The Effects of AI on Digital Artist

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Abstract

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This thesis explores the effects of AI art generators on the video game industry, specifically on the roles of artists and the game development process. The study aims to determine whether the employment of artists in the industry will decline or thrive in the presence of AI art generators, what new job opportunities will emerge, and to what extent artists will benefit from AI implementation.

As new technologies like AI emerge, they can generate not only simple game designs, but also art with a single click and keywords. The author seeks to understand how these changes will impact artist roles in general and the video game industry.

In total, 20 participants answered the survey and six interviewees with experience of game and art industries were interviewed using qualitative research techniques. Discovering their thoughts on AI-generated art, including attitudes toward this new technology, possible advantages and disadvantages, ethical considerations, and the future of AI in digital art and the video game business, were revealed through thematic data analysis. The interviews also looked at the abilities and characteristics needed for game designers and artists to prosper in a future where AI-generated art is employed more and more in the creative process. Moreover, potential copyright concerns associated with the usage of AI assets in the industry were examined, as well as the use of AI in video game production.

Key words
AI, AI art generators, Digital Art, Game develop, Game Industry, Concept Art, Illustrators

Table of Contents

1 Introduction

1.1 Thesis background

Art refers to the expression of human creativity and imagination through various mediums such as painting, sculpture, music, literature, and dance. It is a form of cultural expression that has played a significant role in shaping human societies and reflecting the values, beliefs, and ideas of different civilizations throughout history. Art can serve various purposes, from aesthetic enjoyment and personal fulfillment to social commentary and political activism. It continues to evolve and adapt to new technologies and cultural changes, providing a rich and diverse field of human expression. (Stanford Encyclopedia of Philosophy, 2007).

Art is one of intrigue field and plays an enormous role in our history until now, and to these modern days, it has been one of the most dynamic with the changing of technology. With the presence of artificial Intelligence (AI) recently, it was able to generate art with just a single click, and this can be called AI art generator This can take various forms and under many names, such as Midjourney or Dall-E 2 using AI algorithms to generate artworks, using AI as a tool to assist artists in their creative processes, or using AI to analyze and understand human-made art.

Artificial intelligence has transformed how artists approach their work, express themselves, and have increased the possibilities for what may be made. However, it has also raised concerns about the ethics of art and the function of technology in creative process (Laurie Clarke, 2022). AI art generators have made it possible for artists to work with computers to create new and intriguing kinds of art, pushing the frontiers of creativity and innovation.

The purpose of this thesis is to examine how artificial intelligence art generators are changing the world of art, particularly in the context of the video game industry. This thesis intends to give insights into the current status and future possibilities of AI art generators in the gaming industry and the role that artists will play in this fast-growing sector through a thorough review of existing literature, concept, survey and expert interviews.

1.2 Research Objectives

The goal of this thesis is to explore whether AI art generators can replace human creativity, and if so, to what extent. This research will also investigate which jobs in the game industry may be replaced and what new types of artists may emerge. Additionally, the study will examine how much artists are willing to incorporate AI into their creative process and how much it can support them.

1.3 Research questions

As being mentioned above, this research thesis is focused on AI art generator effect on art industry employment, especially in the game industry. Therefore, the main research question is followed by four supporting questions as follows.

What is the future of AI-generated art in the game industry and how will it continue to impact the development of games and the role of artists in this process?

- What is the potential for AI-generated art to replace human artists in the game industry and how will this affect the job market and the role of artists in game development?
- How will AI-generated art influence the design and aesthetic of future games and what new creative possibilities does it offer?
- How will the use of AI-generated art impact the cost and time required for game development and what are the potential benefits and drawbacks of this trend?
- What are the ethical implications of using AI-generated art in the game industry, especially in terms of employment and copyright issues for human artists?

1.4 Thesis scope and Delimitations

The focus of the thesis will be AI's effects on artists generally and the video game industry. Particularly the stages of the creative process and the applications of AI. The author will discuss about artificial intelligence art generators first. Second, the video game business offers a variety of art jobs, such as animator, 2D artist, and 3D artist. Concept artists and illustrators are the professions on which the author will focus since they now have the most influence. The survey and interview will also focus on discuss mainly on how it is affecting the process of making game in game industry, which part of the creative process that AI affects, what are the pros and cons of AI art generator regarding artist and what artist think about them.

In accordance with the objectives of this research, there are a few limitations that need to be stated. The gaming industry's other creative positions that are unrelated to the art process will also not be studied or researched, and traditional art will only be briefly referenced. The market is flooded with several AI art tools, instead of discussing every tool available, the author will focus on the characteristics that are common to all tools or those that are mentioned in the survey. Stable Diffusion, MidJourney, Dall-E2, and Night Cafe are the anticipated tools.

2 Methodology

2.1 Research Method

The two research methodologies that are most used in academic research are qualitative and quantitative approaches. According to Braun and Clarke (2013), the key difference between these two approaches is that qualitative research collects and analyzes data using words, whereas quantitative research collects and analyzes data using numbers and statistical techniques (Merriam & Tisdell, 2015, 6). The author of this thesis conducted research using qualitative methods. This involving surveys and interviews as a primary method of collecting data, documents analysis as secondary method and thematic analysis to analyze the data being collected.

To examine the benefits and challenges of using AI as part of the creative process, the acquired data is also studied and discussed. Surveys and literature are used in the approach's execution, along with desk research and interviews.

The spoken data is anticipated to be slightly biased because the responses are based on the experience and viewpoint of a single individual. As a result, the qualitative approach by its very essence emphasizes the process, knowledge, and significance employed for this study.

2.2 Research Approach

In terms of the research approach, it is regarded as a plan that directs the study through a series of elaborate presumptions to specific techniques for gathering, analyzing, and interpreting data (Chetty, 2016). The theory is developed using three main methods: deduction, induction, and abduction. A theory and a hypothesis are formed using the deductive technique, and the research strategy is created to test or validate that theory.

This research uses the abductive approach that combines the inductive and deductive approaches to better comprehend the relationship between AI, the video game business, and the artist. Previous knowledge and theories will be specifically reviewed. The author will then continue to observe, listen, and gather information to finally understand the artist considering their individual perspectives on the use of AI art generators. Finally, it is anticipated to draw certain conclusions and provide proposals that help the industry's development, particularly regarding future artist jobs in the video game business.

