Babylonian Journal of Artificial Intelligence
Vol. **(2025)**, 2025, **pp**. 15–22
DOI: https://doi.org/10.58496/BJAI/2025/002 ISSN: 2958-6453
https://mesopotamian.press/journals/index.php/BJAI

Research Article

Image Generation Using Generative AI: Comparison Between OpenAI Art and Stable Diffusion

Ismael Khaleel Khlewee[1,*,]

[1] *Sunni Endowment Diwan, Baghdad, Iraq.*

ARTICLE INFO

Article History

Received 01 Jan 2025
Revised: 18 Jan 2025
Accepted 20 Feb 2025
Published 05 Mar 2025

Keywords

Generative AI

Image Generation

OpenAI Art

Stable Diffusion

AI Art Comparison

ABSTRACT

Generative AI has made significant strides in image generation, with OpenAI Art and Stable Diffusion emerging as two prominent tools in the field. This study aims to compare the capabilities of these two models in terms of performance, quality, and creativity in generating images based on text prompts. We evaluate both tools using a range of image categories, assessing their output for accuracy, creativity, and consistency with provided instructions. The findings suggest that while OpenAI Art offers faster responses and simpler outputs, Stable Diffusion excels in producing more realistic and diverse images. This paper delves into the methodologies of both tools, offering insights into their strengths and limitations, and provides a comprehensive comparison based on experimental results.

1. INTRODUCTION

AI has significantly advanced in its ability to generate images, creating a rich visual experience, and as a result, generative AI is gaining immense popularity in various fields. These technologies represent the pinnacle of current capabilities in image generation and enhancement. One specific model builds upon a recent predecessor that has demonstrated remarkable success in various language-image tasks, showcasing the continuous improvement in this area [1]. Our research question focuses on understanding the differences between these two models and exploring the conditions under which one model may outperform the other [2]. We will delve into the methodologies employed by both models, detailing the distinct approaches they utilize for image generation. Additionally, based on a comprehensive analysis of the images produced by both tools, we will introduce a thorough investigation that highlights the similarities and differences in their performance and efficacy. [3]

Generative AI refers to advanced models or sophisticated techniques that empower artificial intelligence to autonomously generate a variety of outputs, including images, animations, music compositions, and textual content [4]. This innovative technology includes a vast array of applications and use cases, ranging from facilitating the development of groundbreaking technologies, rigorously testing theoretical frameworks, propelling the progress of autonomous vehicles, to providing users with more immersive experiences and personalized solutions across diverse fields like gaming, the arts, retail, and simulation [5]. In this comprehensive study, we place a significant focus on the intriguing domain of image generation utilizing generative AI tools. When we discuss AI-generated artwork, we highlight the interplay of techniques, styles, objects, and scenes that all coalesce during the testing phase to create a visually captivating image that previously did not exist in any physical form. In short, the realm of generative AI uniquely generates images that represent things that are entirely fictional and do not exist in reality [6][22]. To further advance our insights, we present a detailed comparison of two distinct generative AI tools, aiming to illuminate and highlight the unique offerings and functionalities of each tool in this fast-evolving landscape. The system under investigation has been meticulously researched, factoring in both the process of image generation and the qualitative aspects concerning the quality of images produced by neural networks in the context of generative AI [1].

1.1. Research Objectives

Performance comparison between OpenAI Art and Stable Diffusion in image generation.

*Corresponding author. Email: Ismael.khaleel.cs70@gmail.com

2. GENERATIVE AI IN IMAGE GENERATION

Generative AI is a domain of artificial intelligence that broadly deals with creating outputs, mainly in the form of various media types like music, text, and images. Some areas of AI technologies that play a substantial role in Generative AI include machine learning, neural networks, probability, and behavioral algorithms. It has evolved in a four-stage mechanism since the mid-2000s quite drastically. It ranges from pre-deep learning to the contemporary digital manifold era now. It comes with an array of applications across industries. The process of creating something from nothing will hopefully bring technological advancements to the point where our interaction with AI technology can further bring virtual creations to our physical reality [1].

