and evolution can be traced back to the origins of neural networks and deep learning.

Early language models were largely based on the traditional N-gram method, which counted phrase frequencies in text to predict the next word. However, this approach suffers from vocabulary size limitations and insufficient contextual information. With the development of neural networks, researchers began to explore the use of deep learning methods to solve the problem of language modeling.

A major milestone was the proposal of Recurrent Neural networks (RNNS) in 2013. Recurrent Neural networks (RNNS) can handle input sequences of variable length and are able to retain contextual information as they process each word. This provides new ideas for the development of language models.

However, Recurrent Neural networks (RNNS) have problems such as “gradient disappearance” and “gradient explosion”, which limit their modeling ability in long sequences. To solve these problems, researchers introduced the Long Short-Term Memory network

LSTM(Long short-term Memory, Recurrent Neural Network NN's (LSTM) and gated cycle unit GRUs (Glavnoe Razvedivatelnoe Upravlenie) effectively solve the gradient problem and improve the performance of language models [1].

Based on these improvements, in 2018, OpenAI proposed a large-scale language model called GPT (Generative Pre-trained Transformer). GPT(Generative Pretrained Transformer) uses a Transformer as an encoder and decoder, introducing self-attention mechanisms into the language model. The Model's training process is unsupervised, learning the probability distribution of the Language through the Masked Language Model (MLM) task and the Next Sentence Prediction (NSP) task.

The success of GPT(Generative Pretrained Transformer) has sparked research interest in larger, more powerful language models. In 2020, OpenAI released GPT-4, which, with 175 billion parameters, was the largest language model at the time. GPT-4 performs well on a variety of natural language processing tasks, such as text generation, machine translation, dialogue systems, etc. [2].

In the future, there is still great potential for the development of large language models. Researchers are working to solve the technical challenges of training large models and exploring how to better understand and harness the capabilities of these models.

In summary, the foundation of the development and evolution of large language models can be traced back to the origins of Neural networks and deep learning, having experienced the evolution from traditional models to Recurrent neural networks (RNN), LSTM (Long ShortTerm Memory, LSTM (LSTM), GRU (Glavnoe Razvedivatelnoe Upravlenie) and other improved models. With the advent of GPT(Generative Pretrained Transformer), large language models have made great progress in the field of natural language processing and show exciting application prospects.

3. Application of large language model in various fields

3.1. Finance

(1) Improve the quality and ability of customer service: Financial institutions use large language models to provide intelligent customer service and online advisory services to meet the individual needs of customers and improve response speed and customer satisfaction. (2) Improve the level of financial planning and investment decision-making: the big language model can help investors make investment decisions and risk assessments, provide personalized investment recommendations, reduce investment risks, and improve investment returns. (3) Strengthen risk and compliance management: Financial institutions can use large language models for risk management and compliance management, identify potential risk factors and fraudulent behaviors in real time, provide risk early warning and compliance advice, and protect customers' interests. (4) Expand financial education and training methods: financial institutions use large language models to develop virtual teaching assistants or training robots to provide training materials and question-answering services, so as to improve training effectiveness and knowledge transfer efficiency. (5) Providing real-time decision information: By analyzing news, social media, financial data and public opinion, the big language model can help financial institutions understand market dynamics, predict trends and competitors' behaviors, and formulate marketing strategies and decisions. In addition, big language models can also be applied to financial data analysis

and intelligent trading systems to help the financial industry process and analyze large amounts of data and provide relevant insights and decision support [3].

3.2. *Medicine*

From the perspective of Western medicine, the large language model is an artificial intelligence model based on deep learning technology that has broad application prospects in the medical field. First of all, it can be used in the generation of abstracts of medical literature. By analyzing a large amount of literature and generating condensed abstracts based on keywords and topics, it can help doctors understand the latest medical research results and save time and effort. Second, the large language model can assist in medical image analysis, such as X-ray, CT scan and pathological section interpretation. By learning from the medical image database, it can understand the type, degree and corresponding treatment plan of the lesion, and provide accurate and efficient diagnostic support. In addition, the large language model can also conduct real-time monitoring and analysis of medical data, detect abnormal patterns and trends, and predict the occurrence and development of diseases. For example, when monitoring and analyzing a patient's physiological data, a large language model can provide a risk index to predict disease deterioration and help doctors take early intervention measures. In conclusion, the application potential of large language models is great, which can improve doctors' efficiency and provide better medical services to patients by automatically generating medical literature abstracts, assisting medical image interpretation and real-time monitoring of medical data.

From the perspective of traditional Chinese medicine, the big language model can deeply sort out and analyze traditional medical literature, extract valuable information and knowledge points, and provide a support for clinical and scientific research. It can also assist in the formulation of personalized diagnosis and treatment plans, and accurately extract matching medical knowledge based on patients' information. In addition, the large language model has great potential in the optimization of Chinese herbal medicine formulations, and provides scientific basis for doctors to understand the interaction and compatibility rules of herbs through deep learning capabilities.