2.3 Research Design

There are six different kinds of qualitative research designs, according to Merriam and Tisdell (2015, 42). The most popular method is the fundamental qualitative research, which seeks to

identify and interpret the meanings individuals make for themselves. While they have distinct objectives, the other categories—case studies, phenomenology, narrative analysis, ethnography, and grounded theory—share certain characteristics with the fundamental qualitative investigation.

A fundamental qualitative study is used for this thesis, which includes surveys, interviews, observations, and document analysis. The empirical study ascertains how and whether artists are prepared to integrate AI into their creative processes. It also ascertains how they see the consequences of AI art generators on their industrial workflow. The survey complements the qualitative technique and support in generating interview questions. The outcomes show the difficulties, benefits, and expectations related to these encounters.

2.4 Data Collection

The data, which includes data collecting, processing, and reporting, is a significant component and is extremely essential for determining the study's result. As previously mentioned, the research is conducted using qualitative data, which will be acquired through surveys, expert interviews, observations, and a thorough literature analysis. To this thesis, primary and secondary data sources are being gathered. This research author will employ an online research strategy for the survey method.

The viewpoint of artists and their experiences with AI art generators are investigated using an interview technique, including how AI art tools influences their creative workflow, art responsibilities, and overall work process. This method is the greatest choice for gathering information because the creative process cannot be fully witnessed or understood by desk research and reading articles.

Depending on how they are conducted, interviews can be characterized as highly structured (standardized), semi-structured, or unstructured (informal interviews) (Marriam & Tisdell 2015). To optimize flexibility and response quality, the semi-structured interview employed as part of the research to collect the primary data. This technique of interviewing are conducted online.

This interviewing technique makes use of a combination of open-ended, more, and less structured interview questions. The interviewer should develop a clear and comprehensive vision about the question list and outcomes to ensure that the responses will ultimately help address the research questions. Merriam and Tisdell's 2015 book, Qualitative Research: A Guide to Design and Execution, will serve as the main reference for compiling the list of survey and interview questions as well as for the following data analysis.

2.5 Data Analysis

The process of extracting meaning from unprocessed data is called data analysis. Depending on the type of data being utilized and the goals of the research, qualitative data analysis is applied. Before analysis, raw data must be properly categorized, safeguarded, and prepared (Denscombe 2010, 274). Content analysis, thematic analysis, narrative analysis, grounded theory analysis, and discourse analysis are the five analytical techniques frequently employed in business academic research. Thematic analysis act as the author's key tool for data analysis based on the nature of the research. The classifications are analyzed using thematic analysis, which then presents the themes, patterns, connected to the data set and elaborates on them. An essential part of this strategy is interpretation. (Alhojailan M. I. 2012, 40.)

Braun and Clarke define the Thematic Analysis (TA), a method for identifying and organizing patterns of meaning across a dataset. TA allows researchers to identify and make sense of shared meanings and experiences, rather than focusing on unique or idiosyncratic ones. This method is useful for identifying commonalities in the way a topic is discussed or written about.

A comprehensive and popular technique for analyzing qualitative data, thematic analysis may offer insightful information about the perceptions and experiences of individuals and groups on challenging social, cultural, and technical challenges. In this situation, it may be a helpful tool for analyzing the effects of AI art generators on the gaming and art sectors and comprehending the function of artists in this process.

2.6 Thesis structure

The introduction, methodology, theoretical research, finding results and analysis, discussion, and conclusion are the six main components of the thesis. The thesis report will be structured according to a survey of academic literature as follows:

1. Introduction: This part gives a summary of the thesis and discusses the context of the subject and the necessity of the investigation. Clarification is also provided on the goals and constraints.
2. Methodology: In this part, the author describes the methodology that was adopted to carry out the study, including the strategy, design, and methods for gathering and analyzing the data.
3. Theoretical Study: This portion conducts the theoretical framework and evaluates earlier research. The major ideas important to the thesis are introduced and explained by the author.

4. Findings and Analysis: This part explains how the methodologies were used and how realistically the empirical study was carried out and the data was analyzed. The findings of empirical study and the outputs of the data collection procedure are presented in the results section.
5. Discussion: In this part, the opportunities and problems resulting from the practical findings are explained as well as how the findings are validated against the theoretical framework that was previously developed.
6. Conclusion: This part restates the research's objectives and assesses how well the topic presented at the beginning was solved by this study. The study's shortcomings are discussed in this section, and it is suggested that further, more comprehensive research be done on this subject.

3 Theoretical Study

In this section, the author will be introducing different concept related to the thesis research topics for the readers better comprehend the topics before analysing the result and effect.

3.1 The Concept of Art and Digital Art

3.1.1 The Concept of Art

Art has been a crucial component of human expression. Art has evolved and changed throughout the centuries, reflecting the values and objectives of each generation, from prehistoric cave drawings to Renaissance masterpieces. However, depending on the history, religion, and region, it might reflect many different types of aesthetics and be defined and interpreted in many ways.

The concept of art, according to Todd, George F (1983), is frequently and generally used appropriately in a variety of contexts, yet weirdly enough it nevertheless remains a fundamentally obscure concept. He claimed that the problem is not just that there is little agreement among scholars about the specifics of the concept, though the stark differences in opinion in this area are undoubtedly embarrassing in and of themselves; rather, the problem is that people are ultimately unsure of the nature of the concept itself, in the sense that people are unsure of what kind of concept it might be. These mistakes appear to be connected since an erroneous perception of a concept's goodness invariably leads one to search for the incorrect sort of material.

Weitz, another philosopher who published on "Defining Art," came to the same conclusion that there are no requirements that must be met in order for something to be considered art or one of its sub concepts, such as novel, tragedy, painting, or another. All these ideas are open concepts with "family resemblances" in their actual manifestations. (Dickie George, 1969)

For an exceedingly long time, art has been a crucial aspect of human evolution. From a historical standpoint, art has existed for practically as long as humans have (Encyclopedia Britannica, 2023). There are several definitions of art. It uses a range of mediums, including photography, installation, decorative art, printing, drawing, and painting (Britannica, T, 2020). In accordance with Merriam-definition Webster's (2023), art is defined as talent acquired via experience, study, or observation, the deliberate application of skill and inventiveness by the aesthetic awareness, particularly in the creation of artistic things. On the other hand, according to The Cambridge Dictionary, art is the creation of aesthetically appealing or emotionally expressive items, such as music, photographs, or other media. However, the author will focus on the artist, painting, and drawing perspective parts of art in this thesis, excluding other aesthetical fields.

