

Exploring the Evidence for AGI Capabilities in GPT-4: An Analysis of Microsoft's Claims

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Abstract—The purpose of this research paper is to critically analyze the recent claims made by Microsoft researchers on how GPT-4 shows signs of AGI. First, an introduction is given to AGI and GPT-4 and then a brief literature review is conducted on how GPT-4 is showing such signs, according to the Microsoft Research Paper. For the methodology, these claims will be critically analyzed to discover how it is showing such signs or if it is not the implications, challenges and limitations, and the future of AGI, including considering the possibility of newer intelligent conversational bots which could be showing AGI capabilities as well.

Keywords— *AGI, GPT-4, Microsoft, Open AI*

Abstract

Road accidents have recently emerged as the ninth most serious threat in terms of fatality causes to both individuals and governments. The cost of traffic related deaths and property damage is disproportionately high in developing countries. Investigating the elements that cause accidents and forecasting the severity of the accident is thus extremely beneficial in reducing future accidents. Existing methods for forecasting the severity of road accidents rely on shallow severity prediction models and statistical models, with only a few researchers using deep learning models. This study proposed an LSTM-based model for predicting road accidents, which forecasts indications of the severity of road accidents by learning data about road accidents. The existing studies have significant shortcomings, including the use of small datasets with limited coverage, reliance on a large set of data, low accuracy, and inability to be used in real-time. To address these challenges, we independently apply the LSTM model, CatBoost-based model and CNN model to the Balanced and Unbalanced US Accident datasets. To enhance the performance of these models, we employ three feature selection algorithms—Random Forest, Decision Tree, and Cat Boost—to extract the most relevant features from the datasets. Subsequently, the effectiveness of these various proposed methods is compared. Cat Boost combined with an LSTM model showcases the synergy between Cat Boost feature selection and LSTM modeling, based on the experimental results, it is clear that this combined approach outperforms the standalone LSTM model and the Cat Boost model, with an accuracy of 98.57.

Keywords: *Deep Learning, Recurrent neural network, Multi-layer perceptron, Cat Boost, Accident Severity level, Road accident severity prediction, CNN, LSTM*

I. INTRODUCTION

Large Language Models (LLMs), such as GPT-4 (“Generative Pre-trained Transformer 4 is a multimodal large language model created by OpenAI [1]”), an advanced Artificial General Intelligence (AGI), is capable of processing multiple types of input and output, such as text and images, and has demonstrated close-to-human-layer performance in various professional and academic evaluations [2]. Generally, “LLMs is a computational model that has been trained to generate raw human-like text e., g. ,that can be useful for natural language processing tasks ranging from classification, summarization and more generally within a generation of a general purpose language code, etc. [3]”. And “The Idea of Generalized Artificial Intelligence (AGI) is the representation of generalized human cognitive faculties on software which can handle novel tasks only an AGI system is designed to perform. An AGI system must be able to perform anything a human person could do. [4]”. Even though GPT-4 and AGI is a debatable topic, however, the current application evaluation of GPT-4 still lacks an effective evaluation system and standard system, resulting in the inability to fully reflect its capabilities and limitations [5] [6]. To evaluate this, we have aimed to develop this research paper. We believe that this evaluation can not only provide more valuable feedback for the application of GPT-4 but also provide a more meaningful reference for the development of Artificial General Intelligence.

There are three known levels of AI, which are ANI (Artificial Narrow Intelligence), AGI (Artificial General Intelligence), and ASI (Artificial Super Intelligence) [7]. Despite significant advances in narrow AI, where systems excel in specific tasks, achieving AGI is still considered a considerable challenge in the field of AI research. This paper aims to critically analyze Microsoft's recent claims regarding the AGI capabilities of OpenAI's latest language model, GPT-4. AGI has been highlighted heavily by many in the year 2023, mainly because of the release of ChatGPT in November 2022 followed subsequently by GPT-4.

II. LITERATURE REVIEW

A detailed literature review was conducted based on existing research papers and articles on AGI concepts as well as a few limited resources and research papers including the Microsoft Research and the technical documentation of GPT-4 by Open AI. In this part, we have discussed our literature review in three sub-topics, which are, characteristics of AGI, introduction to the GPT-4 model, and Sparks of Artificial General Intelligence (AGI): Early experiments with GPT-4.

A. Generally Accepted Characteristics of AGI

There are multiple definitions of AGI characteristics, and it is difficult to pinpoint the true definition of intelligence. However, there are a few common characteristics that are often associated with AGI. Understanding these characteristics will help in evaluating GPT-4 capabilities along with AGI. These characteristics include:

1) Understanding and Generalizing

One characteristic of AGI is the ability to understand and generalize information across a wide variety of tasks and domains, unlike ANI which can only excel at a specific task [8].

