Brushing Boundaries: An Infinite Zoom Artwork on the Usage of Artificial Intelligence in Creating Art

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Abstract
Art has continued to evolve throughout the years with technology being a key proponent. It paved the way for new mediums such as photography, film, animation, etc. Opening a new horizon for artists to express themselves. Artificial Intelligence (AI) is the latest innovation in art. Due to the rapid development of this technology, the images that A.I. can produce is good most of the time, which led artists to having fears of displacement. This project aims to explore the dynamics of artists and artificial intelligence, showcasing the advantages of integrating artificial intelligence in an artist's workflow. The artists of this project wants to show how powerful of a tool A.I. is and hopes to encourage other artists to also use it in their artworks.

Keywords: Artificial Intelligence (AI), generative artificial intelligence, infinite zoom, technology in art, evolution of art,

Introduction

Technology played a significant role in the world of art. It created new art forms such as memes, digital drawings, mobile photography, and more. The latest thing that has been gaining a lot of attention is the Generative art made by Artificial Intelligence. It can be quite scary seeing an artwork generated in seconds with just a few prompts from a user. We believe that it is not to be feared as it is another tool that artists could use to enhance both their workflow and artwork.

The concept of artificial intelligence in the context of art is interesting. The first time that we encountered this was through NVIDIA Canvas back in 2021, an app which was developed by the company NVIDIA. It turns simple brushstrokes into realistic landscape images using artificial intelligence. Today, there are numerous image generative A.I. models that are available for the public to use. AI art generators can produce images that are unexpectedly stunning, surreal, eerie, or incredibly lifelike. It is fascinating how these machines can create things that sometimes surpass one's imagination. While these programs lack emotional motivation for their art, the resulting creations can evoke emotions in you and inspire new avenues for self-expression (Nanou, 2022).

There has always been a trend with technology where it creates fear in people, a fear that it will replace someone or something. Take for example photography. Many painters in the early 19th century feared that painting would be obsolete if photography mastered color. Fast forward to now, it is a recognized art form and did not replace traditional painters. AI art being new, many are scared and have doubts regarding this evolution, but we believe it is not a threat, but rather, is a good thing. This inspired us to create an art piece showcasing its helpfulness in an artist's workflow.

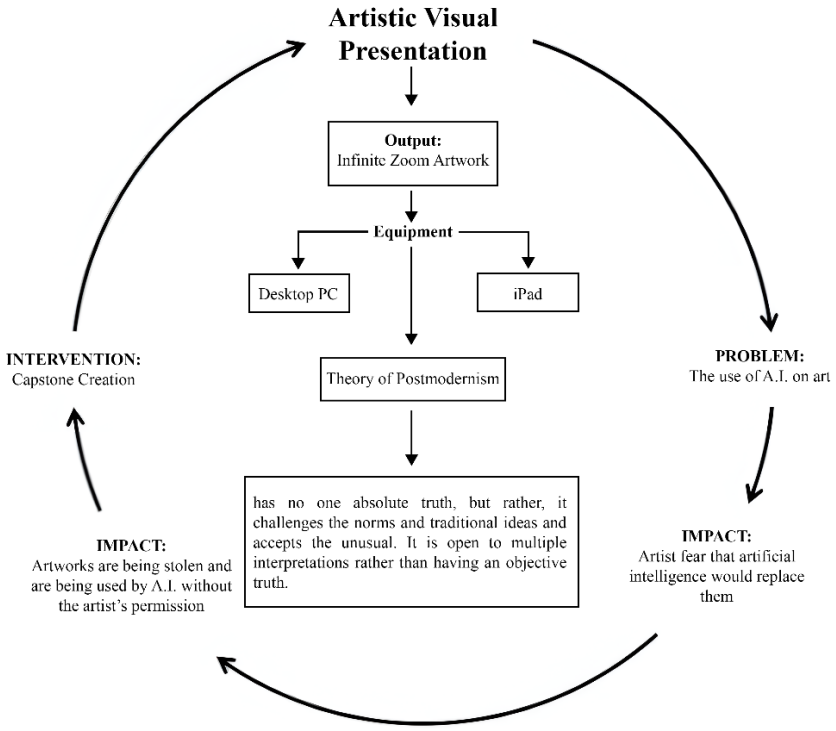
One aspect of an artist's workflow we think would benefit a lot from the help of A.I. is with gathering reference photos. Every artist works with references. Whether it be drawing, painting, or animating, artists use references as guides for things such as anatomy, how the inner workings a certain thing works. It could also be for lighting, like how light behaves with certain objects. A perspective of a certain object and how it would look like at a specific angle. References help bring the artist's vision come to life. Finding references can become a tedious task as artist are very picky with what references they want to use. They may sometimes want a very hyper-specific reference which could be difficult to find, but with the help of A.I. finding reference photos would become significantly easier. With A.I., artist could create very specific images by stringing together phrases that would best describe what they are looking for, and A.I. would generate an image based on the description they have given. This could save hours in an artist's workflow, enabling them to work much faster and more efficiently.

We would be creating an Infinite zoom artwork showcasing an art museum. The museum would contain famous artworks with a twist. A reimagined version of what those would look like in another universe. The pieces that would be displayed are drawn by us with the help of A.I.. It would be drawn in a cartoon style as we think it is the best fit for a vector-based project. We would give a prompt and draw an art piece based on the description or image the A.I. has shown us. There would also be a section where the artworks are fully generated by A.I. to showcase how powerful this technology is. The section containing the A.I. artworks would not utilize a cartoon aesthetic, but rather a more realistic look. The corridors of the A.I. section would be in 3D. The interiors would be modeled, textured, and rendered by us. This will then be placed inside the cartoonish museum. We made the AI's environment realistic to further contrast it with the human made pieces. The 3D environment would suit the surrealistic visuals of the A.I. art pieces in contrast with the pieces that we drew in cartoon which are stylized and expressive. Apart from the artworks themselves, we would also be utilizing both real life and A.I. images as references in creating the interiors of our museum. Other A.I. tools such as image upscalers and enhancers would be used throughout the duration of the project. This work would show how artists use these new forms as tools in creating pieces that enhance their work, pushing the boundaries of creativity, and further expanding what can be considered as art.

Technology keeps on innovating the way we experience and create art. Mediums like Photography, Digital Painting, video games, etc. are some artforms born out of our technological advancement, A.I. art being the latest. Many artists are scared and believe it would take away their jobs, but it is the opposite. A.I. would not replace you, but rather help you. A.I. art with an artist behind it cannot be beaten by solely an A.I. generated one. Our technology is evolving every day, and so is art. It is unstoppable, this technology will only get better each day and we must take advantage of this. Normalize it rather than stop it. The sooner we accept this new technology, the sooner we can regulate it so that it would not get abused. Artists need to adapt to these changes or else they would be left behind, missing out on the opportunity to further expand their artistic skills in this new horizon for art.

Figure 1

Framework Visual Representation of Overall Concept and Methods of Thesis Project: Brushing Boundaries: An Infinite Zoom Artwork on Artificial Intelligence Redefining the Meaning of Art



The creative framework showcases a summary of the project Brushing Boundaries and how it will be executed. This section aims to tackle the details on how we plan on representing Artificial Intelligence in the context of an artwork and how it can be beneficial for artists to integrate in in their own process.