Since the dawn of the digital age, the way people live, work, and create has changed dramatically. The result of this technical revolution is digital art, which enables artists to produce and edit images in ways that were previously impractical. Artists may challenge the limits of what we often think of as art by utilizing the power of digital technology, creating new opportunities for artistic expression.

In the 1990s, as the internet developed, digital art became more widely available to viewers and creators. Utilizing the internet's interactive features and capacity to blend text, images, and ultimately video and audio files, artists began to investigate how it might be utilized as a medium and a messenger. A notable example is Olia Lialina's “My Boyfriend Came Back from the War” (1996), which let viewers to explore a story by clicking on a succession of hyperlinks. (The Art Story, 2023)

The realm of art also shifts because of how technology advances and shapes how we interact with the environment around us. The rise of digital art in recent years has challenged conventional ideas of what makes a work of art. Artists now have new possibilities for expression and experimentation that weren't previously available to them because to the advancement of computerized tools and materials. As a result, human is now in an era of artistic innovation when the distinctions between art and technology are growing blurrier.

3.1.2 Digital art

A relatively new media that has grown in popularity recently is digital art. It is a type of art that produces works of art using digital technology, such as software and hardware tools. Computer technological advancements have made this medium feasible by enabling artists to produce and modify pictures in unique and creative ways. Artists now have more alternatives thanks to digital art, enabling them to experiment with previously unattainable media and approaches.

The creation, sharing of knowledge, and consumption of art have all been altered by the vast and active world of digital art. Digital art is a subcategory of new media art that uses digital technology as a crucial part of the creative process, allowing for a wider variety of expression and experimentation. Harold Cohen's AARON software, developed in the early 1980s, was one of the first ventures towards digital art. It was intended to use a robotic machine to make enormous drawings on sheets of paper. Since then, artists have used a wide range of techniques and styles, from digital photography and computer graphics to experimental forms of art like AI generated and augmented reality (AR) art, and the field of digital art has significantly grown in both form and function. (Lucija, Bravic, 2023)

Digital art creates a final result that may take many various shapes, which is one of its most interesting features. For instance, digital art can result in NFTs, virtual worlds, Adobe Photoshop

collages, and vector pictures (Lucija, Bravic, 2023)**.** More chances for artists to share their work with a larger audience have been made possible by this digital end result. The ability to create with light, music, and pixels is a result of the expansion of the artist's toolkit thanks to digital technology. Digital art has an influence outside of the digital world as well. While certain forms of digital art need specific setups and tools, a fair amount of it can be simply moved and watched via television, computer displays, social media, or the internet. With the use of modern methods like crowdfunding to finance their work and the ability to go viral to bring their work into the public eye, digital art has enabled artists to establish their own careers without the need for representation (The Art Story, 2023).

Digital art is a quickly developing discipline that keeps expanding the limits of what is practical in both art and technology. People may anticipate seeing much more intriguing breakthroughs as digital technology advances and becomes more widely available. The manner that digital art promotes interaction and experimentation between designers, artists, and engineers is another important aspect of it. The medium's digital nature makes it possible to collaborate internationally and to easily share ideas. Due to this, hitherto unimaginable creative forms and fashion trends have been developed.

Concerns concerning the legitimacy and ownership of digital artworks have also increased with the popularity of digital art. Digital art is readily replicated, which has led to debates regarding what really qualifies as an original work of art and how to value and preserve it. As a result, new technologies like blockchain have been created that may be used to confirm the ownership and legitimacy of digital art. Digital art thrives and develops despite these obstacles. People may anticipate seeing even more ground-breaking and inventive works of art that challenge our conceptions of what art can be as the technology underlying digital art develops.

Digital art has practical uses in industries like advertising, entertainment, and education in addition to its aesthetic and cultural relevance. Digital art, for instance, is used to provide visual effects for motion pictures, television shows, video games, and virtual reality applications. Also, it is employed in education to teach pupils about art and technology as well as in advertising to produce eye-catching images and animations.

Digital art may be viewed as an illustration product, an art book, a concept art, character concept art, environmental idea art, and so on in the context of the video game business. It has a significant impact on how a video game will ultimately appear and how the player will perceive and visualize a fictional environment or idea.

In conclusion, the area of digital art is one that is fast developing and has had a big influence on the art world in addition to other fields like entertainment and education. Its digital nature enables new kinds of expression and cooperation, and as technology develops, its influence is certain to increase. As a result, both artists and technologists should continue to research and create in the area of digital art.

3.1.3 Different types of digital art roles

There are many other art positions available, however for the purposes of this thesis, author will only focus on artists roles in the video game and digital industry. There are different types of artists, including 2D artists, 3D artists, concept artists, illustrators, animators, and so on. With current AI technology, a visual may be created in a split second merely by providing a prompt, keywords, or phrases. This has a significant impact on artists who draw by hand, both digital and traditional artists, as it will take a significant amount of time to complete a complete picture with all the details. The nature of work and output that concept artists and illustrators create is particularly close to the artwork produced by AI art. Therefore, concept artists and illustrators will be the focus of this thesis's discussion.

Concept artist

Concept artists, commonly referred to as conceptual artists, are designers in the media and entertainment sectors whose main goal is to graphically express concepts. Instead of being an art form, it communicates visual concepts in practice, and the term was developed to characterize the employment role in the sector (Bucci, 2017). The term "conceptual art" first appeared in the late 1960s when a movement to promote interest in idea-based art was established (The Art Story, 2023).