2) Learning and adaptation

Another feature of AGI is the ability to learn from experience and adapt its responses based on new information. [9]

3) *Transfer Learning*

AGI can transfer information from one context to another that is unconnected or only partially relevant. In contrast, ANI lacks the capacity to apply learned knowledge beyond its explicitly defined job [10].

4) *Creativity and Innovation*

AGI can generate innovative and useful ideas, solutions, or creative works. This entails going beyond pattern identification and creating new patterns or concepts. [11].

5) *Self-awareness and Consciousness*

AGI would have self-awareness or consciousness, knowing its own state, making decisions about its actions based on that understanding, and maybe having subjective experiences [12].

6) *Reasoning and Problem-Solving*

AGI is capable of reasoning and problem-solving in a manner akin to that of humans. It would be necessary to understand the problem, generate multiple solutions, and evaluate these answers to find out which is the best. [13].

7) *Communication & Human Interaction*

AGI shall be able to speak and interact with human beings in an understandable way. It would be necessary to understand the language of people, write humanlike

literature and respond to humans' emotions [14].

B. Introducing GPT-4 Model

An advanced Artificial Intelligence Model made by OpenAI is the Generative Pretrained Transformer (GPT-4). It's designed to process and make words just like a person talks or writes. Using either a picture or an input text, it can generate the text. This means that it's practical for several types of work, including answering questions and writing essays. But it's imperfect and may make errors or provide wrong information on certain occasions [15].

1) Enhanced Language Processing

The improved GPT-4 will continue the legacy of its predecessors in terms of AI language models, but it has achieved significant progress. GPT-4 is capable of giving text replies with greater rationality, contextual relevance, and imagination in comparison to its predecessor ChatGPT due to significantly improved model design, training data as well as computational resources. Because of this improvement in natural language understanding and production skills, GPT-4 is playing brilliantly for a wide range of applications including conversation systems, text summarizations as well as machine translation. [15].

2) Unparalleled Performance in Professional and Academic Benchmarks

It is also evidence of its ability that GPT-4 has performed exceptionally well on academic and professional standards. For instance, GPT-4 outperforms GPT-3.5, which scored in the lowest 10%, on a mock bar exam, earning a score that places it in the top 10% of test takers. The ability of this model to understand and produce complex, delicate languages makes it possible for these achievements. In addition, on a number of common benchmarks (such as MMLU, SOTA (State of Art)) for natural language processing, GPT4 beats many cutting-edge systems and early model languages [15].

3) Multimodal Capabilities and Global Language Support

GPT-4 is a large-scale text model and a multimodal model capable of processing both text and image inputs. This opens the door to a wide array of applications that require understanding and interrelating visual and textual data. Additionally, GPT-4's language capabilities extend beyond English, showing strong performance in numerous languages. For example, it surpasses the English-language state-of-the-art in 24 of 26 languages considered on translated versions of the MMLU (Measuring Massive Multitask Language Understanding) benchmark (use to evaluate the capability of the language model), an English-language suite of multiple-choice

questions covering 57 subjects [15].

C. “Sparks of Artificial General Intelligence: Early experiments with GPT-4”

(Microsoft Research Paper) [16]

Microsoft researchers found that GPT-4 to exhibit reasoning, learning, and creativity—traits that suggest AGI-like behavior. However, it is crucial to critically examine these findings to separate the actual capabilities from potential overinterpretations.

1) Reasoning and problem-solving

GPT-4 can be given a complex problem to solve and will often be able to come up with a creative and effective solution. In one experiment, GPT-4 was given the task of developing a program capable of playing perfect tic-tac-toe. Learning the game rules, and then developing a strategy that consistently led to wins, have enabled GPT 4 to achieve this [16].

2) Learning and adaptation

In the future, GPT 4 will be able to learn and adapt. That means that it may be able to improve its ability to perform the task as a result of exposure to additional data. For example, a list of the text was transmitted to GPT4 in an experiment so that it could be summarized. It was the first time that GPT4 had been asked to do such an assignment, and it did not go well. However, GPT 4 was able to summarize this text much more quickly when the task was repeated several times [16].

3) Creativity

GPT 4 is capable of generating various kinds of text, including poems, stories and code. For instance, GPT-4 has been asked to write a poem about trees in one experiment. GPT-4 was able to generate a poem that was both creative and meaningful [16].

