The Recent Trends of Artificial Intelligence and Its Indications

Wentao Gao *

Department of Physics, University of California, Santa Barbara. United States of America.

* Corresponding Author Email: wentao_gao@ucsb.edu

Abstract. Artificial intelligence technology becomes more familiar to the world by the day, large variety of industries incorporate AI for its functioning power and efficiency. AlphaGo by Google's DeepMind become the first famous AI example of recent days in 2017 after its victory against a human Weiqi champion. It uses neural networks and reinforcement learning to play Weiqi at a superhuman level. AI branches into different fields including medicine, and plays a significant role helping to fight the Covid-19 pandemic in China and the US, especially medical algorithms and physical drones. GPT makes its entrance to the public in 2023, with outstanding data processing and generating power by using deep learning algorithms to generate human-like langua and perform natural language processing tasks. This paper summarizes AI technologies from 2017 to recent day, incorporating information from papers by experts in AI and related fields, focusing on summarize, analyze, and prediction of the AI technology.

Keywords: Data, machine learning, Pre-training, AlphaGo, Generative Pre-trained Transformer.

1. Introduction

Artificial intelligence technology has experienced significant growth in its capability to process and generate within recent years. Population around the world were gradually introduced and started to incorporate then benefit from artificial intelligence technology's application in life.

From 2017 to 2023, numerous amounts of successful machine learning algorithm was made into programs and software for applications. Some examples include the following. AlphaGo-Zero is a machine-learning algorithm. It was trained to play Weiqi. In 2017, AlphaGo-Zero defeated its previous generation program, AlphaGo, with a score of 100-0. Not long before, AlphaGo had just achieved global attention for defeating the human Weiqi world champion [1]. AlphaGo-Zero does not learn from humans but trains through confrontation with oneself. The method is known as "reinforcement learning." Recently, the chatting algorithm known as "ChatGPT" launched by OpenAI has sparked widespread discussion in society. Relying on a neural network structure based on transformer architecture, pre-training unlabeled text data as well as fine-tuning for specific tasks, GPT technology has an excellent performance in the natural language processing. The intelligence and fast update speed demonstrated by GPT technology amazed people [2]. OpenAI released GPT-4 on March 14th, 2023. This new version has further improved its natural language understanding and generation performance. At the official press conference, GPT-4 not only has stronger text processing capabilities but also showcases multimodal functionality. Other than mentioned, the applications of artificial intelligence have been proposed in cyber defense, healthcare, and education.

However, the "bottleneck" of artificial intelligence still bugs the development. Within modern AI development and research progress, the core proves to be "deep learning" of machines, the most fundamental method on achieving goals assigned to AI, this is the aspect that the industry faces the most substantial challenge on. Before solving the fundamental contradiction of learning, the best artificial intelligence cannot compete with ordinary 4-year-old children [3].

Back to daily life, the most concerning question for artificial intelligence is: When will artificial intelligence surpass humans? Will humans be replaced by AI? This article provides reviews of the development and achievement of artificial intelligence's application in numerous fields and algorithms such as GPT and AlphaGo, an analysis of the current application status of artificial intelligence technology in different fields, an analysis of trends among the current artificial intelligence development, discussion of the current stage of lack of limitation and regulation for artificial intelligence, and prediction of the next stage of artificial intelligence, where it is currently

heading and where it should be heading to make it a technology that would only be beneficial to humans.

2. Method

For the general population around the world, the functioning power of artificial intelligence probably did not enter their view until 2017, the year AlphaGo-Zero beat the former Weiqi champion. AI technology took some time to implement into people's lives for a few years and assisted in preventing the spread of the COVID-19 pandemic from 2020 to 2022. Then in 2023, the world was amazed by ChatGPT. Therefore, trends and predictions will be majorly discussed surrounding the aspects of AI technology mentioned above. GPT, the "Generative Pre-trained Transformer," was introduced in 2018. A language model able to generate human-like language by training on humongous amounts of text data. OpenAI presented the first version of GPT, the GPT-1, on a massive dataset of text from the internet. In 2019, OpenAI released a new GPT version, GPT-2, which was even more potent than its predecessor. In 2020, OpenAI released a new version of GPT, GPT-3, currently the most potent language model. GPT-3 was trained on an enormous text dataset with a neural network with 175 billion parameters, making it roughly ten times more powerful than GPT-2[4]. A deep dive will be taken into the development history, basic algorithms, implementation, and subsequent development stage.