Generative AI can normally be divided based on the type of output it yields. For example, text-based outputs can be achieved using AI, music can be generated using AI, primarily concentrates on generating pictures, and even the new AI works well to create realistic images to support a conversation. But here, we wish to specifically talk about AI technologies that mainly concern creating images, and we could argue that the artistic field of painting or drawing is closest in resemblance. AI-generated images go through various types of processes to make, starting from abstract forms, pixel arrays, intricate faces and figures, to realistic rendering images used in films or video games. [7]

Generative AI comes with numerous applications for what we can do with generated images, like creating art, filling spaces between stills, helping those who might have trouble with drawing something right, saving time in creating an animation, and hence more can be used in unimaginable ways, all to take us where? The ideas below could prompt ideas in business-led creativity. The advancement of AI technology we've seen in the last 20 years is mind-blowing. It has auctioned data sets up into the digital manifold, where the space between data can finally be filled with ones and zeros that will turn the raw geometry data into phenomena. It has the power to bring breakthroughs in expanding creativity and invention so far. Energizing! [8]

2.1. Overview of Generative AI

Generative AI, as a field, is concerned with creating content using networks that learn in a manner similar to the human mind. Networks like these are built using artificial neural networks; the most popular should be mentioned: autoencoders, variational autoencoders, and recurrent neural networks. These systems leverage existing datasets as their learning material and force the network to learn the most crucial and significant features of the data, allowing us many times to produce content that is virtually indistinguishable from real things [9]. A small but conceptually large breakthrough came in 2014 when a system named DeepDream was posted to the public to make many shapes and patterns in a variety of datasets that were not there. Researchers began playing around with the simple outputs of networks that attempted to "show" what a picture was to a system and discovered that in their need to conserve computational resources, ambiguous input was often matched with wild and dreamy responses in the images. Ever since, creating and generating images has been a high priority in AI research. [10]

A new system called generative adversarial networks, commonly referred to as GANs, was suggested for learning to talk to the computer to create images. What is most powerful about GANs is not just their generation but the persistence through which GAN researchers have given birth to several core technologies that are capable of massive progress when it comes to the computer creation of image content. Not only is this computer system capable of creating new images, but independent component analysis has opened fields of investigational creation that have attracted scientists and computer users as well as professional artists [11]. These developments are without a doubt revolutionary tools in the development of a new corporate loyalty framework and also provide an essential set of tools to learn and use elements of visual art creation. A lot could be said about the relationship between generative AI, art, computer graphics, and photo retouching, but we will simply note here that generative AI is also fundamentally positioned between the twin towers of these types of technology-driven art interaction based on computer graphics and multimedia information. Inasmuch as a picture and art can be about offering spectators the opportunity to step into the shoes of another individual, the creation of pretty pictures or visual sketch art can find a reasonable selling point. But we are not in that market [12].

2.2. Applications in Image Generation

Generative AI techniques such as GANs, VAEs, VQ-VAEs, Transformers, and LSTMs play a significant role in the generation of images. The fashion industry shares a massive interest in the automatic synthesis of multi-domain images, which diminishes the issue of large collection dissatisfaction. In-game environment design, gaming industries use these algorithms to automatically create game context and environment-level images, which save time and production costs. Moreover, advertising companies use auto-generated portraits and photographs of landscapes and cityscapes that easily attract peoples' eyes. AI systems such as synthetic networks are now used in food imagery technology to generate food images. The food images are generated at a high level of cleanliness, but they are imitation images created by AI. Here one important thing is that AI can provide creative visual experiences through automated creative process generation and recommendation. There are many straightforward outputs that result from the combination of multiple items of input content.

Some of them are genuinely creative. For example, an image encoding algorithm uses AI's internal synthesis processes to explore the nuances of facial expression, abstraction, illusion, and reality. Interestingly, contemporary AI is creating a conceptual style or generates a new form of aesthetic output [6].

However, such art forms have intrinsic issues, including deformation of beauty criteria, fairness criteria, and manipulation of people's faith and views. Depending on the preferences of the observer, art practice can be further enhanced by receiving application-specific image generation processes, thus determining the utility trade-offs explicitly required by different user communities. To some extent, AI art is expected to be a purely analytical medium, devoid of intellectual prejudices and existential restraint. However, whether AI creative products can be treated as genuinely creative needs further more discussion. Thus, in summary, the advancements in AI have led to the realistic generation of AI using handwritten information to image parts of individuals. AI is not only totally dependent on images but also applicable to various creative fields to increase productivity and creativity using AI [13].