3.3. *Government Affairs*

First, large language models can be used for policy making and decision support. By training the big language model, key information can be extracted from a large number of policy documents, laws and regulations, research reports, etc., to assist decision makers in making more scientific and accurate decisions.

Secondly, the large language model can be used for the intelligentization of government services. Government departments need to interact with the public and provide services.

In addition, large language models can be used to mine and analyze government data.

Government departments have a lot of data, such as statistics, census data, etc.

Finally, the large language model can also be applied to the monitoring and analysis of public opinion in government affairs. The government needs to understand the public's needs in a timely manner in order to adjust policies and improve services.

4. The Prospect and Risk Analysis of Large Language Models

4.1. *Prospects*

(1) Natural language generation: Large language models can generate accurate and smooth text, which can be widely used in intelligent assistants, intelligent customer service and machine translation in the future. Through the interaction with the user, the large language model can provide real-time questions and services. As a result, large language models can be widely used in many fields. For example, in the fields of automated question answering and intelligent assistants, large language models can accurately answer users' questions and provide more personalized services.

(2) Promote the development of intelligent dialogue systems: Large language models can achieve more natural dialogue exchanges, making the dialogue system more interactive and communicative.

This is of great significance for applications such as intelligent assistants and chatbots. In the future, through the large language model, the future can better meet the needs of users and provide higher quality services.

(3) Support natural language understanding and generation: Large language models can help machines better understand human language expressions and generate statements that conform to context and semantic logic. This is very important for the tasks of machine translation, summary generation, and automatic text generation.

(4) Content creation and assisted writing: Large language models can provide writers with ideas and inspiration to help them write articles, novels or poems more efficiently. At the same time, large language models can also assist writers in writing, such as with grammar correction and style suggestions.

(5) Create new business opportunities: The development of large language models will provide new business opportunities for entrepreneurs and enterprises. For example, people can enter the relevant resource library according to the big language correlation model according to their own needs to find their own information, personnel, environment, etc., more efficient and comprehensive optimization of business use.

(6) Personalized education and intelligent tutoring: The big language model can provide students with personalized learning materials and homework guidance according to their learning needs and interests, so as to help students better learn and understand knowledge.

(7) Academic research assistant: Large language model can provide scientific researchers with a large number of literature materials and research results, helping them to conduct data collection, literature review and experiment design more efficiently.

4.2. Risk

4.2.1. Information quality and credibility. While large language models can produce high-quality text, there is also a risk of abuse and misdirection. Malicious users may use large language models to generate false information, rumors and fake news on a large scale, with negative effects on society. Therefore, relevant departments need to strengthen supervision and review of information output by large language models.

4.2.2. Privacy and data security. Large language models usually require a large amount of data for training, which may involve user privacy. If the user data is not properly managed and protected, it may lead to privacy disclosure and data security issues. Therefore, protecting user data and privacy becomes an issue that needs to be paid attention to when using large language models.

4.2.3. Bias and discrimination. There may be bias and discrimination in the training data of large language models, which also reflects the social biases that exist in the real world. If left uncorrected and unmanaged, the output of large language models can further exacerbate social inequality and discrimination. Therefore, governments or relevant authorities need to raise awareness of data bias and take steps to avoid producing unfair outcomes [4].

4.2.4. Legal and ethical issues. The development of large language models may raise a number of legal and ethical issues, such as copyright issues, intellectual property issues, and legal disputes arising from the spread of false information. Large language models can generate realistic false information, which may lead to problems such as false news, confusion of facts and deceiving users. At the same time, large language models can also be abused to carry out scams, cyber attacks, and inappropriate speech. The government or relevant departments need to establish corresponding legal and ethical frameworks to reasonably regulate the use and abuse of big language models [5].

5. Conclusion

In summary, this paper highlights the development and potential risks of large language models and proposes important initiatives to address these risks. The foundation of the development and evolution of big language models can be traced back to neural networks and deep learning. With the advent of GPT(Generative Pretrained Transformer), big language models show exciting prospects. It can not only promote the development of dialogue systems, but also assist in content creation, provide new employment opportunities for people and provide work-learning efficiency. Large language models also have a high utilization rate in the financial field, which can meet people's needs through intelligent data analysis. In medicine, intelligent recognition through big data can provide more accurate treatment plans and diagnosis results. In government affairs, a large amount of information can be intelligently extracted, such as population censuses, public opinion analyses, etc., to provide intelligent services for government departments. However, in future development, due to the upgrading of algorithms and the huge amount of information provided by users, it will be necessary to strengthen the supervision review of the output of large language models and the correction of data bias. The credibility of information quality and the privacy of users have become the most important risks. For the issue of academic bias and ethical norms, it is also necessary for academia, industry and government to formulate corresponding policies and norms, popularize Internet security knowledge for the public through the Internet and other means, and establish a sense of correct judgment. We can also use the big language model to determine the sensitive words of the network, to ensure the sustainable and safe development of the big language model, and to bring us more benefits and innovation. The paper still lacks the support of actual experimental data, which needs further thought and exploration.

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