AlphaGo is a computer program designed by DeepMind to play the board game Go. After defeating Lee Sedol, the world champion, in 2016, AlphaGo made history. AlphaGo was a breakthrough in artificial intelligence, as Go is a highly complex game with more possible board positions than atoms in the universe [1]. The first version of AlphaGo, AlphaGo Fan, was trained on a large dataset of human Go games. The second version of AlphaGo, called AlphaGo Lee, was explicitly designed to play against Lee Sedol. The third version of AlphaGo, called AlphaGo Zero, was introduced in 2017. This version of AlphaGo was trained entirely through self-play, without any human data [5]. The article will deeply study the evolution and current stage of AlphaGo technology and some of its recent implementations.

Artificial intelligence technology has been increasingly implemented in medicine in recent years, aiming to improve patient outcomes and reduce healthcare costs. One area of medicine where AI has been beneficial is medical imaging. AI algorithms can analyze medical images to help identify and diagnose diseases [6].

AI algorithms can also help drug discovery by analyze large data on drug compounds thus predict their efficacy. AI has also been implemented in clinical decision-making, helping doctors to make more accurate diagnoses and treatment plans [7]. The COVID-19 pandemic has highlighted the potential of AI technology in medicine. One area where AI has been particularly useful in the COVID-19 pandemic is medical imaging. AI has also been used to develop new treatments for COVID-19. For example, BenevolentAI used AI algorithms to analyze data on existing drugs and identify potential treatments for COVID-19. In addition, AI has been used to develop predictive models for the spread of COVID-19[8,9]. The article will have a complete illustration and summary of the status of AI technology in medicine.

3. AI Implementation of Recent Years (AlphaGo, GPT, medicine and Covid-19)

3.1. Rise of AlphaGo and AlphaGo-Zero

DeepMind Technologies presented AlphaGo, it made waves in 2016 when it defeated Lee Sedol, the world champion of Weiqi. The victory of AlphaGo became a milestone of success artificial intelligence progression, as Go was considered one of the world's most complex games [1].

Following AlphaGo's victory, DeepMind continued to develop the program, and in 2017, they announced the development of AlphaGo Zero. AlphaGo Zero significantly improved over the original AlphaGo program, as it learned to play Go without any human input. Unlike the original AlphaGo,

which relied on human data to learn how to play Weiqi, AlphaGo Zero could learn the game purely by playing against itself.

AlphaGo Zero's training process involved playing millions of games against itself, using a neural network to evaluate each move. Through this process, AlphaGo-Zero was able to develop a deep understanding of the game, and it was able to defeat the original AlphaGo program 100 games to 0 in a series of matches.

Since the development of AlphaGo and AlphaGo Zero, there have been several applications for the technology. One of the most significant applications has been in game development. By using machine learning algorithms like those used in AlphaGo, games can have more capable opponents for players to challenge[10]. Additionally, machine learning algorithms can be used to generate content for games, such as procedurally generated maps or enemies.

Another application for the technology is in the field of robotics. Machine learning algorithms can be used to teach robots how to perform complex tasks, such as navigating through a crowded environment or manipulating objects. Using machine learning algorithms like those used in AlphaGo, robots can learn to perform these tasks without explicit programming.

In addition to game development and robotics, machine learning algorithms like those used in AlphaGo have been applied to various other fields, including natural language processing, computer vision, and finance. By using machine learning algorithms to analyze large datasets, researchers can gain new insights into complex problems, such as disease diagnosis or stock market trends.

AlphaGo and AlphaGo Zero have significantly impacted the development of artificial intelligence. Since their development, the technology has been applied to various fields, and it has the potential to revolutionize how we approach complex problems. As research in artificial intelligence continues to advance, we will likely see even more applications for this technology in the years to come.