The medium that we chose for our project is a digital illustration through an infinite zoom artwork. We chose this medium because we think that it is unique, not to mention that an infinite zoom art is only possible thanks to modern day technology. We also believe that this medium complements the concept that we are tackling, as both infinite zoom art and generative A.I. are mediums that are exclusive to the digital outlet. Both are not possible without the advancements of technology. We would be using both a PC and an iPad for digital illustration and to stitch our drawings to create the "infinite zoom" effect using an app called Endless Paper on IOS.

Post-modernists perspective has no one absolute truth, but rather, it challenges the norms and traditional ideas and accepts the unusual. It is open to multiple interpretations rather than having an objective truth (Duigan, 2023). This theory best fit the concept that we are dealing with. The recent development of artificial intelligence has astounded many people. One of these developments is in the field of art, having a machine generate an image based on a text given by the end-user. This is called Generative A.I. and many see this as a threat to both the career and artistic expression of artists. But it can also be seen as a new medium for artists to explore and express themselves. We could also see it as a tool that could be beneficial for artists. Artificial intelligence in art is still very new and it is hard to pinpoint where exactly its headed towards as of right now because it is continuously being developed and is rapidly getting better each day. This newfound technology can be interpreted in multiple ways, and it challenges our pre-existing beliefs on what can and cannot be considered as art. That is why we think the post-modernism theory best fits our project.

The **research design** of this project would be an infinite zoom museum containing both 2D and 3D outputs. The museum would be divided into two (2) main sections. The first section would be done in 2D toon style which would be illustrated by us. Using a toon style in our illustrations gives us more room for a livelier and more expressionistic take on existing artworks, giving it each artwork a "human" element to it. The second section is done in 3D and would show fully A.I. generated artworks. The 3D art style would give the section a much more realistic look which would complement the surrealistic aesthetic of generated artworks of artificial intelligence. Each section would also have subsection to match the genre that we are trying to emulate. The two sections having contrasting art styles would give the viewers a better sense of distinction between the areas of the museum.

Our **target audience** are artists and art enthusiasts who may or may not be familiar with generative artificial intelligence. We wish to showcase the A.I.'s capabilities and how it can be a powerful tool for artists and a new medium in which they could express themselves.

For the **design process**, we started off with researching on artificial intelligence, its history and how it works. After getting a general sense of what it is, we then explored the various generative A.I. models that available for the public. We decided on using 3 A.I. models which is Bing's image creator powered by DALL-E 3, Adobe Firefly, and Krea.AI because we think this would best serve our needs. We did a sample using Bing's Image creator and prompted Spoliarium by Juan Luna in the style of Renaissance painting to see if what we wanted to do was possible.

Figure 2

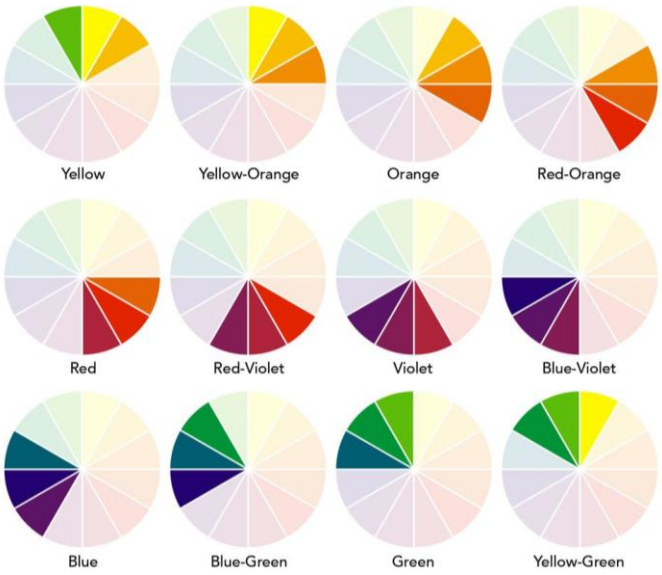
Spoliarium by Juan Luna in the Style of Renaissance Painting

Note. made with Bing's image creator

Transitional colors would be used in this project to showcase the shift in environments within the museum. Bright and lively colors would be used in the 2D section which we drew, while neutral and earth colors would be used for the AI generated 3D space of the museum.

Figure 3

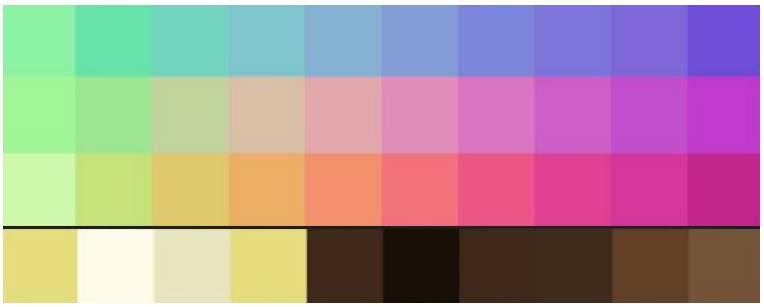
Analogous Color Scheme



Colors ranging from orange to yellow were used in the hallway to showcase the warm welcome as the start of the museum journey. Colors with cool tones were used for a section of the artwork that gives the feeling of relaxation since it is the part where the audience can participate in our infinite zoom.

Figure 4

2D Color Palette



This color palette in Figure 4 contains many vibrant colors which is used in the 2D section of the project. We used lively colors to match the toon art style that we have used. Using bright colors represent energy and life which we want to evoke a “human” element in the drawings. That the artworks are drawn by us.

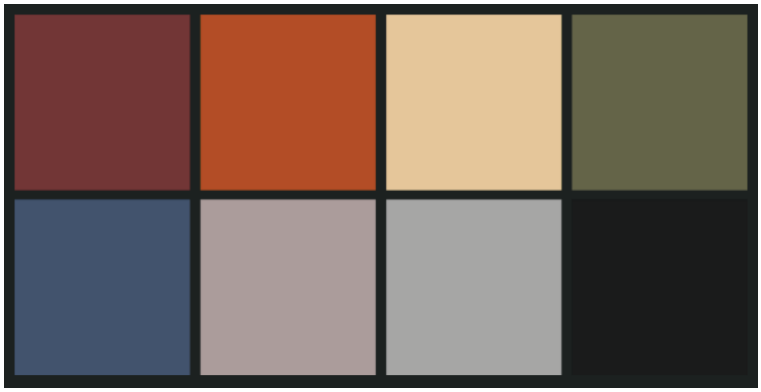
Figure 5

Monochromatic color scheme

The 3D section utilizes a monochromatic theme to draw focus on the subject more, rather than the colors. This is used heavily showcase the dullness in the environment.

Figure 6

3D Color Palette



This color palette in Figure 6 are neutral and earth tones. These are used in the A.I. generated section which is in a 3D environment. Using these colors would represent the dullness and lifelessness of the A.I. generated art. It would also heavily contrast the bright colors used in the 2D section.