A concept artist is required to possess a deep understanding of the principles of art as well as good design, technical, research, time management, and communication skills. A concept artist's responsibilities may include designing characters, landscapes, items, and vehicles. The area may be enlarged, and certain artists may focus solely on one aspect of concept art, such as environment concept art. (Feng Zhu, 2020)

From a script or creative brief, concept artists create the initial visual conceptions (characters, objects, vehicles, and locations). They are the ones who decide the work's tone and style, giving an abstract notion life, and concept art serves as a reference point for the duration of a project's development. Since the concept artist's work will serve as the foundation for the style of the animation, video game, cartoon, etc., their involvement is significant. By showcasing the main characters and settings of a project, they interpret a client's design requirement or develop their

own unique vision. As it is refined and expanded further during the development process, this early artwork will be straightforward but expressive (CG Spectrum, 2023). Particularly in video game projects, concept artist work acts as an essential medium for communication with other art and visual departments, especially in the early stage of the product development (Indeed Editorial Team, 2021). For demonstrations of concept artist's works, see Appendix 3.

In one of his videos, Feng Zhu did explain the gaming business has seen significant development in the previous 25 years. The types of games are being defined for the first time, ranging from 16-bit visuals to photo-realistic content. Many of these games are the first of their kind, including first-person shooter games and role-playing games, among others, and they establish a whole genre of games. Then open world games came out in survival mechanic games, and that changed the way the playing field in terms of our job went. Then, open world games with survival mechanics started to appear, which transformed the playing field for concept art line of work. Only 30 to 50 concept artists were legitimately employed during this time, while the rest of the business simply hired anyone who could draw effectively. (Feng Zhu, 2020)

In the industry, concept artists are thought of differently from product consumers. Concept art is what is displayed to the public online in galleries like ArtStation, in advertising materials, and in artbooks devoted to video game concept art. However, not all concept art is meant to be seen by the public. In fact, only a fraction of the concept art created for a game is typically displayed to the public, with the majority of it being kept behind closed doors. This is because concept art is often used as a reference for the development team, providing them with a visual guide to follow as they work on the game. (Anhut, 2014)

The visual aesthetic and general feel of a video game are created with the assistance of concept artists, who play a crucial part in the industry. They must collaborate closely with other members of the production team to ensure that their work is in line with the overall vision for the game since they are in charge of creating the characters, environments, and props. The tasks and responsibilities of concept artists may change as a result of developments in AI, but it is obvious that their originality and aesthetic vision will always be crucial to the creation of successful video games.

Illustrator

Illustration has been in some form or another for centuries, but it has only lately been recognized as a separate field. Over the years, it has been described in a variety of vague and varying ways as a visual language and medium, including painting, engraving, commercial art, cartoons, illustrations in books, and drawing. Perhaps because of the occasional overlap, it is frequently

mistaken with other fields, most notably graphic design and fine art. Alan Male claims that illustration is about conveying a certain contextualized message to an audience. Its foundation is an objective necessity that was either created by the artist or a client with a commercial based to complete a certain objective. The scope and diversity of these many responsibilities are what make the illustration field such a powerful visual language (Alan Male, 2007). Therefore, we may understand an illustration simply as a visualization created by an artist. Each illustration aims to clarify facts. It could be a collage, a drawing, or a picture as long as its objective to portray facts and information graphically is maintained. See appendix 4 for illustration artworks from different illustrators working for game development companies.

In the field of video games and game art, an illustrator creates worlds and game or genre concepts based on ideas by concept artists. The majority of the work is done using drawing and painting programs like Adobe Photoshop, Procreate, and other similar ones, especially in the era of digital art. They frequently follow a creative brief provided by a customer or business. An image that tells a story, evokes a feeling or mood, or promotes an idea or item is created by a digital illustrator. A digital illustrator's work may include illustrations and elaborate special effects for movies, video game components, ads, graphic design, and book covers, among other things. I illustrators produce unique pictures for both client projects and personal work. (CG Spectrum, 2023)

After receiving project information, the digital artist creates artwork that effectively conveys the concept, character, images, scene, sequence, icon, etc. These illustrations are developed through the creative process, which also involves refining and reworking various prototypes until the final artwork is approved. They utilize computer software on PCs or graphics tablets, as the name suggests. Every artist has an own approach, and every project calls for a particular set of skills. The majority of illustrators are freelancers, although there are several significant corporations, publishing houses, and marketing agencies who employ their own artists. They must address constructive criticism and provide the client's request promptly, affordably, and in the appropriate manner. (CG Spectrum, 2023)