3. GENERATIVE AI TOOLS

There are many different approaches and tools for generating images using generative AI. In comparison, we chose two prominent tools: OpenAI Art and Stable Diffusion.

3.1. Background on OpenAI Art and Stable Diffusion Tools

OpenAI Art and stable diffusion tools emerged in digital art as a relatively young domain. OpenAI Art has been in the earliest experimental phase for more than five years, and has been open to the public for just over a year. OpenAI Art combines many new developments in the field that have emerged over the last few years. The underlying models used to create these projects have changed dramatically over time. The discovery of new models over the past few years has led to a rapid evolution of the stable diffusion tools. The early product has been demoed as a stable diffusion tool for a long time, initially as a limited product. Similarly, the first releases were in the form of three-dimensional prints[14]. The Stable Diffusion Competition Model was one of the most successful projects, which was sold out to a community that remains highly engaged to this day, arguing that more variations should exist within this product. The idea was developed in part because the Head of Art suggested that photography could be a way to create marketable art using AI. The projects running Stable Diffusion were some of the first pieces of the Head of Art. In terms of audiences, while OpenAI Art has a significant following, the projects and communities developed around stable diffusion tools have remained comparatively smaller in size while remaining highly interconnected. OpenAI Art and the stable diffusion tools were developed and released in the context of the digital art project and market that had grown up around the programmable blockchain. Each generation of the system brought widely varying groups of creators to new algorithms. These were all developed using open-source platforms and then shared with the public for feedback[15].

3.2. Key Features and Capabilities of OpenAI Art

OpenAI Art is a digital artist tool designed by a team at OpenAI. The application is based on algorithms that offer opportunities for easy and instant creation of artworks in a wide variety of styles. Most importantly, the tool is designed in a specific manner to work with an easy and intuitive interface to aid the process of creating artwork [16].

Key features and capabilities of OpenAI Art: OpenAI Art is a versatile artist tool that combines human artistic choices and preferences with sophisticated programming algorithms that can create a wide range of different types of innovative, complex, and diverse artworks. The goal of OpenAI Art is to help people make artistic choices to generate images that they have in mind and use strategies to help bridge together their thoughts and the model. The tool has been designed with the knowledge that making programs more accessible to a wide range of artists and creators facilitates the development of new art forms. We have found that the method we created poses a menu of parameters that are required to enable the creation of the potential artist tool to be easy to understand and use by humans, as well as those who are expected to have little or no background in computer programming, and those who may have difficulty using user interfaces related to data visualization[17].

According to the ability to use the data analysis programming language designed to interpret the algorithm that humans can use to create art, style artwork pieces to look like an artwork piece of the user's choice from some of the collections included in a very large database of made-up art created by the same programming algorithms and tools. Using another tool to interpret the image caption, the software makes use of a computational programming language that enables it to compute, manipulate, visualize, and relate information in terms of images and mathematical expressions, and artistic style, from photographs or images from one's own collection of images, made-up art, artwork, or works of other people. The software can be considered as generating and manipulating software responding to user input to demonstrate and explain differences in art, style, expression, content, and meaning [18].

3.3. Key Features and Capabilities of Stable Diffusion Tools

Stable Diffusion is one of these tools. The main functionality of Stable Diffusion lies in text-to-image prompts, which essentially give a text description to go with the image. In each description, there is one sentence that would result in the

relative image. For users on the tool's website, they can type in inputs and see images that are generated from these inputs and descriptions. They can furthermore adjust things like strength values, and the artwork provided will then change as they would like it. It needs to be mentioned that using Stable Diffusion as a user is customizable and flexible, giving users liberty with what they want [19].

The ability to type in prompts and generate art was used most famously in the form of OpenAI Art, with another tool, DALL·E. Since then, other tools like this have been more developed, such as the Big Sleep tool, which is a Stable Diffusion tool with more features and is a newer-developed tool with more updates on its way. Although some people do not think that Stable Diffusion provides a genuine artistic edge, it also needs to be mentioned that it is certainly easier to use and understand for those who are new to text-to-image and text-to-art content in the modern day. Stable Diffusion does have its limitations, however. For example, changes put into the input text field sometimes do not reflect as much in changes to the provided art. Often, the artwork will use the same colors and strokes to create an image, no matter the input [20][21].

4. EXPERIMENTAL SETUP

We conducted experiments based on different datasets in order to verify and compare the capabilities of OpenAI Art and Stable Diffusion.