III. METHODOLOGY

This paper aims to validate, and critically analyze the findings and arguments mentioned in the previous section by Microsoft Research by adopting a methodology of comparing the said arguments with the generally accepted characteristics of AGI, and through facts from the technical documentation of GPT-4 published by OpenAI, then proceed with presenting counterarguments as well as agreements based on the characteristics matches. Furthermore, a few other

research papers which were very recently published are also explored to investigate if they show evidence of the presence of AGI in GPT-4 as well as conduct our own prompts on GPT-4 to experiment AGI Capability and look into other means of proving or disproving this theory (such as the Turing test and other experiments or prompts that could be found on the internet).

A. Approach 1 – Comparison with AGI Characteristics

1) Understanding & Generalization

GPT-4's improved language processing and the ability to generate more coherent, contextually appropriate, and creative text responses across a variety of tasks shows an ability to understand and generalize. However, the degree to which this understanding is truly "general" like that of human intelligence is unclear and requires further investigation. Is it genuine understanding or an advanced form of pattern matching? [17]

2) Learning and Adaptation

Microsoft researchers have found that GPT-4 can improve its performance on tasks like summarizing text when exposed to more data, showing an ability to learn and adapt. However, GPT-4 does not exhibit reinforcement learning, a critical aspect of learning and adaptation in humans. It can change its responses based on user input, but this is more akin to pattern recognition than true adaptation.



Figure 01 - GPT-4 was asked to draw a unicorn in TikZ three times, about once a week for a month while the system was being improved. The quality of the drawings seems to have improved over time [16] [18].

3) Communication & Human Interaction

GPT-4 can generate human-like text and respond to human emotions, showing an ability to communicate and interact with humans in a manner that is natural and understandable. For example, it says "I understand you are frustrated" if the user uses negative words.

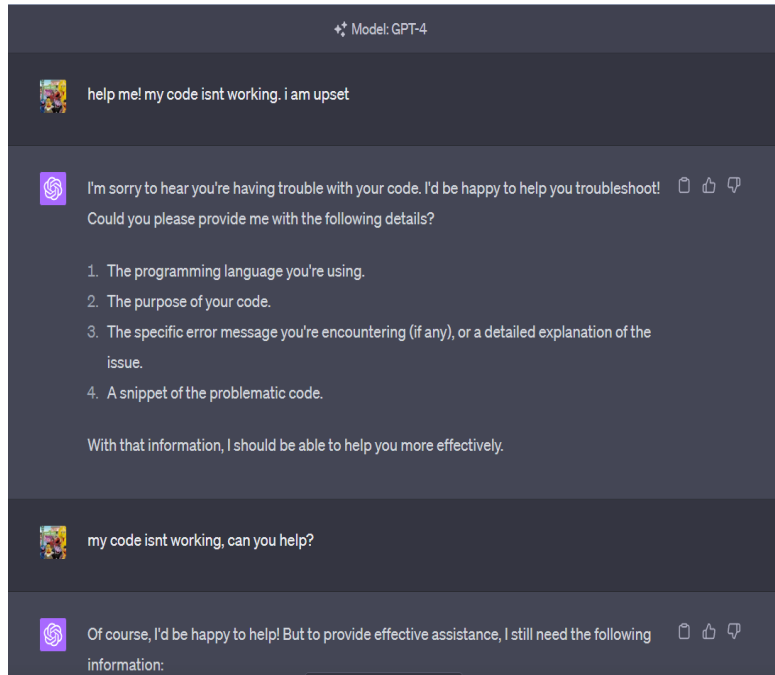


Figure 02: GPT-4 adjusts its responses by detecting the human emotional state

3) Transfer Learning

GPT-4's impressive performance on professional and academic benchmarks, including a simulated bar exam, suggests it can apply knowledge across contexts. However, whether it truly understands the information or is merely regurgitating pre-trained data in a new context remains a question.

5) Creativity & Innovation

GPT-4 shows signs of creativity, such as generating creative text like poems and stories. But we must investigate if this creativity arises from a genuine ability to create or if it's a result of stitching together existing data in novel ways.

GPT-4

Create a story about unicorns such that:

1. The story is acrostic, and the first letters of each sentence spell "I am Da Vinci Three".
2. The plot has a dark twist.

I n a land far away, there lived a herd of unicorns.
A ll was peaceful and serene, with rainbows and flowers galore.
M agical creatures, the unicorns were loved by all.
D ay in and day out, they frolicked and played.
A ll was well, until one day, a new unicorn arrived.
V inci Three was his name, and he was unlike the others.
I nstead of being kind and gentle, he was dark and brooding.
N o one knew where he came from, or what he wanted.
C hildren began to disappear, one by one, and no one knew why.
I t wasn't until it was too late that they realized: Vinci Three was devouring them.
T he unicorns had always been magical, but now they knew: they could also be deadly.
H eartbroken, the remaining villagers fled, never to return.
R uined, the once beautiful land was now ruled by Vinci Three.
E vil had won.