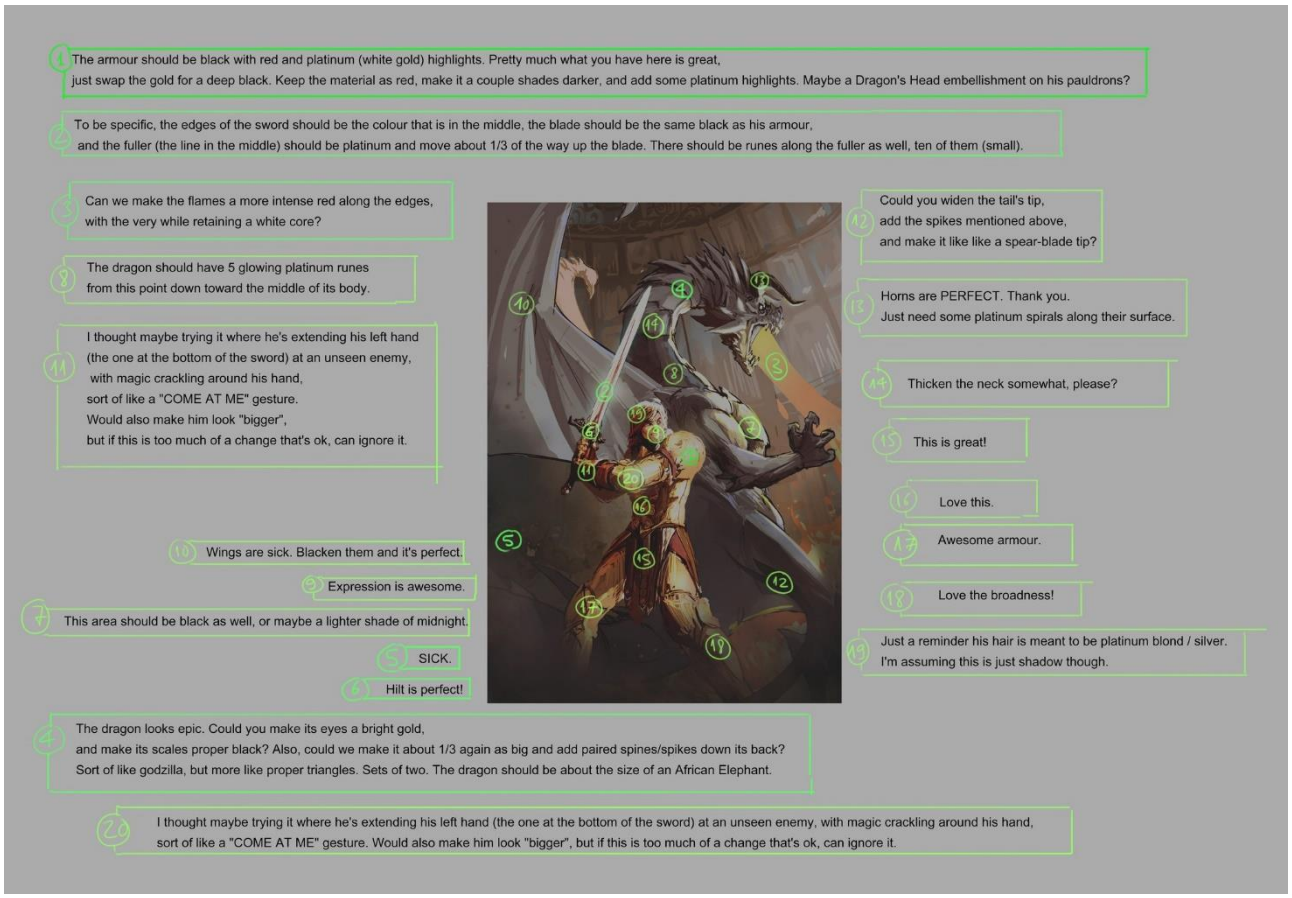

Figure 8: Client's feedback for an illustration, by Vuong Le, a Freelance Illustrator

Difference between Concept artist and Illustrators

What are the differences between a concept artist and an illustrator then? Illustrations and design concept art differ from one another whereas a very different audience will be viewing the work. Developers view the concept art products, but they are not the end users; rather, they are a pipeline or a step in the production process. On the other hand, an illustration is completely evaluated by the customer; the customer commissions the work of art, which is the finished product. (Feng Zhu, 2020)

A completed gaming product may be played by millions of people, but only a tiny percentage will be interested in looking for and viewing the game's concept art. Concept artists would know that production level is more significant than art, art is important but only occupied 10%, and the most important is 90% production level. This means that the concept art needs to have a decent and strong design content, be able to be built, and attract consumers in enough to get them to buy it. This stage of the production process for concept art usually is pre-production. (Feng Zhu, 2020)

On the other hand, illustration requires artists to have 90% extremely high art capabilities (since the artwork is the ultimate result) and 10% skills in design and other related areas (because the consumer is paying for it). Most of the procedure is post-production. (Feng Zhu, 2020)

There are many uses for illustration, including in publication, cinema, and television. The video game business is one sector where artwork is crucial. A lot of artwork is needed for video games, from background art to character designs, and illustrators are essential to building realistic and interesting gaming environments. The video game business has expanded tremendously in recent years, and games are now more sophisticated and complicated than ever. As a result, artists now have a lot of options for employment in this fascinating and evolving industry. See appendix 5 for a comparison table between Concept Artist and Illustrators.

3.2 Video games industry

The video game business is a vibrant and quickly expanding segment of the entertainment industry that appeals to gamers of all ages and socioeconomic levels worldwide. Video games have taken center stage in contemporary popular culture thanks to their engrossing gameplay, breath-taking visuals, and participatory narrative. The video game business provides something for everyone, from traditional console games like Mario and Zelda to massively multiplayer online games like World of Warcraft and Fortnite. (Omri Wallach, 2020)

Although the video game business is not frequently associated to the traditional art world, it has become more and more clear in recent years that video games are a distinctive and compelling art form in their own terms. Video games provide a degree of creative expression that is unmatched in any other media thanks to their lifelike visuals, engaging soundtracks, and sophisticated stories.

Since the beginning of time, artists have been drawn to the video game business and have contributed their talents in the fields of painting, sculpting, animation, and other creative forms to the development of game worlds and characters. Aesthetics from video games have also affected and been influenced by other fields of the arts, with influences ranging from fine art and graphic design to film and television.

As the relationship between the video game business and the art world is growing and shifting. The video game industry is positioned to play a bigger role in the realm of art and creative expression, whether it is through partnerships between game developers and conventional artists or the creation of new tools and technology that blur the lines between art and gaming.

3.2.1 Video games company structure

The process of making a video game is intricate and complicated, requiring a wide variety of knowledge and abilities. Every aspect of game production, from concept art and storytelling to programming and game design, calls for meticulous preparation, execution, and teamwork.

Mac Brunet (2022), an art teacher and Senior Artist with years of experience working in the video game business under Blizzard, offers an insightful viewpoint to better understand the process and pipeline of the industry. He offers a thorough breakdown of video game company department and the process of game development in his online film and production class at ArtSchool from Cubebrush. See appendix 6 for triple A game company structure and video game development.

In addition to highlighting the value of cooperation, Brunet gives a thorough breakdown of the many departments involved in video game development. He offers a thorough evaluation of the numerous divisions that are essential to a video game's production. The teams from the Art Department, Engineers, and Game Design and Sound Design are highlighted as the three main departments that contribute to the game production process. In order to provide a smooth and immersive gaming experience, each of these departments has a certain function to perform.

Concept art, character design, environment art, and animation are just a few of the many abilities and disciplines that the art department combines into the game production process. It is the largest department involved in the process. The department is in charge of the game's visual appeal, which has a big influence on how players respond to it. The department's head, the Art Director, is essential in developing the game's aesthetic, ensuring that each team follows it, and making sure the game functions properly. To ensure that the final product looks and feels like a smooth and polished experience, the art director collaborates with other departments, develops the game's visual style, and oversees the art department's resources.