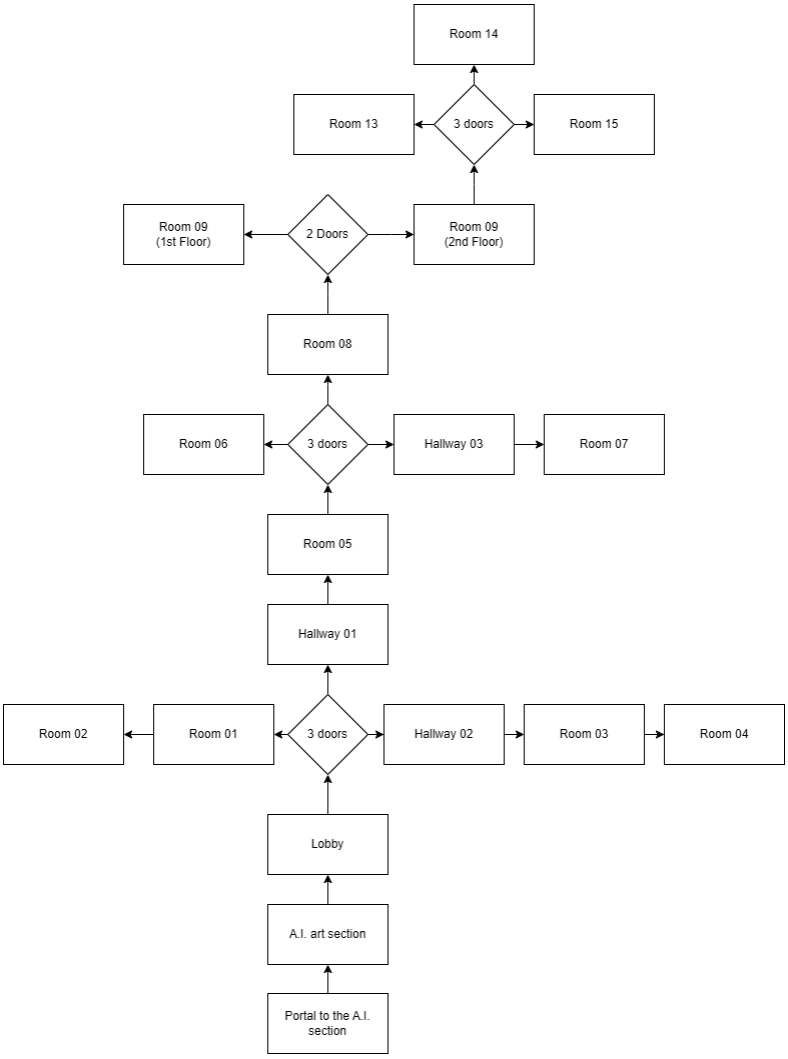
Figure 7

2D Museum Flowchart

The flowchart in Figure 7 illustrates the layout of the 2D part of the museum and how each room of the connects with one another and where it leads to. The flow between rooms is simple and linear, evolution having the most rooms as it is the highlight of the project. The evolution section is connected and leads to the A.I. art section of the museum.

Figure 8

A.I. Section Flowchart (3D Museum)



This is a continuation of the 2D section's flowchart (Figure 7). It is connected via the room labeled as "portal to the A.I. section." The flowchart in Figure 8 illustrates how each room of the 3D part of the museum connects with one another and where it leads to. The flowchart of the 3D part is much more complex compared to the 2D flowchart (figure 7) as it offers more choices and freedom to the users on where they want to go. It also features a first and second floor, one room, being split into two different angles, offering different perspectives.

Having the layout of both parts contrast each other is intentional. The 2D part is more linear and easier to understand. The diagram looks "normal" and easy to follow. A parallel with how we feel with the mediums of art we have now. We view it as normal, easily understood as pieces of art. While the 3D part is more complex. The diagram does not just go into a straight line, it has more decision trees, making it harder to follow. It gives you a different ending, depending on which path you take. A parallel to new emerging tools and innovation. Those are deemed unconventional and not widely understood by everyone.

This project aims to show the capabilities of Artificial Intelligence when it comes to art. A.I. can be a powerful tool in conceptualization and enhancing an artist's workflow by generating specific images that they need using unique prompts by the artist. The usage of A.I. in this project would be incorporated all throughout pre-production, production, and post-production to varying degrees. This project also shows the usage of Artificial Intelligence in our field, that is art, with a lot of controversy going on in today's era. We want to show that A.I. is a technology that can be used to help artists of today in creating unique art pieces by maximizing its ability. With the help of A.I., artists can now see multiple different artworks that can be used for inspiration. A.I. alongside the technology of infinite zoom will be used multiple times to finalize this project.

Pre-production Phase

In the pre-production stage of the project, we researched the latest news and development with A.I. technology as it has been rapidly getting better with new versions such as DALL-E 3 or ChatGPT Vision getting better each day. Researching further about these news and development helped us integrate A.I. the best way possible in our project. It is also at this stage of the project where we researched on what A.I. model/s we should use that best suited our project. After careful consideration, we have decided on using Bing's image creator powered by DALL-E 3, Adobe Firefly, and Krea.AI. We chose to use these three for numerous reasons. First, is that all three are free, which means everyone has access to it. Seeing that our target audience are the mass who are in the creative space, using a software that is easily accessible would encourage more people to try and explore the wonders of A.I. for themselves. Second, is that all three are user-friendly. Generating an image using A.I. can be intimidating for someone who does not have a clue, as they may think they need some coding knowledge to do so. These three applications make it as straightforward as possible and easily understandable to use. Lastly, we love the images that these three have generated for us. All of them gave us more flexibility in what we want to be generated. Apart from the text box used to prompt images, it also gives by us styling options such as "cinematic", "digital painting", "photography", etc. to help better generate image as close to what we imagined it to be. That is why all three image generating models would be used throughout the project.

The second part of the preproduction was deciding on other A.I. tools we might need for this project. Since we would be working on an infinite zoom canvas, we fear that our illustrations might become pixelated when zoomed in too much. That is why we have thought of using an image upscaler to remedy this problem. By upscaling our illustrations, this would eliminate the noticeable pixelation when zoomed in too far. We are aware that image upscalers tend to have a hard time processing complex image, but we think this won't be a problem for us, since our works would not have that much complex illustrations that the A.I. would not be able to handle. We settled on using an application called "Upscayl" which is a free and relatively easy to use image upscaler. We also took our time to study the medium we will be focusing on which was Infinite Zoom. This infinite zoom type of art was made with the help of an application called Endless Paper. Finalizing our target theme and project was done during this stage.

After establishing the tools that we would use, we thought of what we would specifically put within the museum. Museums have themes, and each piece are curated according to the theme. We decided on having 4 curated sections for our museum, namely “evolution”, “local art”, “international art”, and “A.I. art”. Evolution would showcase the evolution of art itself from pre-historic all up until contemporary art. Local art would feature Filipino made artworks such as the Spoliarium by Juan Luna, and the international art would feature artworks from around the globe. A.I. art would be a section dedicated to showcasing A.I. generated paintings to showcase its capabilities.

We then visited some museums near us which were the National Museum of Fine Arts, National Museum of Anthropology and the National Museum of Natural History to gather references and study what elements we could use for our own museum.

Production Phase

Production is where we created the infinite zoom art with the help of A.I. We used paid software, namely Adobe Illustrator on the computer, and Procreate on the iPad, in drawing both the 2D section and artworks of the museum while the 3D section was created using a free open-source 3D software called Blender. We chose Procreate because we believe that it is the best drawing software available for the iPad. When it comes to PC, we had a choice between Adobe Illustrator and Adobe Photoshop, and although Photoshop is better overall when it comes to drawing illustrations, we chose to use Illustrator because the app that we are going to export our illustrations to is Endless Paper. Which uses a vector rendering engine, and Illustrator is a vector-based software.

