IMAGE GENERATIVE AI: AI ART AND ARTIST

1Prakhar Nayak , 2Nikhil Verma, 3Priyanshu Anand, 4Chetanjai Singh, 5Savita Sahu

1,2,3,4B.tech Fourth Year Student, 5Assitant Professor

1,2,3,4,5Department of Computer Science & Engineering,

1,2,3,4,5Government Engineering College, Bilaspur , CG India

Abstract: Under the overall structure of the creative industries, this paper examines the state of the art in artificial intelligence (AI) technologies along with its applications. An overview of artificial intelligence (AI), with a focus on machine learning (ML) algorithms used to generate images. The creative processes in the visual arts are significantly impacted by this quickly developing field of artificial intelligence (AI) and image creation technologies. The increasing number of artistic applications and research projects at the nexus of AI and art AI is utilized to create new works of art and for creative reasons.

Index Terms - **Artificial intelligence, Machine Learning, Stable Diffusion**

1. INTRODUCTION

Artificial intelligence (AI) is rapidly penetrating every facet of daily existence. It is widespread has an impact on everyone, and is developing really quickly. AI can benefit humans in a variety of ways, including by performing labour-intensive, hazardous, or boring tasks for us; assisting in disaster relief and life-saving efforts; and providing entertainment and comfort in our everyday routines. AI technologies have gained strength and are being used more and more in a wide range of applications for specialized, creative, and general tasks.

Compared to ordinary behaviours, processes related to the creative sector require significantly different levels of ingenuity and skill sets. While AI achievements mostly depend on data compliance creativity frequently takes advantage of the human imagination to generate unique ideas that might not adhere to norms. In essence, creatives may think "outside the box" and pose "What if" questions that are difficult for limited learning systems to tackle since they have a lifetime of experiences to reflect on.

There has been a recent increase in the number of artists who are thinking about utilizing AI technologies to help them with "non-creative" duties like editing and image search. Since most AI technologies have been built to work in closed domains where they may support and aid people, this suggests a general awareness of the state of the art and indicates a general acceptance of AI as a tool across the community.

This study examines the uses of artificial intelligence (AI) and related technologies that are or could be important to the creative industries. After giving a brief introduction to AI and contemporary technologies, we present a number of imaginative domain applications. The second section of the study examines how design methodologies can address the legal, ethical, philosophical, social, economic, political, and technological issues brought by artificial intelligence. Nowadays, there is a growing understanding that, in order to guarantee the safe, advantageous, and equitable use of AI technology, a responsible approach to AI is required. The "AI art" movement is rapidly gaining traction in the mainstream of contemporary art. Although this has given the practice more energy, there is still much debate on whether or who is truly deserving of the title of "AI artist."

2. Image generative AI

Artificial intelligence (AI) is the combination of codes, methods, data, and algorithms that allow a computer system to learn and behave like a human and, as a result, make decisions that are comparable to—or sometimes even superior to—those made by humans. An artificial intelligence system effectively integrates a learning approach, a computational architecture, and a data environment for learning. As a result, training databases play a crucial role in maximizing the efficiency of machine learning operations, and as such, they hold a substantial amount of an AI system's value.

Neural Style Transfer (NST) was one of the most famous AI innovations that spurred the quick application and advancement of AI technologies for art. This technique showed how CNNs may be effectively used to separate and combine the "content" and "style" of a picture to create a styled image. A thorough review of the current NST techniques and their range of applications, as well as numerous new research contributions and applications, came after this discovery. The nomenclature used in computer vision and graphics implies that "content" and "style" have very simple definitions. A picture's "content" is defined as identifiable objects4 and people, whereas an image's "style" refers to an appealing or unique visual departure from the photorealistic portrayal of content.