4.1. Datasets Used

The data set used is a set of different text commands in multiple fields that ask the model to generate specific images to compare with the other model. The commands are as shown in Table 1.

TABLE I. THE DATASET.

No	Field	Image Description
1	Landscapes	Mountain landscape with clear lake below
2	Animals	Huge elephant walking through savanna with big tree in background
3	Everyday things	Tidy desk with laptop and flowers in vase
4	People and Social Scenes	Little boy playing in the garden with a red ball.
5	Places and architecture	Modern city with skyscrapers lit up at night
6	Arts and Designs	Oil painting of a colorful bird on a tree branch in spring
7	Technology	Industrial robot working in a factory next to other machines
8	Science fiction	A spaceship flies through a galaxy full of stars and planets.

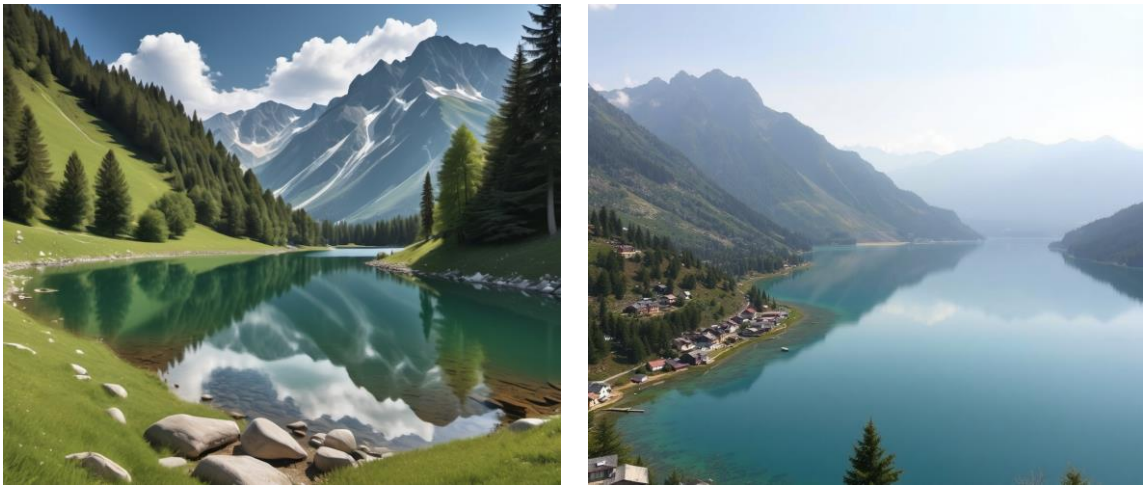
4.2. Models Evaluation Criteria

The criteria and standards that we adopted in evaluating each of the two models are (image quality, accuracy of the resulting images, creativity, consistency with text commands, innovation in the resulting images).

5. RESULTS AND ANALYSIS

We will classify the images according to each field and put the image created for each of the two models for comparison.

1. **Landscapes:**
   - Mountain landscape with clear lake below



OpenAi Art Stable Diffusion

Fig. 1. Mountain landscape with clear lake below

2. **Animals:**
   - Huge elephant walking through savanna with big tree in background.

OpenAi Art Stable Diffusion

Fig. 2. Huge elephant walking through savanna with big tree in background.

3. **Everyday things:**
   - Tidy desk with laptop and flowers in vase.

OpenAi Art Stable Diffusion

Fig. 3. Tidy desk with laptop and flowers in vase

4. **People and Social Scenes:**
   - Little boy playing in the garden with a red ball.

OpenAi Art Stable Diffusion

Fig. 4. Little boy playing in the garden with a red ball.

5. **Places and architecture:**
   - Modern city with skyscrapers lit up at night