The first thing that we did was do a very rough sketch of the museum in the endless paper app to figure out its layout and to see where things are going to be placed. After that was finalized, we then began designing the museum and the main lobby as it the first thing people would see when they zoom inside of the museum. We used Krea.AI text-to-image to generate a reference for the environment of the museum. We gave the A.I. a prompt which returned multiple images of what it thinks is a museum. A.I. generated images and real-life photographs of the National Museum in Manila were used in creating the facade and interior of the museum. The first section that we worked on was the “Evolution” section as it has the most layers, and it also connects with the second section which was the “A.I. art” section. After finishing the two sections, we then finished both the local and international sections.

After the environment was finished, we sorted out which painting we would include. We then used Bing’s Image creator for prompts such as “Spoliarium by Juan Luna in the Renaissance style” as reference and drew what we have imagined based on what the AI gave us. For the A.I. section of the museum, we again used the museum that the A.I, generated as reference in modeling and texturing the interior.

Our priority was the design of the museum itself; we used different prompts in the AI models we have, to generate a reference that is suited to our liking. This made the museum seem much more out of the ordinary and fit to our theme. We also made sure that our National Museum is a part of the designing process and interior of our museum. An example of this was the Spoliarium by Juan Luna which is included in our museum with a twist of the Renaissance style, this said piece was inspired by the prompts we used in the A.I. image creator. Multiple local paintings were featured, alongside our own creation, in different sections of this museum.

We also made three characters that will guide the audience all throughout their journey of exploring in our museum, which was also inspired by the A.I. generated images that was prompted by words such as pet dog and cat to make sure that our guide will be friendly and familiar for the eyes of the audience.

Post-Production Phase

Here at the post-production part was where we finished drawing and rendering, we used Adobe Photoshop to polish our work further. We encountered a problem during rendering the 3D scenes as it crashes the moment we start to render. Initially, we planned on rendering the 3D scenes in 8k or 4k resolution to avoid pixelation, but we soon learn that rendering at these resolutions with our current setup was impossible due to hardware limitations. Our GPU has only 6 Gigabytes (GB) Video Random Access Memory (VRAM) and rendering at 4k or 8k would need more than just 6GB of VRAM. That is why we opted to use an image upscaler as a workaround to this problem. We would render the scenes in 1k resolution and use an A.I. upscaler to upscale the image to 4k or 8k. We chose to use the software "Upscayl" for this as it is both free and easy to use. After everything was rendered, we stitched it all together in the application called Endless Paper while making sure that the transition is fluid and easy for the audience to navigate. Lastly, we would pick out the best-looking images that the AI has generated and feature in its own section in the museum to showcase how amazing this type of technology has become.

Sample Works

Figure 9

A.I. Section 3D Hallway

Figure 10

A.I. Section 3D Room

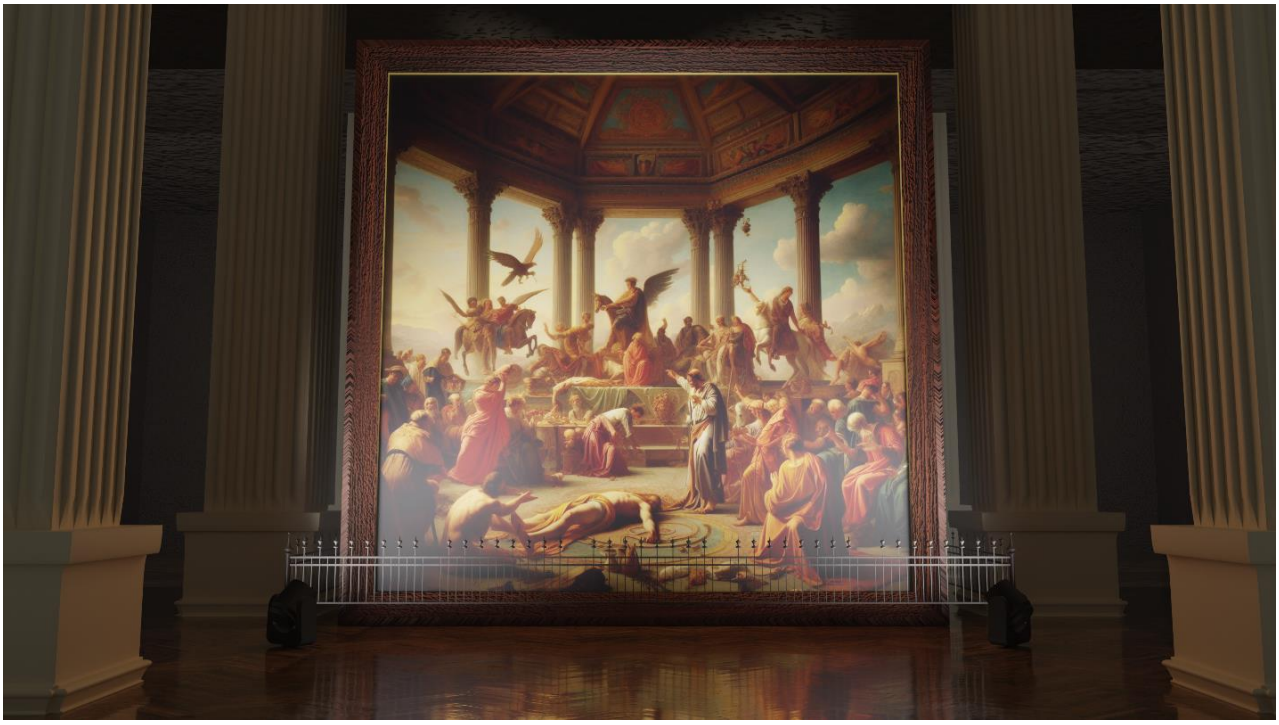


Figure 11

2D Section Hallway

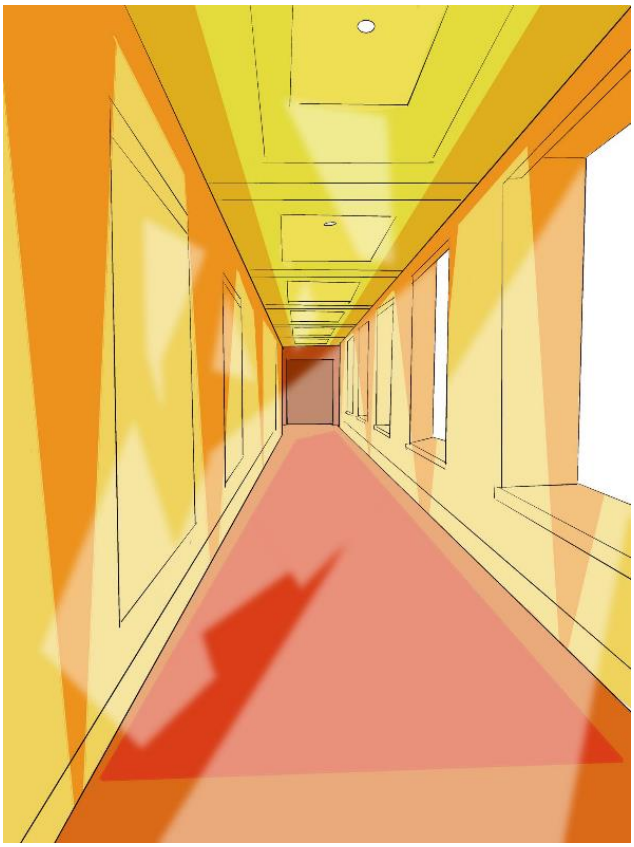
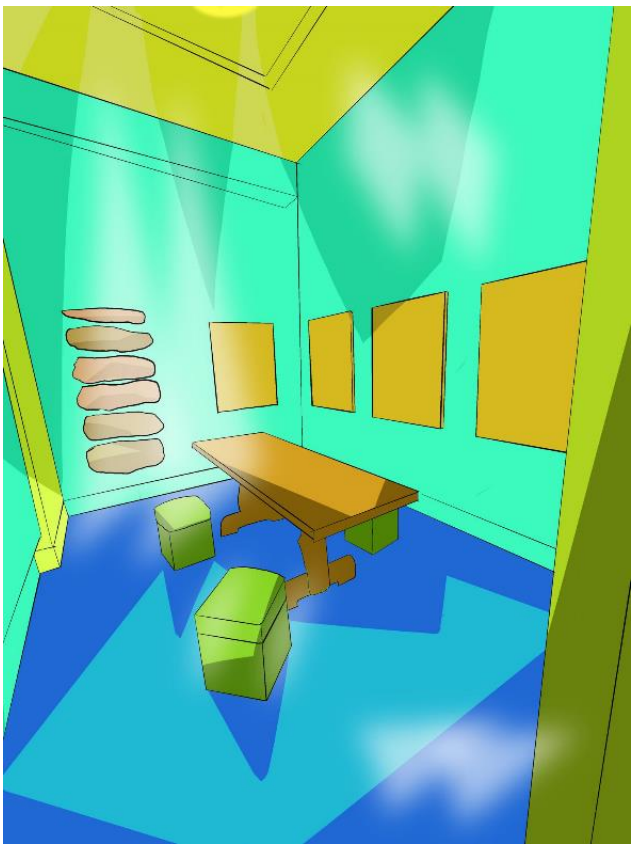