2.1. Generative Adversarial Networks (GANs)

Generative Adversarial Networks (GANs) are the most essential technological advance that has greatly contributed to the current emergence of the AI Art movement. A significant advancement in the endeavour to employ machines to produce original visual material is represented by GANs. The training of two "competing" models—a generator and a discriminator—which are often implemented as neural networks, is the fundamental function of a GAN. While the discriminator is taught to identify generated images as fake and actual images from the original sample as real, the generator seeks to capture the distribution of true samples of the input sample and produce realistic images. The optimization process, which is intended to be a minimax optimization problem, finishes at a saddle point, which is regarded as a maximum by the discriminator and a minimum by the generator. When this framework was put into practice, it produced remarkably realistic-looking spoof versions of a variety of image formats. Soon after, GAN emerged as one of the most significant areas of artificial intelligence research, and other sophisticated, domain-specific variants of the original design, such as CycleGAN, StyleGAN, and BigGAN, were developed.

to further develop the GAN technology's ability to produce material in an innovative manner. According to AICAN, or artificial intelligence creative adversarial network, training a GAN model on painting images will only teach it how to create images that resemble existing art; this is similar to the Neural Style Transfer method and won't result in the creation of anything genuinely creative or original. In order to allow the network to produce artistic works by maximizing divergence from established styles while adhering to the art distribution, the authors of the research suggest changing the optimization criterion. The creators of the AICAN system demonstrated through a number of studies and exhibitions that people frequently couldn't distinguish between artworks created by human artists and those generated by AICAN. Apart from the AICAN initiative, a lot of other developers and artists used GANs with different modifications and particular training

settings to generate their digital artwork. This technique is now the most commonly used in the AI art scene. Meanwhile, transformer-based designs and their successful application to many tasks in diverse domains have garnered significant attention within the AI research community, with a focus on text and multimodal applications. A very sophisticated neural network called DALL·E, introduced by OpenAI in January 2021, can produce visuals from text captions for a variety of topics that can be expressed in natural language. Although many attempts have been made to develop text-to-image synthesis systems, the recently released DALL·E results are quite encouraging and have received a lot of attention. While this particular model is not publicly accessible at this time, we anticipate that sophisticated text-to-image synthesis models like this one will be a significant trend in AI art in the future.

2.2. Stable Diffusion

Making art with (AI) tools has emerged as a creative and practical approach. Users can conceptualize elaborate and complicated artworks that exhibit a uniqueness and creativity that surpasses traditional art creation by employing machine learning algorithms and neural networks. Stable Diffusion AI painting software is distinctive and unusual because it uses models, which may be taught based on user preferences and specifications. AI paintings' style and content can be determined by the trained models, and mixing various model types can result in surprising outcomes. To comprehend the various varieties and uniqueness of models Stable Diffusion, a thorough manual is required. The goal of this study is to examine the technical features of each model and compare the variations in the photographs that each model produces.

Constant Dispersion An approach to creating images that use artificial intelligence technology is called AI painting. It starts with simple images and works its way up to complicated and extremely detailed ones via a process known as "Stable Diffusion". The forward and backward processes are the two main processes that make up the diffusion model. AI begins with an image that contains random noise. Thereafter, this image is subjected to a number of diffusion procedures. Diffusion can be compared to the effect of an ink droplet falling into a glass of water. After a few minutes, the ink becomes haphazardly dispersed throughout the water as it travels throughout it. AI then carries out reverse diffusion, gradually bringing back the image's information. AI makes reference to a target image or style during this process, which enables the created image to progressively display these features. AI ultimately produces an image with rich features and a distinct style after numerous diffusion and reverse diffusion repetitions.

On the other hand, the diffusion process works in the image space, which can be memory-intensive, slow, and computationally demanding, particularly when producing high-resolution images. As a result, Stable Diffusion is a latent diffusion model that works by first compressing the image into a latent space rather than in the highdimensional image space. By applying the diffusion process on a lower-dimensional latent space rather than the actual pixel space, latent diffusion lowers memory and computing expenses.

