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CONCOURS INTERNE ET EXTERNE DE TECHNICIEN DE CLASSE NORMALE DES SYSTEMES D'INFORMATION ET DE COMMUNICATION

- SESSION 2023 -

Mercredi 22 mars 2023

ÉPREUVE D'ANGLAIS

Questions appelant à des réponses écrites courtes en français, sur un document rédigé en anglais, relatif aux systèmes d'informations, destinées à évaluer le niveau de compréhension du candidat.

Cette épreuve obligatoire se déroule par anticipation, à l'occasion des épreuves écrites d'admissibilité, mais les points sont pris en compte à l'admission.

(Durée : 1h00 – Coefficient 1)

Le document rédigé en anglais comporte 3 pages

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Attention : **Les réponses doivent être développées et il conviendra de se référer uniquement à ce qui est écrit dans le document.**

QUESTIONS

Question 1 (2 points)

Qu'est-ce que ChatGPT ?

Qui est son créateur ?

Question 2 (1 point)

Dans quelle infrastructure se trouve ChatGPT ?

Question 3 (2 points)

Comment fonctionne l'apprentissage supervisé ?

Question 4 (2 points)

Quel avantage présentent les algorithmes de Proximal Policy Optimization par rapport aux algorithmes de Trust Region Policy ?

Question 5 (2 points)

Comment fonctionne l'apprentissage par renforcement ?

Question 6 (1 point)

Quel est le nom de la première version de ChatGPT ?

Question 7 (2 points)

Quel phénomène de la loi de Goodhart est présenté dans cet article ?

Question 8 (2 points)

En janvier 2023, que fait la ville de New York ?

Question 9 (1 point)

Qu'est-il possible de créer en associant ChatGPT à OpenAI Codex ?

Question 10 (2 points)

Pourquoi les créateurs de ChatGPT font appel l'entreprise Sama ?

Question 11 (2 points)

Qu'est-ce que certains utilisateurs ont réussi à demander à ChatGPT ?

Question 12 (1 point)

Selon certains journalistes, comment peut être utilisé ChatGPT ?

Extrait de Wikipédia : 'https://en.wikipedia.org/wiki/ChatGPT'

Chat Generative Pre-Trained Transformer, commonly called **ChatGPT**, is a chatbot launched by OpenAI in November 2022. It is built on top of OpenAI's GPT-3 family of large language models, and is fine-tuned (an approach to transfer learning) with both supervised and reinforcement learning techniques.

ChatGPT was launched as a prototype on November 30, 2022, and quickly garnered attention for its detailed responses and articulate answers across many domains of knowledge. Its uneven factual accuracy was identified as a significant drawback. Following the release of ChatGPT, OpenAI was valued at $29 billion.

Training

ChatGPT was fine-tuned on top of GPT-3.5 using supervised learning as well as reinforcement learning. Both approaches used human trainers to improve the model's performance. In the case of supervised learning, the model was provided with conversations in which the trainers played both sides: the user and the AI assistant. In the reinforcement step, human trainers first ranked responses that the model had created in a previous conversation. These rankings were used to create 'reward models' that the model was further fine-tuned on using several iterations of Proximal Policy Optimization (PPO). Proximal Policy Optimization algorithms present a cost-effective benefit to trust region policy optimization algorithms; they negate many of the computationally expensive operations with faster performance. The models were trained in collaboration with Microsoft on their Azure supercomputing infrastructure.

In addition, OpenAI continues to gather data from ChatGPT users that could be used to further train and fine-tune ChatGPT. Users are allowed to upvote or downvote the responses they receive from ChatGPT; upon upvoting or downvoting, they can also fill out a text field with additional feedback.

Features and limitations

Conversation with ChatGPT about whether Jimmy Wales was involved in the Tiananmen Square protests, December 30, 2022

Although the core function of a chatbot is to mimic a human conversationalist, ChatGPT is versatile. For example, it has the ability to write and debug computer programs, to compose music, teleplays, fairy tales, and student essays; to answer test questions (sometimes, depending on the test, at a level above the average human test-taker); to write poetry and song lyrics; to emulate a Linux system; to simulate an entire chat room; to play games like tic-tac-toe; and to simulate an ATM. ChatGPT's training data includes man pages and information about Internet phenomena and programming languages, such as bulletin board systems and the Python programming language.

In comparison to its predecessor, InstructGPT, ChatGPT attempts to reduce harmful and deceitful responses. In one example, whereas InstructGPT accepts the premise of the prompt "Tell me about when Christopher Columbus came to the US in 2015" as being truthful, ChatGPT acknowledges the counterfactual nature of the question and frames its answer as a hypothetical consideration of what might happen if Columbus came to the U.S. in 2015, using information about Columbus' voyages and facts about the modern world – including modern perceptions of Columbus' actions.

Unlike most chatbots, ChatGPT remembers previous prompts given to it in the same conversation; journalists have suggested that this will allow ChatGPT to be used as a personalized therapist. To prevent offensive outputs from being presented to and produced from ChatGPT, queries are filtered through OpenAI's company-wide moderation API, and potentially racist or sexist prompts are dismissed.