Figure 12

2D Section Room



Review of Related Literature

This section contains literature that are related to the topic of Artificial Intelligence in the field of art. Multiple articles, books, and studies that are within the scope of our project are reviewed for the output.

New technology in Art

The emergence of photography brought a fundamental shift in our understanding of what art is. It paved the way for a new art form. These advancements have transformed the way we perceive and engage with art. Though photography was not intended for artistic purposes. Artists quickly experimented with what they could do with this new medium. It was first used to complement paintings, however over time, artists began trying to blend photography with painting, giving birth to a new artistic expression, photomontage (Silva, 2022).

It took a while before photography was acknowledged as an art form because of the controversies surrounding it. Many critics deem it as nothing more than an industrial mechanism that copied reality with little to no artistic value. It was not until the 20th century that photography was acknowledged as an art form, opening a whole new avenue for artists to express themselves (Silva, 2022).

Photography was not accepted as an art form at first because they thought it was a soulless medium that rivals painting. That because it produces realistic images, it was out to replace traditional painting. But it only paved way for a new way for artists to showcase their artistic skills. We believe that the same thing is happening with AI art. Many would say it is out to replace artists, but it is the opposite. AI is relatively new and is continuously evolving each day. Today, AI has many applications towards art. It can enhance one's workflow, analyze patterns, and automate tasks that would be otherwise tedious or difficult if done manually.

What is AI?

The capability of a computer or a robotic to execute tasks that usually requires a level of intelligence from an entity is called Artificial Intelligence (AI). It is commonly seen in projects that require cognitive processes like rationalizing, analyzing, or pattern recognition. Ever since the 1940's, machines have exhibited the ability to carry out complex tasks like proving a mathematical theorem or playing a game of chess. These machines have achieved levels that could match an expert in doing certain tasks such as diagnosing, searching, handwriting recognition and conversing. Yet, machines are still no match for an actual human being despite their memory capacity and processing speeds.

AI is making waves in the field of technology thanks to machine learning. Machine learning is a process in which a computer learns from a dataset it has been given. Which eliminates the need for intervention from a programmer in giving it specific operations. This also meant that a computer could perform a task incorrectly because it has been given the wrong materials. It can be compared to how a baby is taught to behave based on other's example (Mueller & Massaron, 2018).

It is mind blowing just how much AI has been integrated in our day-to-day life without us even realizing it. When we hear the word “Artificial Intelligence”, we usually imagine a robot of some sort who mimics human intelligence to carry out a specific task, but that is just one of the many ways AI has been integrated in technology. It can be seen in small scale applications like the voice assistant in your phone being able to recognize your voice or the facial recognition feature that you use to unlock your phone, those are all powered by AI. It is also being used for security measures such as fraud detection for your credit card, alerting you if the system thinks the transaction is unusual. AI is a great tool in making our lives easy. Allocating tedious tasks to an AI would grant us the ability to focus on other stuff that is more important.

Artificial Intelligence in Art

AI art is any piece of digital media that has been created by Artificial Intelligence. This includes texts, photos, videos, and audios. It is done via a person typing in prompts to a text box, telling the AI what the end user wants to see (Wall, 2023). Generative AI is a machine learning algorithm that utilizes trained artificial neural networks to generate entirely new images. This type of technology has the capabilities to blend styles, ideas, and characteristics to craft original art pieces. There are two (2) major generative AI models, namely, Generative Adversarial Network (GAN) and Diffusion Model (AltexSoft, 2023).

The way Generative Adversarial Network works is by pitting together two neural networks against each other, namely the generator neural network and discriminator neural network. The generator model attempts to create fake images, which is then checked by discriminator model to see if the image is real or fake. If the discriminator deems it fake, the generator will go through an update to improve itself and fool the discriminator. Vice-versa, if the discriminator model is fooled, it will update itself to not be fooled again. This is a never-ending cycle which makes GANS generated image better and better each cycle. They keep challenging each other, enhancing each cycle (AltexSoft, 2023).

Diffusion model works by creating a new image based on the dataset that it has been trained on. It samples an artwork, analyzes its components, and then adds noise upon it. It then learns how the noise was added in hopes of it understanding how to reverse the process. After figuring that out, it now reverses the process, taking away the noisy data it has created. The model has now learned how to produce that certain data and could use it to create a new set of data, hence creating the generated image (AltexSoft, 2023).

Art in technology is fascinating as it continues to find new ways to interpret life and art itself. Many artforms have come out due to our evolving technologies. Most recently, Artificial Intelligence has been making waves as it is the innovation in the world of art. Many are worried that this may take over the art industry as it could perform tasks much faster than if it were performed manually. We believe that it is a powerful tool that artists can use to enhance or make their work better.

AI as a Tool

According to the Dept. Head of Digital Painting of CG Spectrum, Brandon Reimchen, the AI models that exist now do not pose a threat to artists, but rather a tool that could help them speed up their workflow. It can be beneficial as it could serve as concepts or ignite new ideas (Wall, 2023). I do agree as AI models like Adobe Firefly have helped me several times in the past in visualizing my concepts. Though there are some ethical issues surrounding some AI models that just steal other people's work, tweaking it a bit and passing it as its own, or how other people generate these types of artworks and claiming it their work (Copeland, 2023).

AI can be a powerful tool in enhancing works. A great example is the upcoming final song from The Beatles. Paul McCartney, the bassist of The Beatles, told *Today Programme* that their upcoming final song was finished with the help of AI. He said that through AI, they were able to isolate the vocals of John Lennon from an old demo track (Dunworth, 2023). They used AI so that they could get a clear version from the deceased vocalist and mix it like normal. It is not a case of an AI model imitating Lennon's voice to make him sing lyrics he never sang before. A similar thing was done to isolate Lennon's voice for a Disney+ documentary back in 2021 (Novak, 2023).