The department of engineers, which focuses mostly on programming, is in charge of creating and maintaining the software that drives the whole project. The Technical Director is in charge of the department and works closely with the art department to make sure that the graphics complement the gameplay and user interface. The technical art team and the department's engineers work together to ensure that the code is efficient and effective. In order to ensure that the project is finished on schedule and under budget, they also build tools to increase the productivity of the artists and other team members.

The game's audio features and gameplay mechanics are handled, respectively, by the game design and sound design teams. The game design team works closely with artists, programmers, and other members of the production team to develop the game's mechanics, character designs,

level layouts, and user interface using specialized tools and software. The sound design team is in charge of the game's audio components, including voice acting, music, and sound effects. They make sure that these elements flow naturally with the rest of the game's mechanics and design to enhance player experience.

In general, he stresses the value of collaboration and communication during the game-development process. It emphasizes the importance of each division and its function in producing a smooth and engaging game experience. Game developers may make sure that each department efficiently collaborates to accomplish the desired results and deliver a beautiful user experience by knowing the workflow of the company and the process for generating a video game.

3.2.2 Video games development process

The area of game creation is intricate and constantly changing, necessitating a high degree of technical know-how, teamwork, and creativity. This Stage of Game Development essay by Devin Pickel (2019) will offer a thorough overview of the many stages involved in game creation, stressing the essential duties and difficulties unique to each level.

As it lays the groundwork for the whole process, the pre-production phase is essential to the accomplishment of any game development project. The target market is determined, the game concept is produced, and the project's parameters are established during this stage. A game design document, which acts as a road map for the next stages of production, is also created during this stage.

The majority of the effort involved in game development is done during the production phase. This phase entails developing the game mechanics, programming the game components, and testing the game to make sure it is interesting and engaging. This phase of the project is frequently the most time-consuming and difficult since it calls for intense teamwork and coordination amongst the many parties involved.

Post-production, which comprises refining the game and getting it ready for release, is the last phase of game development. Bug fixes, final testing, and the design of promotional materials are all part of this phase. The game's monetization plan is also created and put into action at this stage.

User testing and feedback are extremely important throughout the whole game development process in order to make sure that players will find the game entertaining and engaging. Game developers may design games that are suited to the requirements and tastes of their target audience by incorporating user input into the creation process.

The essay emphasizes the value of teamwork, communication, and project management in game creation in addition to the stages mentioned above. A high degree of cooperation between many teams, including artists, programmers, designers, and producers, is necessary for the production of successful video games. To guarantee that deadlines are fulfilled, resources are distributed effectively, and the project remains on course, effective project management is crucial. Down below are the development stage of a video game company. See appendix 6 for triple A game company structure and video game development.

3.2.3 Roles and responsibilities of concept artist and illustrator

Concept artists and illustrators, who are in charge of bringing a game's visual components to life, play significant responsibilities in the video game business, as was already established. In the pre-production stage of game development, concept artists often provide drawings, designs, and other visual concepts that support in defining the appearance and feel of the game world (Feng Zhu, 2020). They work together with other developers and game designers to produce intricate artwork that faithfully captures the intended tone and aesthetic of the game.

When researching relevant topics, styles, and genres for their work, concept artists consult with producers, art directors, game developers, and other team members to comprehend the project brief. Based on written briefs, they develop comprehensive key designs using traditional and technical methods, and they present drafts of their concepts for approval. (CG Spectrum, 2023)

Additionally, concept artists offer constructive, proactive responses to criticism and create identify clearly that lay out the dimensions and specifics for the rest of the team to follow. They follow to a timetable and could also be in charge of helping to produce assets and marketing materials. They also keep refining thoughts and designs all the way through the production process. (CG Spectrum, 2023)

On the other side, illustrators focus on the fine details of the game's visuals, developing character designs, environmental artwork, and other materials that will be included in the finished product. The work of illustrator is often post-production (Feng Zhu, 2020). They frequently collaborate with concept artists to further develop and improve their initial ideas, therefore they need to be knowledgeable in the technical specifications for video game art, such as resolution, colour schemes, and other factors.

To make visual narrative come to life, illustrators are essential. They must be able to use visual images to tell stories and identify the best techniques for holding the audience's attention. Making ensuring that the illustrations fit high colour standards and the client's expectations is an essential component of an illustrator's job. They also need to have a thorough awareness of the nuances of

various design genres, styles, and colour schemes in order to offer advice on the best course of action. The artist must be able to create finished artwork that corresponds to strict technical requirements while yet producing work that is consistent with project requirements or the client's vision. An illustrator must, in general, have a good eye for detail and the ability to create work that is both captivating and up to the highest standards of quality. (CG Spectrum, 2023)

Although both concept artists and illustrators are in charge of producing visual representations, their processes and responsibilities differ. While illustrators produce finished works that are used in the end result, which is post-production, concept artists concentrate on generating ideas and designs for a project, which is pre-production.

3.3 Artificial Intelligence used in Art.

3.3.1 AI and AI art generator

Artificial intelligence, or AI, is a field of computer science that focuses on building intelligent computers that are capable of carrying out activities that typically require human intellect, such as learning, problem-solving, decision-making, and sensing. AI systems are capable of a wide range of tasks, including speech and picture recognition, data analysis, and result prediction. (Boben, M.A, 2018)

Due to technological improvements and the availability of abundant data for machine learning algorithms, the development of AI has accelerated recently. Numerous industries, including healthcare, banking, education, and entertainment, are utilizing AI. In the field of art, AI has become a potent instrument for developing fresh means of artistic expression and investigating novel creative possibilities.

By enabling robots to produce and create creative pieces of art, artificial intelligence is transforming the art industry. Large quantities of data are used to train AI art algorithms to identify the patterns, styles, and techniques used by various artists. These algorithms then utilize this information to create new works of art. (Jonathan K, 2023)

In certain ways, AI may help artists create by automating laborious processes like colour correction, image resizing, and filtering. AI may also be used to examine and interpret already-existing pieces of art, offering perceptions into the methods and idiom of the creator. Although AI in the arts is still a relatively new discipline, it has the potential to completely change how art is produced, examined, and appreciated.