3.2. The Incredible GPT Technology

GPT technology incorporates deep learning for human-like language generation, other known as Generative Pre-trained Transformer, a neural network architecture introduced by Google in 2017[11].Wikipedia articles, books, and web pages as well as other large text data are used to pre-train GPT models. In this process, models learn to calculate the next word in a given sequence. This is done by feeding the model a sequence of words and asking it to predict the next word. The model is then updated based on how well it predicts the correct word[2].

After pre-training, the model trains using more specific data to suit specific tasks, known as fine-tuning. Transformer blocks are computation units of GPT model. The transformer blocks use a self-attention mechanism that allows the model to focus on parts of input information separately, and a neural network that process the outcome of the self-attention mechanism [12].

During the pre-training process, the model is fed a sequence of words, and the final transformer block in the model is used to predict the word coming up. The prediction uses the output of the previous transformer block, which is passed through a softmax function to generate a probability distribution over the vocabulary. The input data is processed similarly. The input data is fed through the transformer blocks[11], and the final transformer block generates the output. The output can be a sequence of words, a sentence translation, or a chatbot query response.

One of the key advantages of the GPT model is its ability to generate human-like text. This is due to the large amount of text data that the model is pre-trained on, which allows it to learn the nuances of language. The model can also generate text in different styles, such as formal or informal, making it useful for various applications. However, the GPT model also has some limitations[12]. For example, it can generate biased or offensive text, depending on the data it is trained on. It can also generate factually incorrect or misleading text, which can be a problem in applications such as news article generation. However, it has some limitations, such as the potential for bias or error in the generated text.

The development of GPT technology has been an exciting journey since its inception in 2017. The original version of GPT was presented by OpenAI. It had 117 million parameters and was trained on

large text data. This model could generate coherent text, but it could not produce indistinguishable from human-written text. However, it was a significant step forward in natural language processing.

In 2020, OpenAI released GPT-3, which had 175 billion parameters. This model's version was capable of creating text that was indistinguishable from human text. It was used in various applications, including language translation, content generation, and chatbots.

Another application of GPT-3 was its use in generating news articles. It was trained with news articles and could generate articles almost indistinguishable from human-written articles [2].

In 2021, GPT-3 was used to create an AI-generated screenplay called "Sunspring." The screenplay was entered into a film festival and was well-received by critics, with one critic describing it as "a fascinating glimpse into the future of creative writing."[2]

In 2022, GPT-3 was used to create AI-powered virtual assistants. These assistants could perform various tasks, including scheduling appointments, sending emails, and making phone calls. The technology benefited people with disabilities or difficulty using traditional user interfaces[12].

As of 2023, GPT technology continues to develop and evolve. Its potential applications prove to be vast despite the potential risks associated with the technology raises concern. Chatbots, language translation, content generation, GPT technology leads AI to a different level [11].

3.3. AI in Medicine

AI has the potential to revolutionize the field of medicine by improving diagnosis accuracy, personalizing treatment, and enabling the discovery of new treatments. AI models can find patterns and correlations that for predicting outcomes and inform treatment decisions after being trained on large datasets of patient information .

Medical imaging is a very promising application of AI. Algorithms can analyze medical images: X-rays, CT scans, and MRIs. With these methods, anomalies that indicate a disease could be detected. Algorithms can also enable earlier diagnosis and treatment by detect lung cancer's early signs. AI has also shown potential in genomics, by being able to analyze humongous datasets of genetic information for genetic disease associated mutation identification [7]. Using this information, a more individualized plan of treatment that consider a patient's unique genetic makeup could be developed.

AI algorithmspredicts likelihood of Alzheimer's disease development with medical history[7]. This information can develop targeted prevention strategies and help patients make informed decisions about their health. In addition to diagnosis and treatment, drug discovering is a field that welcomes AI. AI can calculate the compounds that are especially useful for a particular disease by studying chemical datasets [6]. This can accelerate the drug discovery considerably.