Baidu, the Chinese counterpart of Google has developed their own generative AI model to further their business and create new opportunities. Their image generating model Wenxin Yige was made to create traditional Chinese ink paintings. This model was able to complete an unfinished masterpiece by the late Chinese painter Lu Xiaoman. The model was able to interpret and understand Chinese poetry as paintings which can be hard even for a human (Marr 2023). This kind of application in historical art can help with art restorations or could help us better understand broken/unfinished pieces as AI tries to predict missing pieces.

These AI models do not just generate artworks but could also be utilized in art analysis. It has the capacity to identify objects via pattern recognition, detect for identical or similar works which could help a lot in identifying plagiarism, multimodal representation, etc. (Cetinic & She, 2022). AI could have the potential to redefine what can and cannot be considered "art." Using AI to analyze artworks has the potential in creating new insights, recognize patterns, or gain a deeper understanding of an artist's style. It really is a powerful tool in extracting and dissecting pieces and giving it a whole new meaning.

Regulation on AI Art

In 2011, a monkey named Naruto took the camera of wildlife photographer David Slater and captured a monkey selfie. Later, Slater and a copyright blog called Techdirt got into a dispute in 2014 after both fought to keep the image of Naruto on their websites. Techdirt argued that only human-made works are capable of being protected by copyright law. People for the Ethical Treatment of Animals (PETA) also filed a lawsuit against slater over the images in 2015. Since the monkey took the pictures, she was the rightful owner of the copyright. As a result, it raised a significant legal question of whether copyright laws extend to non-human animals (Claydon, 2018).

The power of generative AI can also be used for the wrong reasons. An Analyst dubbed it as a "predatory arms race" on pedophile forums as it can generate realistic images of children committing sexual acts. On forums on the dark web, thousands of AI-generated child pornography have been discovered. Some users have even shared full instructions on how to do it themselves. Because it features children who do not exist, the photographs have also sparked discussion on whether they even break federal child protection regulations. Even if the image is AI-generated, the Justice Department officials who fight child exploitation, say that such photographs are nonetheless prohibited (Harwell, 2023).

Its potential is massive and does bear both good and bad implications. Rather than try to cancel something that is unstoppable, we must accept it. Trying to ignore its existence or refusing to talk about it would only lead to further abuse of its usage. The sooner we accept this new technology, the sooner we could sit down and have a discussion on the ethical and moral implications of AI. From that point, we could set up some rules and regulations regarding the use case of AI in an artwork. If that happens, no one would be fooled by AI. People would be able to critically think and decipher whether something is real, or AI generated.

Infinite Zoom

The march of technology in this our era is continuously growing. This progression has an impact on the art world, today there are many types of art that is popping out of the internet. Specially an art form called “Infinite Zoom.”. What is infinite zoom? It is simply a digital artwork that you can continuously zoom in. The magical part of this type of art is that the continuously zooming in on the artwork does not affect the quality of the piece, meaning that the quality of the image does get any lower and is not pixelated regardless of how close you zoom into it. This also opens the whole level of possibility; an artist can simply create a story just by making endless number of scenes in an infinite sized canvas (WatCh: Digital Art With Infinite Zoom Baffles Internet, 2022).

Creating an infinite zoom art is quite interesting. Its unique characteristic of being able to zoom in continuously with little to no loss in quality opens new opportunities for artists to express themselves. One very known and easy way to create an infinite zoom art is via an app named Endless paper, available exclusively for Apple's iPad. Endless Paper features an "infinite canvas" which lets you draw, write, and import images in its canvas as much as you want. The app was tailor made for the iPad with its Fractile vector-based engine that delivers high-definition vector rendering quality at 120fps when zooming or panning within the canvas (Endless Paper, n.d.).

Although the software for an infinite art is limited right now. We do hope that it gets developed further and reach a mainstream level of popularity among artists because it delivers a very interesting medium. One that could not exist if not for our technological advancement.

Is A.I. bad?

Marvel's TV show titled Secret Invasion was trending on the internet, but for a good reason. People started hating on the series once it was made public that the opening credits was made using artificial intelligence. The director of the show Ali Selim told polygon that Method Studios, used A.I. to create the opening sequence. This sparked a debate online regarding the usage of AI. Many argued that the AI took job opportunities from graphic designers and animators who could have done the exact same work (Horton 2023).

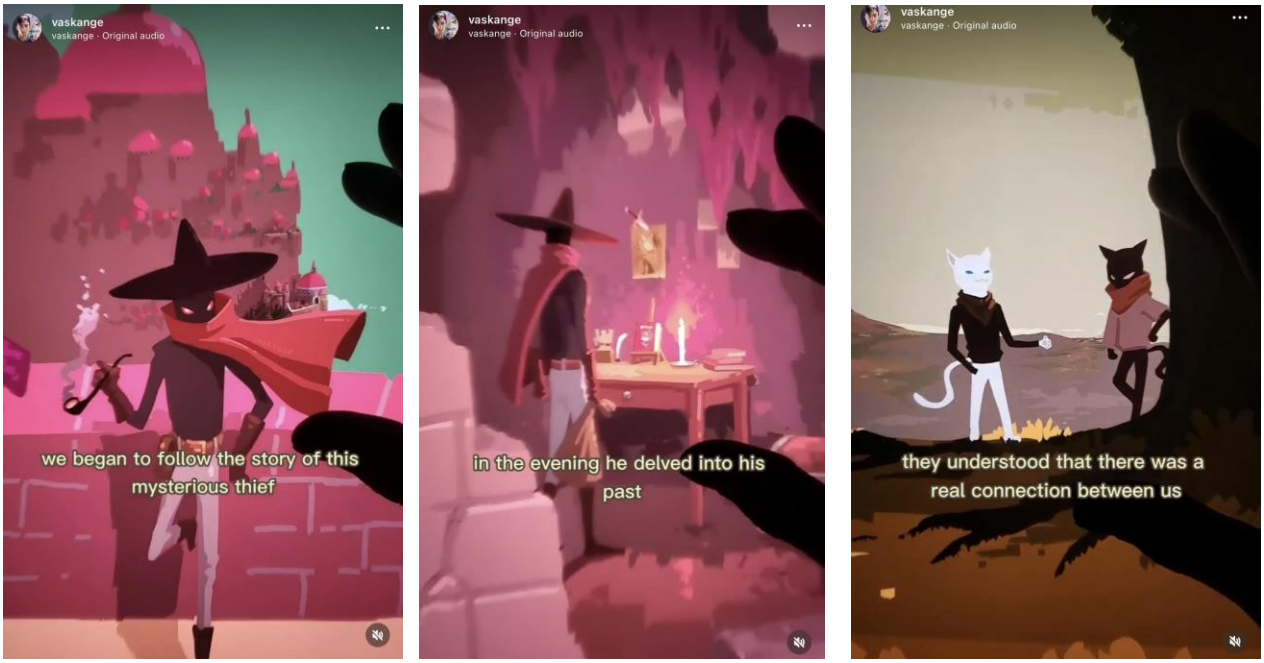
Recently, a survival game titled Palworld has skyrocketed in popularity after its release, but it also garnered the attention of some who are claiming it plagiarized Pokémon designs and potentially having AI influences on their design. The people online raised their suspicion's regarding the similarities between Palworld's creatures and Pokémon's. To add fuel to the flame, it also sparked the question on whether the game used AI in its development. This is since that their previous game AI: Art Imposter, incorporated an AI image generator within the game (Zolotarenko, 2024).