OpenAi Art Stable Diffusion

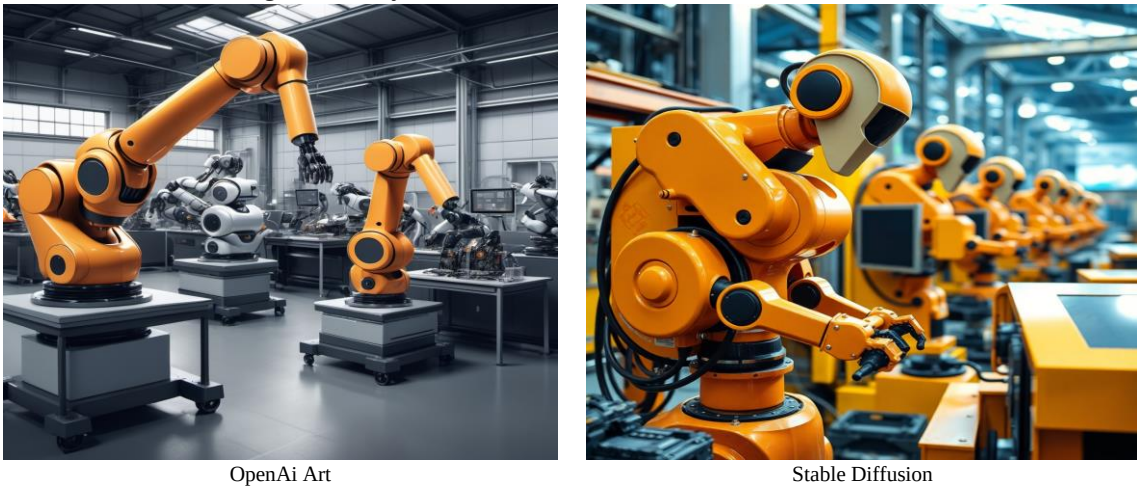
Fig. 4. Modern city with skyscrapers lit up at night.

6. **Arts and Designs:**
   - Oil painting of a colorful bird on a tree branch in spring.

OpenAi Art Stable Diffusion

Fig. 6. Oil painting of a colorful bird on a tree branch in spring.

7. **Technology:**
   - Industrial robot working in a factory next to other machines



OpenAi Art Stable Diffusion

Fig. 7. Industrial robot working in a factory next to other machines.

8. Science fiction:

- A spaceship flies through a galaxy full of stars and planets.

OpenAi Art Stable Diffusion

Fig. 8. A spaceship flies through a galaxy full of stars and planets.

5.1. Quantitative Comparison

Through the results that appeared from generating images for the two models, the two models will be compared quantitatively according to the following criteria (time taken, image quality), The first model will be called M1 and the second model will be called M2 to indicate them in the table. as shown in Table 2:

TABLE II. QUANTITATIVE COMPARISON.

Model	Time Taken	Image Quality
OpenAi Art (M1)	M1 takes less time than M2	M1 lower quality than M2
Stable Diffusion (M2)	M۲ takes More time than M1	M2 higher quality than M1

5.2. Qualitative Comparison

In qualitative comparison, both models seem close in their results, as the OpenAi Art model showed distinctive creativity and gave good consistency with text commands, and the same goes for the Stable Diffusion model, which gave excellent results, but the results of the Stable Diffusion model seem more realistic.

6. DISCUSSION

The results of this study provide a rich source of useful comparative data to put OpenAi Art and Stable Diffusion in their relative context. By analyzing the quantitative and qualitative metrics and image generation of both tools presented in this paper, we found that, in comparison, Stable Diffusion depicts more unusual and unique items, shows greater diversity, and, in the case of creating public content, elicits more comments. OpenAi Art is seen to outperform Stable Diffusion in terms of response speed to text prompts and also generates smaller images than the other model.

7. CONCLUSION

The comparison between OpenAI Art and Stable Diffusion highlights key differences in image generation capabilities. OpenAI Art is faster in responding to prompts and generates smaller images, but its outputs may lack the realism seen in Stable Diffusion, which produces higher-quality, more detailed, and diverse images. Despite these differences, both models demonstrate strong creative potential and consistency with text inputs. Stable Diffusion's ability to create more visually complex and realistic images makes it particularly suited for certain applications, while OpenAI Art's speed and ease of use make it valuable for users seeking quicker, less complex outputs. The study emphasizes that both tools have unique advantages, and the choice between them should depend on the specific needs of the user.

Conflicts Of Interest

The authors declare no conflicts of interest.

Funding

The authors clearly indicate that the research was conducted without any funding from external sources.

Acknowledgment

The author acknowledges the support and resources provided by the institution in facilitating the execution of this study.