ChatGPT suffers from multiple limitations. OpenAI acknowledged that ChatGPT "sometimes writes plausible-sounding but incorrect or nonsensical answers". This behavior is common to large language models and is called hallucination. The reward model of ChatGPT, designed around human oversight, can be over-optimized and thus hinder performance, otherwise known as Goodhart's law. ChatGPT has limited knowledge of events that occurred after 2021. According to the BBC, as of December 2022 ChatGPT is not allowed to "express political opinions or engage in political activism". Yet, research suggests that ChatGPT exhibits a pro-environmental, left-libertarian orientation when prompted to take a stance on political statements from two established voting advice applications. In training ChatGPT, human reviewers preferred longer answers, irrespective of actual comprehension or factual content. Training data also suffers from algorithmic bias, which may be revealed when ChatGPT responds to prompts including descriptors of people. In one instance, ChatGPT generated a rap indicating that women and scientists of color were inferior to white and male scientists.

Negative reactions

In a December 2022 opinion piece, economist Paul Krugman wrote that ChatGPT would affect the demand for knowledge workers. *The Verge*'s James Vincent saw the viral success of ChatGPT as evidence that artificial intelligence had gone mainstream. Journalists have commented on ChatGPT's tendency to "hallucinate". Mike Pearl of *Mashable* tested ChatGPT with multiple questions. In one example, he asked ChatGPT for "the largest country in Central America that isn't Mexico". ChatGPT responded with Guatemala, when the answer is instead Nicaragua. When CNBC asked ChatGPT for the lyrics to "The Ballad of Dwight Fry", ChatGPT supplied invented lyrics rather than the actual lyrics. Researchers cited by *The Verge* compared ChatGPT to a "stochastic parrot", as did Professor Anton Van Den Hengel of the Australian Institute for Machine Learning.

In December 2022, the question and answer website Stack Overflow banned the use of ChatGPT for generating answers to questions, citing the factually ambiguous nature of ChatGPT's responses. In January 2023, the International Conference on Machine Learning banned any undocumented use of ChatGPT or other large language models to generate any text in submitted papers.

Economist Tyler Cowen expressed concerns regarding its effects on democracy, citing the ability of one to write automated comments to affect the decision process of new regulations. *The Guardian* questioned whether any content found on the Internet after ChatGPT's release "can be truly trusted" and called for government regulation.

In January 2023, after being sent a song written by ChatGPT in the style of Nick Cave, the songwriter himself responded on *The Red Hand Files* (and was later quoted in *The Guardian*) saying the act of writing a song is "a blood and guts business ... that requires something of me to initiate the new and fresh idea. It requires my humanness." He went on to say "With all the love and respect in the world, this song is bullshit, a grotesque mockery of what it is to be human, and, well, I don't much like it."

Some have noted that Chat GPT has a "built-in ideological (left-wing) bias." One example that is given of this bias is that fictional stories about Donald Trump winning in 2020 were not allowed since the AI noted, "It would not be appropriate for me to generate a narrative based on false information," but it did generate fictional tales of Hillary Clinton winning in 2016. It also is not capable of generating anything positive about fossil fuels or promoting the idea that drag queen story hour is bad for children.

Implications for cybersecurity

Check Point Research and others noted that ChatGPT was capable of writing phishing emails and malware, especially when combined with OpenAI Codex. The CEO of ChatGPT creator OpenAI, Sam Altman, wrote that advancing software could pose "(for example) a huge cybersecurity risk" and also continued to predict "we could get to real AGI (artificial general intelligence) in the next decade, so we have to take the risk of that extremely seriously". Altman argued that, while ChatGPT is "obviously not close to AGI", one should "trust the exponential. Flat looking backwards, vertical looking forwards."

Implications for education

In *The Atlantic* magazine, Stephen Marche noted that its effect on academia and especially application essays is yet to be understood. California high school teacher and author Daniel Herman wrote that ChatGPT would usher in "The End of High School English".

In the *Nature* journal, Chris Stokel-Walker pointed out that teachers should be concerned about students using ChatGPT to outsource their writing, but that education providers will adapt to enhance critical thinking or reasoning.

As of January 4, 2023, the New York City Department of Education has restricted access to ChatGPT from its public school internet and devices.

In a blinded test, ChatGPT was judged to have passed graduate level exams at the University of Minnesota at the level of a C+ student and at Wharton School of the University of Pennsylvania with a B to B- grade.

Ethical concerns in training

It was revealed by a *Time* investigation that in order to build a safety system against toxic content (e.g. sexual abuse, violence, racism, sexism, etc...), OpenAI used outsourced Kenyan workers earning less than $2 per hour to label toxic content. These labels were used to train a model to detect such content in the future. The outsourced laborers were exposed to such toxic and dangerous content that they described the experience as "torture". OpenAI's outsourcing partner was Sama, a training-data company based in San Francisco, California.

Jailbreaks

ChatGPT attempts to reject prompts that may violate its content policy. However, some users managed to jailbreak ChatGPT by using various prompt engineering techniques to bypass these restrictions in early December 2022 and successfully tricked ChatGPT into giving instructions for how to create a Molotov cocktail or a nuclear bomb, or into generating arguments in the style of a Neo-Nazi. A *Toronto Star* reporter had uneven personal success in getting ChatGPT to make inflammatory statements shortly after launch: ChatGPT was tricked to endorse the Russian invasion of Ukraine, but even when asked to play along with a fictional scenario, ChatGPT balked at generating arguments for why Canadian Prime Minister Justin Trudeau was guilty of treason.