3. AI ART AND ARTIST

3.1. AI Art's Originality

The increasing trend of utilizing AI technology in the creation of art sparks debates about the essential issues surrounding the creative nature of these pieces and their place in the annals of visual arts history. It is vital to discuss the novelty of AI art in the framework of art history in order to fully comprehend the dynamics of this form of art. Is the 21st century merely providing answers that are technically feasible for concepts developed in the 20th century? It has been said long ago that we are looking forward to the forms that are now being created with the help of cutting edge technology. Recognizing that the use of computers in the arts dates back to the early days of computing is crucial to appreciating the originality of AI art in its current form.

Furthermore, during the past few decades, a great deal of theoretical and practical research has been done on the concept of "generative art," which is defined as the use of a system with some degree of autonomy as a relevant component in the production of art. The AI Art movement aimed to create software that "will one day be taken seriously as a creative artist in its own right," but it also focused on sociological issues in addition to technological ones. Many academics who have studied AI art have felt that it is important to highlight its historical background because of the increased attention that the art form has received in recent years and the general "hype" surrounding everything connected to the acronym "AI."

Considering the historical context, it makes sense to doubt the novelty and originality of the core ideas of AI art. However, the unique technological advancements of the past several years have made it possible to investigate those ideas at a new scale. The majority of contemporary AI art pieces can be interpreted as samples taken from the "latent space." The ability to explore that abstract, multi-dimensional space of encoded visual representations is arguably the most innovative feature of AI art. From the viewpoint of the artist, the latent space is a domain of limitless possibilities that result from the multifaceted interaction of the known and unknown, rather than a place of reality or fantasy. The main challenge and defining "signature" of the artist ultimately comes down to how this space is designed and what is found within. Understanding the part played by humans in this process of collaboration with the machine is crucial in this setting.

3.2. The Artist's Function

Not only do engineers and brilliant people use artificial intelligence (AI) to create their work, but many modern artists also incorporate AI in their creations. Many artists have focused on how AI technologies impact human experience and reflect the world in response to the growing public interest in AI. Although these artists frequently employ AI, their aesthetic is less closely tied to the visual artifacts of modern AI algorithms, and their work is influenced by the history of MCA.

The interaction between humans and computers when producing AI art has been the subject of continuous discussion. The degree of autonomy the computer has in making choices that can be deemed necessary for the creative process is one of the major questions. Do computational technologies possess characteristics of autonomous "behavior" or are they still considered merely tools? And is the way a particular tale is framed based on the procedure's truth or on underlying marketing considerations?

Regardless of the story behind the creation process—for example, the fact that the artwork was labelled as being made by an AI—the majority of recent examples of sold AI artworks suggest that, despite ongoing debates, the authorship rights are currently attributed to the artist who produced the artwork using AI techniques. The issue of data sources is more complicated, even while it is possible to refute the notion that those who create computational models should have authorship rights in the same way as it is ridiculous to give credit to the person who invented the camera for creating creative images. In the event that copyrighted photos are included in the training data for AI art generation utilizing GANs, other people's artistic contributions would be included in the final product. Of course, this could not even be apparent in the finished product, but it still needs to be acknowledged ethically. The disclosure of every stage in the creative process would be necessary to have a thorough understanding of all the potential contributions. This is especially important in light of the current surge in interest in buying artificial intelligence (AI) art, which opens the door to new kinds of forgeries, such as passing off manually created photos edited with image editing software as AI artwork. But artists are not particularly eager to share every stage of their creative process, mainly because certain procedural decisions

3.3. Global View of AI Art

A computer powered by artificial intelligence (AI) is capable of functioning "intelligently," giving the appearance of comprehension, but lacking "awareness" of larger contexts. On the basis of the trained model from a database that is accessible, it can, nevertheless, provide probabilities or predictions of what might occur in the future from a number of alternatives. AI cannot genuinely provide broad context, emotion, or social relationships with existing technology. On the other hand, it may have cultural and sociological effects on modern human life. UNESCO has made specific comments regarding the possible effects of AI on communication, culture, education, science, and the availability of information, especially in relation to the issues surrounding the digital divide.75. Artificial Intelligence appears to widen the divide between individuals who can and cannot use new digital technologies, resulting in a rise in information access inequality. In relation to

4. CONCLUDING REMARKS

In the field of image production, generative models have achieved notable success with the swift advancements in deep learning and artificial intelligence. We were able to comprehend the distinctions between various models by investigating various approaches, technical features, and application variations of various models. When applying and training models, it's critical to take into account the unique conditions. Combining various models can produce more inventive and creative artwork as well as surprising consequences. These several model kinds show various methods for resolving issues with image production.