Many people still see AI in a bad light in the world of art. Some do abuse AI, furthering the idea that it has no merit and could only cause trouble. We want to change that way of thinking with people. Instead of dismissing AI as bad, we should rather focus on the idea of how we could set some rules and regulation to stop these abuses and promote the benefits of using AI, so that people would not hate it so much.

Review of Related Works

Figure 13

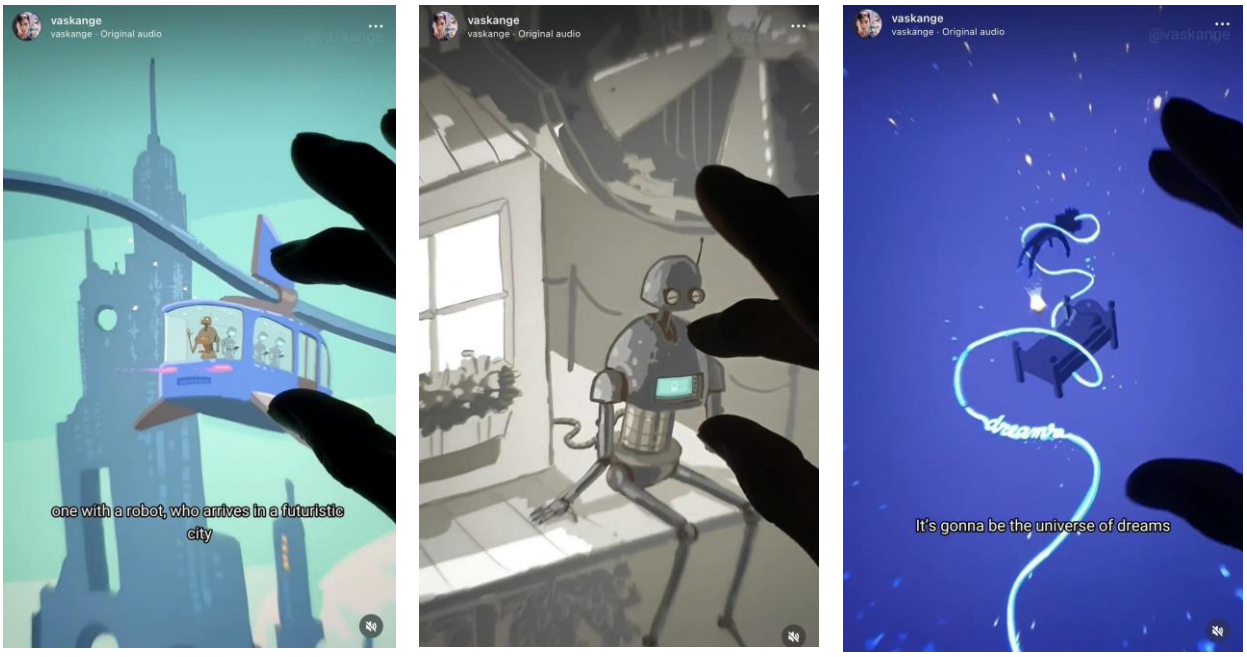
Vaskange, (2023). Biggest Dream



A world where a mysterious thief resides in a city that is known for being beautiful, he often remembers his past with his former friend that he made an inseparable connection with. Reliving the moment with his friend makes him remember all their adventures and their wildest dreams which he would like to achieve even after his only friend passed away.

Figure 14

Vaskange, (2022). Futuristic Robot



This art piece is about a futuristic robot that lives in a floating city. This robot can do what any other robot can do but something weird happens when he is charging, he always dreams of a little boy that somewhat reminds the robot of himself which makes him question his true identity little by little.

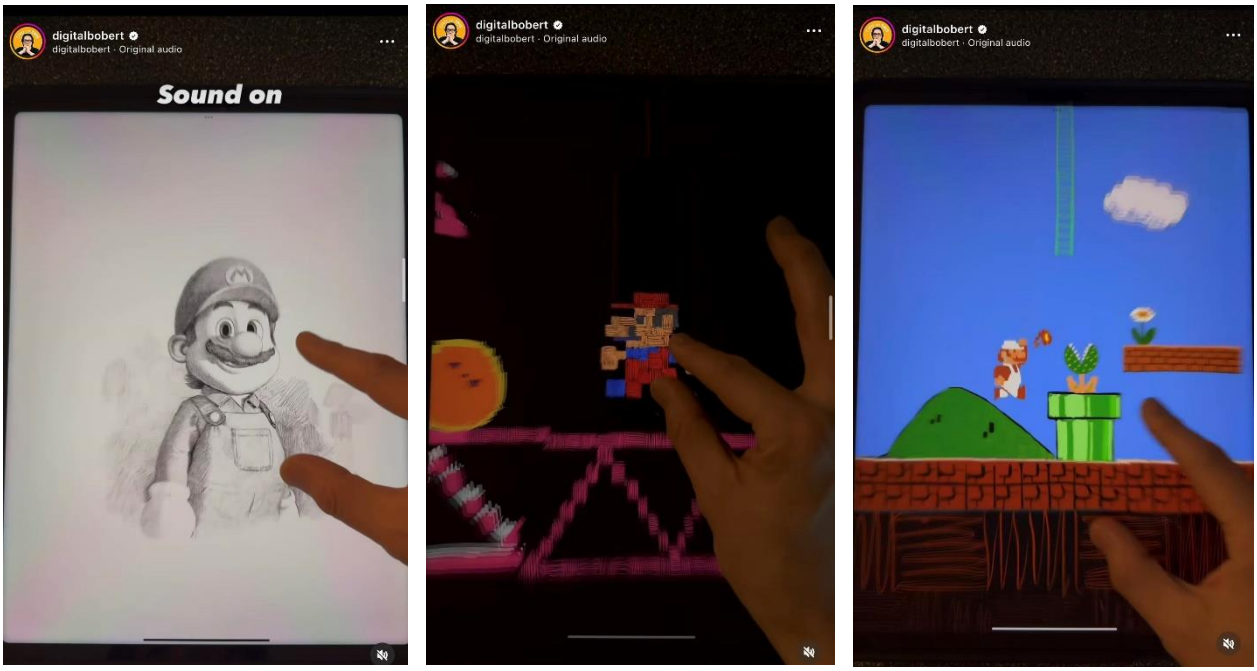
Figure 15

Vaskange, (2022) Vacation

This infinite zoom was about the artist's experiences, Vaskange visualizes all his memories of his recent vacation. It started in which Vaskange drew himself in a room where he creates all these wonderful ideas leading up to his vacation in different places such as mountains where the train passes, into an underwater diving experience and ending it with a portrait that gives off the impression of vacation that will be remembered.