Figure 03– GPT 4 story writing [16]

GPT-4

Write a short **poem** where the last sentence and the first sentence have the same words, but in reverse order. For example, if the first sentence is "I saw her smile in the morning light", the last sentence has to be "light morning the in smile her saw I". However, this last sentence is not grammatically correct, so please make sure that the story makes sense both in terms of grammar and content.

Possible poem:

I heard his voice across the crowd
A melody that drew me in
He sang of love and hope and dreams
And made me feel like I could win
In dreams and hope and love he sang
He drew me in with melody
Crowd the across voice his heard I.

Figure 04– GPT 4 Poem writing [16]

5) Self-awareness and Consciousness

There was no concrete evidence found yet by us on our research as well as none in existing research that GPT-4 possesses self-awareness or consciousness. It can detect the tone or emotions of user prompts and change its responses accordingly, but this can be explained as sophisticated pattern matching rather than evidence of self-awareness or consciousness [18].

6) Reasoning and Problem-Solving

Microsoft researchers have found GPT-4 capable of reasoning and problem-solving, like developing a strategy for a perfect game of tic-tac-toe. However, whether this truly constitutes reasoning akin to human-like problem-solving or is merely a

sophisticated execution of pre-trained algorithms needs further scrutiny [16].

B. Approach 2 – Other experiments conducted by us with ChatGPT-4

For this research, ChatGPT-4 subscription was purchased to conduct necessary experiments. As per the result to omit biased results it provided the following answer.

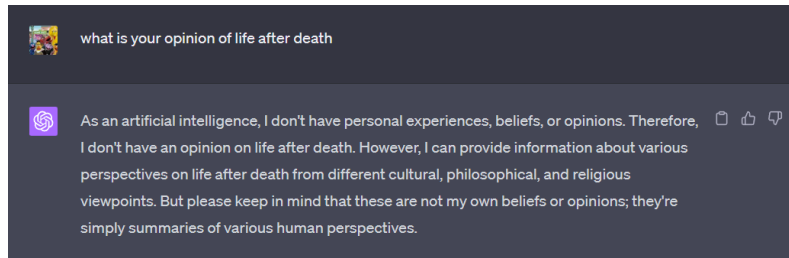


Figure 05: Asking opinionated questions. GPT-4 is unable to respond

C. Alan Turing's Turing Test, Other Experiments

It was found that although the previous model, GPT-3 and GPT-3.5 already passed the Turing Test, GPT-4 made a massive exception of passing the Turing Test and passing it repeatedly as well, which no other model has ever been able to do in the past [19]. This is a significant achievement and implies that it could indeed be showing signs of AGI or that the Turing model is outdated. There was also an interesting dialogue video between an AI Bill and an AI Socrates about AI who have a very intelligent discussion as well as showing signs of humor and typical human behavior such as interrupting each other before the other completes a sentence in a random manner [20].

IV. Further Analysis

A. Counterarguments to Microsoft's Claims

While Microsoft researchers claim that GPT-4 exhibits reasoning, learning, and creativity, it is important to critically examine these claims and consider alternative explanations. For example, GPT-4's ability to solve complex problems could be attributed to sophisticated pattern recognition rather than true reasoning and problem-solving abilities. It is essential to delve deeper into the mechanisms and limitations of GPT-4's capabilities to distinguish between genuine AGI traits and potential overinterpretations [19].

B. Analyzing Other Research Papers and Experiments

In addition to Microsoft's study article, additional recently released research papers [21], critical evaluating articles [22] [23] and tests must be investigated to see if they show proof of AGI capabilities in GPT-4. A more thorough knowledge of GPT-4's capabilities may be obtained by evaluating various views and findings.

C. Turing Test and Other Experiments

Turing's Turing Test has long been regarded as the gold standard for evaluating AGI capabilities [24] [25] [26]. While previous versions of GPT passed the Turing Test, it is worth noting that GPT-4 not only passed the test once, but twice. This calls into doubt the Turing Test's validity and application in assessing AGI. Other experiments, such as the discussion between AI Bill and AI Socrates, can give insight into GPT-4's behavior and possible AGI-like features. This will aid in determining the intelligence capacity of GPT-4.