Even though a variety of works of art are referred to as "AI Art," it is frequently unclear which precise AI technologies were employed in the creation of a certain piece because many artists do not disclose every step of their creative process. But since the creation of AI art is growing quickly and attracting interest, it's important to comprehend and talk about all the factors that go into determining a piece's quality. Currently, to engage in the activity, one must possess a particular level of technical knowledge and skill. Applications of AI technologies are moving quickly in the direction of easier-to-use frameworks. It is consequently challenging to determine whether the technological complexity and ingenuity involved should determine the worth of a certain AI artwork.

AI systems will make more and more judgments that have a lesser or larger impact on our lives and way of life. AI must be able to balance the relative importance of values held by various stakeholders and in multicultural environments, take into account societal norms, moral and ethical issues, explain its rationale, and ensure transparency in all areas of application. Rethinking accountability is likely the most crucial thing to think about as the capacity for autonomous decision making increases. Since AI systems are essentially tools, their owners or users have complete control and accountability over them.

It's important to reconsider what work means as AI systems take the place of humans in many traditional jobs. More importantly than occupations changing, jobs themselves will change in nature. Jobs that make a positive impact on society, personal fulfillment, and human progress are considered meaningful. These do not always correspond to "paid jobs" that exist today. AI systems can free us up to do the things that give us energy and happiness, like taking care of one other, enjoying the outdoors, participating in sports, hobbies, and the arts, and meditating.

REFERENCES

[1] Anantrasirichai N, Achim A, Bull D (2018) Atmospheric turbulence mitigation for sequences with moving objects using recursive image fusion. In: 2018 25th IEEE international conference on image processing (ICIP), pp 2895–2899

[2] Bostrom N, Yudkowsky E (2014) The ethics of artifcial intelligence. In: In Cambridge handbook of artifcial intelligence

[3] XU, T., ZHANG, P., HUANG, Q., ZHANG, H., GAN, Z., HUANG, X., AND HE, X. Attngan: Fine-grained text to image gneration with attentional generative adversarial networks. In Proceedings of the IEEE conference on computer vision and pattern recognition (2018), pp. 1316–1324

[4] HERTZMANN, A. Can computers create art? In Arts (2018), vol. 7, Multidisciplinary Digital Publishing Institute.

[5] Unknown. "Is artificial intelligence set to become art's next medium?" Christie's, 12 December 2018, , accessed 2 December 2020

[6] McCormack et al. For original GAN paper see I. Goodfellow, J. Pouget-Abadie, M. Mirza et al., "Generative adversarial nets," Advances in neural information processing systems, 2672–2680, (2014)

[7] J. Bailey, "Helena sarin: Why bigger isn't always better with GANs and AI art," Artnome, 14 November 2018, , accessed 2 December 2020.

[8] For an argument in favour, see P. Galanter, "Towards Ethical Relationships with Machines That Make Art," Artnodes, No. 26. 1—9, (2020); for an argument against, see McCormack et al.

[9] L. Zhang and M. Agrawala. Adding conditional control to text-to-image diffusion models. arXiv preprint arXiv:2302.05543, 2023

[10] J. Song, C. Meng, and S. Ermon. Denoising diffusion implicit models. In International Conference on Learning Representations, 2021.

[11] Stability-AI. Stable diffusion public release. https://stability.ai/blog/ stable-diffusion-public-release, 2023. Accessed on 2023-05-17.