Despite numerous potential benefits of AI used in medicine, potential challenges must be addressed. The need for large datasets of patient information to train AI algorithms raises concerns about patient privacy and the security of patient data. Additionally, there are concerns about the potential for bias in AI algorithms, exceptionally if the algorithms are trained on datasets that are not representative of the population as a whole.

3.4. AI vs Covid-19

The Covid-19 pandemic has significantly impacted the world, and many countries have turned to technological solutions to help prevent and contain the spread of the virus. AI technology has been at the forefront of these efforts, with many innovative applications being developed and deployed in the fight against Covid-19. We will examine how AI has been used to prevent Covid spreading, focusing on examples from China and the United States [8,9].

3.4.1 AI against Covid-19 in China

China responded quickly by deploying AI technology to help fight the Covid-19 virus. A notable AI application in China was using drones to monitor public spaces and enforce social distancing measures. These drones have cameras and AI algorithms to detect people not wearing masks or standing too close together. The drone operators could then use loudspeakers to remind people to

follow the rules.9,10Another application of AI in China was using thermal imaging cameras to detect people with high temperatures. These cameras were installed at airports, train stations, and other transportation hubs to identify people who might be infected with Covid-19 quickly. The cameras could detect temperatures from a distance, making it easier to quickly screen large numbers of people [8,9].

3.4.2 AI against Covid-19 in the United States

In the United States, AI technology has also been used to help prevent the spread of Covid-19. Tracing apps is the most common application of AI against Covid-19 in the US. These apps alert two people near each other if someone tests positive for Covid-19, as well as anyone in close contact with them, allowing those individuals to get tested and self-isolate if necessary. Another application of AI in the United States has been using machine learning algorithms to analyze large amounts of data and identify patterns that could indicate an outbreak [8,9]. For example, researchers at Carnegie Mellon University used machine learning algorithms to analyze social media posts and identify areas where people were reporting symptoms of Covid-19. This information was then used to help public health officials target their resources more effectively.

Artificial intelligence technology has played an essential role in the fight against Covid-19. From drone surveillance in China to apps in the United States, AI has been used to help keep people safe. While there are certainly challenges associated with deploying AI technology in this context, the benefits have been significant.

4. Future of Artificial Intelligence

Over the past several years, tremendous growth appeared in the field of artificial intelligence. From machine learning to natural language processing to computer vision, AI systems are capable of handling increasingly complex problems. It is clear that AI will play increasingly important roles in many industries in future.

It can be expected that AI systems become even more sophisticated in their ability to diagnose and treat medical conditions. The systems will be able to analyze wider range of medical data, including genetic information in order to provide even more accurate diagnoses, condition predictions and treatment recommendations. AI could also affect drug development in crucial ways. Potential drug candidates can be easily identified and predict how living bodies react using the ability to analyze large amount of data. In this way, drug developments could be faster and more effective, ready for a wide range of medical conditions.

Beyond medicine, automotive industry has large usage for AI. For example, AI systems are already being implicated into developing self-driving cars. As these systems become more advanced, future self-driving could become a norm in daily traffics, with enough precise and regulations, roads could become safer with reduced traffics. AI is also being used to personalized shopping experiences for customers. In the future, AI could become more sophisticated such that it can predict the products customers are most likely to buy and adjust prices in real-time to maximize sales.

Sadly, with all the advancements comes the likelihood of job displacement, data privacy and so many other potential issues. More and more concern around AI technologies are appearing everyday, thus strong and firm regulations on the technology done by humans are detrimental. Humans should not focus solely on productivity when it comes to AI technologies.

5. Conclusion

The future of AI development is very bright overall. With the ability to analyze vast amount of data and identify patterns that humans may not be able to see. AI has played important role in medicine and the dight against COVID-19. AlphaGo and AlphaGo-Zero have had a significant impact on AI technologies, and as of 2023, GPT technology continues to develop and evolve. With the strong generation power from accurate training, GPT is poised to lead AI to become more beneficial and

useful. As long as people address concerns around AI, the world can look forward to a future where AI plays an increasingly important role in life.

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