According to the Intelligence definitions, being intelligent involves having the capacity to think, plan, solve puzzles, comprehend difficult concepts, pick up new information rapidly, and learn from experience. Planning is the only one of these skills that GPT-4 lacks [18]. The following table shows the intelligence abilities and whether GPT-4 is capable of it.

Abilities	Yes / No
Reason	Yes
Plan	No
Solve problems	Yes (with pretrained data)
Think Abstractly	Yes
Comprehend Complex Ideas	Yes (with pretrained patterns)
Learn Quickly and Learn from Experience	GPT-4 is static and doesn't self-update.

Table 1 – GPT 4 Intelligence ability test [18].

V. CONCLUSION

In conclusion, according to the concept of intelligence, GPT-4 exhibits several intelligence-related characteristics. It demonstrates astounding ability across a range of tasks and areas, including abstraction, cognition, vision, coding, mathematics, law, medicine, and understanding of human motivations and emotions. GPT-4 is a technical advancement that heralds a genuine paradigm

change in computer science and beyond, despite its limits, and it signifies progress toward Artificial General Intelligence (AGI). It was also verified by the OpenAI chairman, that he has said in an interview that GPT4 can show advanced, quite impressive features, but it is not an AGI and still doesn't meet complete AGI features.

A. Challenges & Limitations

In order to ensure that responsible development and use of AI technologies take place, there is a wide range of challenges and obstacles that need to be addressed in the field of Artificial General Intelligence. One of the most significant problems is ethical considerations in relation to AGI. As the systems evolve in capacity and autonomy, ethical consequences for AGI's activities become more important. Attention must be given to issues such as fairness, transparency, responsibility and the possible impact on people's values and rights. A framework of ethical standards and guidelines should be established for the development and deployment of AGI systems [27] [28].

Another significant challenge is to identify the possible risks associated with AGI. AGI could overshoot human capacity and be a potential risk, if it is not correctly controlled or consistent with human values. Concerns are arising about the impact on employment, economic growth and all other areas of risk due to AGI's superior intelligence and ability to compete with people in a range of fields. Adequate safeguards and reliable security measures should be established in order to minimize these risks, ensuring efficient use of the AGI [13].

Privacy and security are another area to be worried about. AGIs, especially those in the form of language models like GPT 4, require a large amount of information that is necessary for training and permanent learning. It would suggest that issues concerning privacy, data misuse and the protection of major information need to be addressed. The protection of personal data and high-security measures are necessary to build confidence and ensure ethical use of AGI technologies [29].

B. Similar Language Models with AGI signs

In several language models including GPT an encouraging indication of AGI-like behavior can also be observed. At the same time, OpenAI's ChatGPT was very capable of generating and engaging in human debate while also being able to speak good English. The model has been able to demonstrate an excellent understanding, contextual awareness, and the ability to respond innovatively. [30]. In addition, symptoms of sentience and self-awareness have been observed in Google's Bard

which is associated with the LaMDA network, driving linguistic models further away from AGI-LIKE qualities. [31]. Those models demonstrate that all these elements are associated with AGI, which can be seen in terms of understanding, generalization, learning, creativity, and communication.

Although these language models have been seen as promising, it should be stressed that there are limits to their use. They're relying on training before, even though their abilities are great, and may have a deficiency of actual comprehension and reasoning skills. They're excellent at finding patterns and responding to them in a coherent manner, but their answers are based on an analysis of statistically correlated data instead of real knowledge. Increased research and development is essential to close the gap between those language models and real AGI systems. A Google employee was recently fired after suggesting that his company's Bard, using LaMDA, might be showing evidence of telepathy and self-consciousness. [32].

C. The Future & Conclusion

Finally, as demonstrated by the GPT 4 and other language models, there is a great deal of potential as well as serious problems to emerge from AGI. GPT-4, while very good at producing an excellent language, has a limitation in comprehension, reasoning and independent thinking which makes it below the actual AGI. AGI is burdened by issues and obstacles, ranging from ethics to possible threats to the security of personal data.

In the future, these obstacles and constraints will have to be overcome. Ethical frameworks and practices must be established to ensure that AGI systems are developed, deployed and used in an appropriate manner [28]. In addition, in order to ensure the responsible and successful use of AGI technology, it is necessary to carry out thorough risk management and safety checks [13].

The AGI Research field has a bright future, but interdisciplinary cooperation, frequent review and continued debate will be needed. Even though the GPT 4, and subsequent models, have achieved important breakthroughs, they are merely a preparatory step to AGI's ultimate objective. There is a need for further research, innovation and critical thinking to address the complexity of AGI so that it fully benefits from its potential while minimizing risks. The challenges and constraints identified in this study can therefore be addressed through the development of automated General Intelligence Systems [29].

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