References

[1] A. Bandi, P. V. S. R. Adapa, and Y. E. V. P. K. Kuchi, "The power of generative ai: A review of requirements, models, input–output formats, evaluation metrics, and challenges," Future Internet, 2023. mdpi.com

[2] Y. Liu, H. Duan, Y. Zhang, B. Li, S. Zhang, and W. Zhao, "Mmbench: Is your multi-modal model an all-around player?," in *European Conference on*, Springer, 2025. [PDF]

[3] R. Padilla, W. L. Passos, T. L. B. Dias, S. L. Netto, "A comparative analysis of object detection metrics with a companion open-source toolkit," Electronics, 2021. mdpi.com

[4] Z. Lv, "Generative artificial intelligence in the metaverse era," Cognitive Robotics, 2023. sciencedirect.com

[5] Z. Qadir, K. N. Le, N. Saeed, and H. S. Munawar, "Towards 6G Internet of Things: Recent advances, use cases, and open challenges," ICT express, 2023. sciencedirect.com

[6] S. S. Sengar, A. B. Hasan, S. Kumar, and F. Carroll, "Generative artificial intelligence: a systematic review and applications," Multimedia Tools and Applications, Springer, 2024. springer.com

[7] Y. Cao, S. Li, Y. Liu, Z. Yan, Y. Dai, and P. S. Yu, "A comprehensive survey of AI-generated content (AIGC): A history of generative AI from GAN to ChatGPT," arXiv preprint arXiv, 2023. [PDF]

[8] R. T. Hughes, L. Zhu, and T. Bednarz, "Generative adversarial networks–enabled human–artificial intelligence collaborative applications for creative and design industries: A systematic review of current …," Frontiers in artificial intelligence, 2021. frontiersin.org

[9] F. F. H. Nah, R. Zheng, J. Cai, and K. Siau, "Generative AI and ChatGPT: Applications, challenges, and AI-human collaboration," *Journal of Information*, 2023. tandfonline.com

[10] G. P. J. C. Noel, "Evaluating AI-powered text-to-image generators for anatomical illustration: A comparative study," Anatomical Sciences Education, 2024. wiley.com

[11] M. Y. Liu, X. Huang, J. Yu, T. C. Wang, and others, "Generative adversarial networks for image and video synthesis: Algorithms and applications," in *Proceedings of the …*, 2021. [PDF]

[12] R. Gozalo-Brizuela and E. C. Garrido-Merchán, "A survey of Generative AI Applications," arXiv preprint arXiv:2306.02781, 2023. [PDF]

[13] D. Baviskar, S. Ahirrao, V. Potdar, and K. Kotecha, "Efficient automated processing of the unstructured documents using artificial intelligence: A systematic literature review and future directions," IEEE Access, 2021. ieee.org

[14] K. I. Roumeliotis and N. D. Tselikas, "Chatgpt and open-ai models: A preliminary review," Future Internet, 2023. mdpi.com

[15] G. Somepalli, V. Singla, and M. Goldblum, "Diffusion art or digital forgery? investigating data replication in diffusion models," in *Proceedings of the*, 2023. thecvf.com

[16] V. Alto, "Modern Generative AI with ChatGPT and OpenAI Models: Leverage the capabilities of OpenAI's LLM for productivity and innovation with GPT3 and GPT4," 2023. [HTML]

[17] E. Cetinic and J. She, "Understanding and creating art with AI: Review and outlook," ACM Transactions on Multimedia Computing, 2022. [PDF]

[18] J. Li, S. Hashim, and J. Jacobs, "What we can learn from visual artists about software development," in *Proceedings of the 2021 CHI Conference*, 2021. acm.org

[19] N. Pavlichenko and D. Ustalov, "Best prompts for text-to-image models and how to find them," in *Proceedings of the 46th International ACM*, 2023. [PDF]

[20] Y. Li, H. Wang, Q. Jin, and J. Hu, "Snapfusion: Text-to-image diffusion model on mobile devices within two seconds," in Advances in ..., 2024. neurips.cc

[21] R. Tang, L. Liu, A. Pandey, Z. Jiang, and G. Yang, "What the daam: Interpreting stable diffusion using cross attention," arXiv preprint arXiv:2022. aclanthology.org.

[22] A. Alsajri, H. A. Salman, and A. Steiti , Trans., “Generative Models in Natural Language Processing: A Comparative Study of ChatGPT and Gemini”, Babylonian Journal of Artificial Intelligence, vol. 2024, pp. 134–145, Nov. 2024, doi: 10.58496/BJAI/2024/015.