The topic of AI art technology traces the development of AI in art from the 2015 release of Alexander Mordvintsev's research tool Google DeepDream (Schneider & Rea, 2018). In order to synthesize digital images, DeepDream was developed to distinguish shapes and other visual components in images. An artificial neural network was trained using millions of samples, and the network's parameters were gradually modified until the necessary classifications were created. After experimenting with several techniques, the researchers developed a strategy that assisted in teaching AI how to perceive the right qualities. They claim that this approach provides a qualitative understanding of the level of abstraction to which a particular layer has evolved in its understanding of images. They called this approach "Inceptionism" in recognition of the neural network architecture they used. (Alexander & Christopher & Mike, 2015)

Use of AI-generated visuals has gained increasing attention after the 2015 release of Google's DeepDream program. Due to the topic's early stages and the lack of philosophical and artistic depth in the works produced, the art world's interest in it was brief at the time. (Schneider & Rea 2018.)

Future AI art generators like Midjourney and Dall-E are powered by Generative Adversarial Networks (GANs), a technique that Google's DeepDream laid the groundwork for. GANs, according to Ian Goodfellow's 2014 assertion, are the next development in neural networks and can be trained to produce distinctive and dramatically different images. It is an improvement over Google DeepDream since it enables for the creation of new fragments rather than relying just on current images. (Schneider & Rea 2018.)

Figure 11: Illustration of the most important technological milestones that led to the current AI Art production.

The portrait of Edmond Belamy seen below was auctioned at Christie's on October 25 during the Prints & Multiples event. The extended parenthesis in the algebraic formula infer that it was constructed by an algorithm utilizing artificial intelligence (GAN).

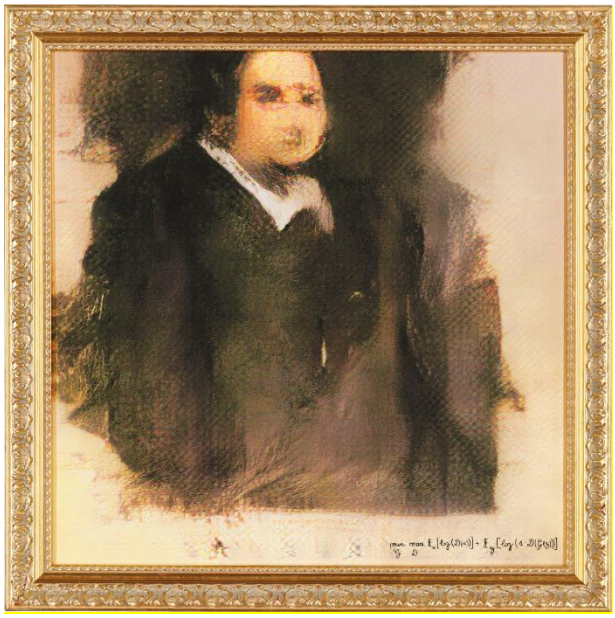

Figure 12: Portrait of Edmond Belamy, 2018, created by GAN (Generative Adversarial Network). Sold for $432,500 on 25 October 2018 at Christie’s in New York.

Over 15,000 portraits made by a member of the Obvious collective provided as the dataset used to train the algorithm. An algorithm that has been taught to distinguish between photographs taken by humans and those taken by machines was then shown the created portraits. Traditional artists have voiced worry about the effects of this new technology since GANs were developed. However, creatives that employ AI in their work think that the euphoria about the technology's potential is unwarranted. (Schneider & Rea 2018.)

Obvious' work may appear less innovative than was originally thought in light of recent advancements in AI art, but it nevertheless demonstrates that humans still have a crucial influence on how an AI grows artistically. This has undoubtedly laid the groundwork for later AI art programs like Midjourney, Dall-E2, Stable Diffusion, and others. Even though the art created by AI has advanced quite far from the past, but the art created by AI is still distinctive and unnatural and still be able to recognize by eye. See appendix 7 for examples of artworks that is created by recent AI art tools such as Stable Diffusion, Midjourney, in order to see how advance these AI tools has become.

3.3.2 Ethics of using AI

AI has fundamentally changed how we live and work in the twenty-first century, and its influence is only growing. Artificial intelligence is becoming more and more ingrained in our daily lives, from self-driving cars to virtual assistants. However, there are rising worries about AI's ethical ramifications as its usage grows more pervasive. A number of ethical concerns have been highlighted in particular by the application of AI in industries including healthcare, banking, and surveillance.

The ethical challenges that arise when employing AI in art, such as those relating to authorship, authenticity, and originality, will be addressed at in this thesis. We seek to present a sophisticated knowledge of the ethics of employing AI in art and to provide insights into how these challenges might be resolved in the future by a thorough investigation of existing practices and ethical frameworks. As a relatively new technology, no limitations or guidelines have been established for its usage as a method, hence the discussion of employing AI to produce art is still up for debate.

Since Midjouney, Dall-E, and other AIs have become more prevalent in recent years, AI art generators have gained popularity. Concerns regarding the authorship and veracity of AI art have been expressed by certain artists and members of the community. Which of the following parties—the artist who developed the algorithm, the programmer who wrote the code, or the machine itself—should receive credit for creating an AI-generated artwork? Concerns concerning the legitimacy of AI-generated art are also raised since it is sometimes impossible to tell if a piece was totally produced by the AI or whether the artist or programmer had any influence or manipulation.

A paper by Kevin Roose (2022) that appeared in The New York Times discussing another piece "A.I.-Generated Art Received a Prize. Artists Are Not Content." This article examines the debate around artificial intelligence's application in the arts as well as the issues of authorship and authenticity. In this instance, Jason Allen's "Edmond de Belamy" artificial intelligence-generated portrait received an art award at Christie's auction house using AI tools Midjourney. As a result, he faced a furious response from musicians who effectively accused him of cheating.