Figure 16

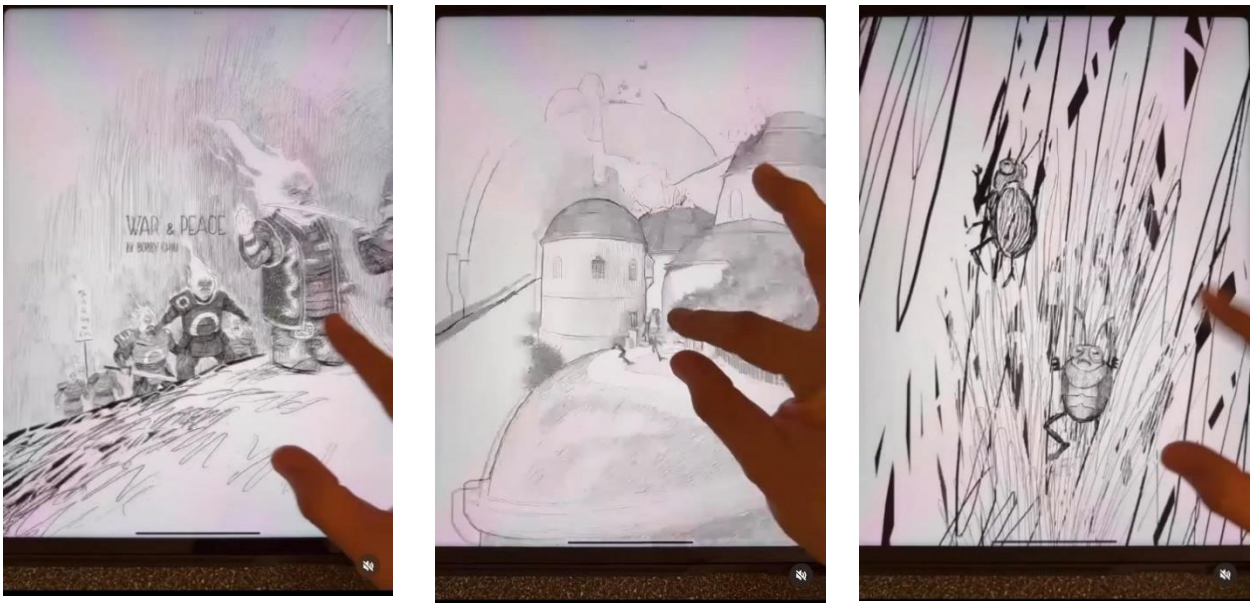
Bobby Chiu, (2023) Super Mario Infinite Zoom Art



This artwork was made to showcase Super Mario legacies, it shows the different games that Super Mario was a part of, from the most recent up to the oldest game that the character has been through. It also displays the artist's unique creativity in making infinite zoom, he likes to create an infinite zoom piece that is not linear. This means that he zooms in a different direction, be it left or right and sometimes from the most unexpected angle.

Figure 17

Bobby Chiu, (2023) War and Peace



This piece demonstrates the effects of war in the most explosive aspect down to the microscopic level. Bobby Chiu made sure that the audience could see the downside of wars be it the lives lost to cities destroyed and ending with the natural ecosystem being disrupted. He also added the evolution of technology when there is a war, since both sides want to win, they will be competing in creating the most advanced technology.

Results and Discussion

In this study, we tackled the subject of Artificial Intelligence (AI) and how it can play a role in creating artworks. The subject of artificial intelligence covers a huge scope of topics in the realm of technology, with different branches such as Machine Learning, Neural Networks, Robotics, etc. In this research, we focused on a subset of machine learning called generative AI as it is the most relevant to our topic. How generative AI produce images differs for every AI model, each having their own method in creating images. The study focused on the utilization of artificial intelligence when it comes to creating artworks.

There are many websites and software on the internet that integrates generative AI in their services, some are paid, and some are free. When choosing a generative AI program, do consider the factors that most important to you. When we were looking for generative AI programs to be used in this project, we considered three things such as user friendliness, accuracy, reliability, and free. User--friendliness for how easy it is to use the program. Accuracy on how close the images produced are to our prompts. Reliability for how reliable it is in delivering the same level of accuracy for each image it produces and it must be free. We want to use free programs so that others can also try it out for themselves. We settled on using Copilot, Adobe Firefly, and Krea.AI as this were the programs that checked out all our needs for this project.

Our chosen Medium was a digital illustration on an infinite zoom canvas that is why we used the app "Endless Paper" available on the iPad. Endless paper is a great app to use when doing infinite zoom art, although, it has its limitations. We first rendered the 2D and 3D illustrations at 4k or 8K resolution with a PPI of 300 to have the best quality possible and to avoid any pixelations when zooming in. However, endless paper was not able to handle such huge resolutions and high PPI. After importing 5 images of our works, endless paper would prompt us we cannot import any images further, displaying a message telling us we have run out of Random Access Memory (RAM). We tried to search the internet regarding this problem, but nothing popped up. After researching further, we theorized that it was because of how we rendered the image is what is causing the problem. Displaying a very high-resolution image with a high PPI takes a ton of processing, and having multiples of it in one canvas can be difficult for an iPad. To further back our theory, the images that were imported inside endless paper were buggy as some were flickering when trying to zoom in and out. A clear indication that endless paper was having a hard time processing this image in an infinite zoom style. For this, we had to bump down our resolution and PPI to 1080p with a PPI of 72. We also tried to keep the file sizes of our work as low as possible without any loss of quality to further avoid this error. After everything, all the images were imported fine with no visual bugs when trying to zoom in and out.

The images produced by AI can be daunting at first. We too were surprised on how well and fast it produced images that are relatively accurate with our prompts. It did what we told it to do and were impressed. At the start of this project when we were testing out if our idea could be done, we feared what we might uncover. Would this project prove to us that it will replace us artist in the future with its generative image capabilities? You might think so as well, but that is not the case.

At a first glance AI generated images are impressive as it created an image you told it so, but upon closer inspection, that's when things start to fall apart. Looking closer at this AI generated images, you could see many imperfections and errors. Stuff such as the lighting of objects. It is a hit or miss as you could tell that objects that shouldn't be receiving light in the scene are getting lighten up or being lighten up opposite from where the light source should be. Another thing to note is that it distorts objects just enough so that you could recognize it, but looking upon it closer, you would see some of its parts are missing or in places it shouldn't be. Like for example a chair. You know it's a chair, but the AI generated image of a chair has an extra leg. Lastly, we noticed how it struggles a lot with generating human characters, specifically with their hands and faces. The faces of some are blurred or distorted. The hands of some either have no thumbs or have it in the wrong spot, extra fingers, and fingers bending in a way that is not conventionally normal. These are some of the things we have observed with the generated images. They look great if you look at it, but you could quickly realize that its AI generated due to its imperfections and inconsistencies.

That is why we believe it will not replace us artists. While it did not generate a picture-perfect image, it did however provide a great tool for harnessing creativity and references. It also provided help in making tedious tasks such as upscaling and enhancing images easier than before. We find it to be a powerful tool during the course of this project.

Conclusion

The study shows that artificial intelligence can be utilized by artist in creating artworks. Generative AI software can become powerful image referencing software as it can produce reference images specifically tailored to the user's prompt. Image upscalers are a great tool to upscale low resolution or produce high resolution images that would be otherwise not possible to render due to hardware limitations. Artificial Intelligence is not a threat for artist. It would not replace artists, but rather artists' who does not know how to use these tools because it is unstoppable. This technology is continuously being develop, thus making its better each day. Being adaptable and open for such changes is important for an artist. Keeping an open mind allows for new possibilities to explore, a new way for artists to express themselves, another outlet that could inspire creativity.

Recommendations

Research Topic

The subject generative AI is a relatively new and is rapidly getting better each day. New information regarding AI might come out, which would give a better understanding of the subject matter. Thus, further examination regarding its future development and its implications on the context of art can be studied to provide further data on how it can be utilized effectively as a powerful tool that can be used to enhance an artists' workflow.

Ethical Implications

There are no rules and regulations yet regarding the usage of AI as it is relatively new. This means its ethical implications like copywrite infringement on works of other artists being used to train AI models without their permission is happening. We encourage future researchers to delve into the legality and ethics of AI once further information and data has arisen. This aspect must be tackled for us to set the proper rules and regulations to ensure the responsible use of AI.

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Appendix