Figure 12: Jason Allen’s A.I.-generated work, “Théâtre D’opéra Spatial,” took first place in the digital category at the Colorado State Fair. Credit

The use of technology in the creation of art has come under discussion among critics and artists as a result of this article. It draws attention to the conflict between the conventional understanding of art as the result of human creativity and the recent development of employing AI to produce art. However, several artists defended Allen, claiming that utilizing A.I. to make a painting was the same as using Photoshop or other digital image-manipulation tools and that human ingenuity was still needed to come up with the appropriate prompts to produce an award-winning picture. (Kevin Roose, 2018)

Disagreements over cutting-edge artistic technology are nothing new. The development of the camera caused many painters to recoil because they perceived it as a devaluation of human artistic ability. French poet and critic Charles Baudelaire referred to photography as "art's most fatal adversary" in the 19th century. Similarly, in the 20th century, purists scorned computer-aided design (CAD) software and digital editing tools for demanding too little expertise from their human colleagues. (Kevin Roose, 2018)

The capacity of the current generation of AI tools to create exquisite works of art with little effort, according to critics, is not what sets them apart from older AI tools. Applications like DALL-E 2 and Midjourney harvest millions of photographs from the public internet, train computers to identify correlations and patterns in those images, and then create new images in that similar aesthetic. Therefore, artists who publish their works online could unwittingly aid in the training of their computational rivals. This prompts crucial queries about the worth of art, the value of the creative process, and the significance of authorship. (Kevin Roose, 2018)

The development of AI art generators has led to significant concerns about the moral and legal consequences of AI-generated art. James Vincent, a Senior Reporter for The Verge, explores the issues surrounding the use of artificial intelligence in the production of art in his article titled "The scary truth about AI copyright is nobody knows what will happen next". Researchers were previously unconcerned about AI-generated art because of the early models' constrained capabilities. However, with recent technological developments, software like Stable Diffusion has made it possible to duplicate an artist's distinctive style in just a few hours, raising significant concerns about the morality and legality of AI-generated art.

One such case is the cloning of the style of Disney illustrator Hollie Mengert by a Canadian student of mechanical engineering. As Mengert outlined, she felt as though her creative rights were being violated by this unlawful exploitation of her work. Since there are currently no laws governing AI-generated art, its popularity is growing, which has led to concerns from members of the ArtStation community who believe that AI-generated art frequently lacks proper acknowledgement or payment and is a derivative of the work of human artists. (James Vincent, 2022)

The use of AI art tools is becoming more and more popular, and Jason Allen's artwork, which just received an award, is just the beginning. Since there are currently no regulations addressing the copyright issues associated with AI-generated art, a large number of works by various artists are being used as training data for AI. This triggered a "No AI Art" protest on Artstation, one of the major media platforms. After AI-generated art started to surface on the site in early December without any attribution, members of the ArtStation community started to protest. Protesters are worried that AI frequently appropriates human artists' work without acknowledging or paying them for it.

Figure 13: “No AI Art” images posted by artists started to dominate the trending section of ArtStation following the platform's refusal to ban AI-generated artwork.

The top online community and portfolio site for artists that work in industries like video games, cinema, and comics is widely recognized as ArtStation. On the site, AI-generated images have increased in prevalence as a result of the rising use of AI technologies like Stable Diffusion and Midjourney. ArtStation refuses to prohibit such content despite appeals from several artists to do so. The result was the dissemination of "No AI Art" photographs. When ArtStation introduced the "NoAI Tagging" function, which needed consent from artists rather than being enabled by default to prevent their work from being scraped for AI training, the situation got more divisive. (Jess Weatherbed, 2022)

Because of copyright difficulties and the massive quantity of data that is being used to train AI from artist work, most artists are discouraged and upset about AI art tools. Since there are now no regulations in place and AI art tools are only lately starting to gain popularity.

All parties concerned must give considerable thought to the ethical implications of employing AI in art because the topic is complicated and has many facets. Although AI art opens up a world of creative and innovative possibilities, it also raises concerns about authorship, authenticity, and the place of human artists in the creative process. To make sure that we are utilizing this technology in

a responsible and sustainable manner, it is crucial to give transparency, accountability, and ethical decision-making top priority as we continue to explore the possibilities of AI art. We can only expect to fully achieve its promise and protect the values and concepts that are fundamental to the art world by having meaningful and critical conversations about the ethics of AI art.

3.3.3 Using AI in game production and certain art positions

With the rise of the video game business, which has grown to be one of the biggest entertainment sectors across the globe, so has the desire for excellent graphics and immersive experiences. Recently, the usage of AI in the game production process has increased significantly, especially in several art professions. Game creators are exploring for methods to incorporate AI into the development of visual material, such as character designs, scenery, and special effects, as AI technology develops. However, the incorporation of AI into the game production process presents ethical questions and difficulties about the position of artists in a more and more automated sector of the economy.

Using AI in game production in general

The entire gaming experience for gamers has significantly improved as a result of the integration of AI into the video game industry. AI is applied in many different contexts, including gaming analytics, generative content creation, and in-game AI. Characters and adversaries in video games that are controlled by AI are referred to as in-game AI. The use of AI has increased the in-game characters' intellect and made them more difficult and realistic competitors.

By using algorithms to build game material, such as levels, environments, and even whole game worlds, procedural content generation has substantially decreased the labour of game developers and allowed them to produce more sophisticated games in less time. Contrarily, game analytics makes use of AI to provide creators insights on player behaviour and preferences, allowing them to enhance the game's design and increase player engagement.

Additionally, AI has made its way into several artistic roles in the video game business, such as animation and character design (Yannakakis & Togelius, 2018). AI may be utilized to create fresh character designs, accelerating, and streamlining the process. It may also be utilized to improve already-existing designs so that gamers would find them more appealing. AI may assist in the creation of more realistic and fluid animations, easing the effort of animators and enabling them to concentrate on more difficult tasks. Based on predetermined criteria, AI may also be used to automatically create animations.

As with any technology, there may be possible ethical issues to consider. One such worry is the use of AI to game analytics, which examines player preferences and behaviour to improve game design. A better gaming experience may result from this, but it also raises issues with data privacy and the possibility of unintentional collection of users' personal information. Additionally, concerns have been made concerning the place of human creativity in the business and the possibility of a lack of diversity and originality in game design as a result of the employment of AI in some artistic roles, such as character design and animation (Yannakakis & Togelius, 2018).

The use of AI in game development has several benefits. The ability to enhance game design is one of the main benefits. AI may be used to monitor player behaviour and preferences, allowing game designers to make more interesting, person-specific games. This may be done by employing machine learning algorithms that look for patterns and trends in player data such as gaming metrics. Then, using this knowledge, game mechanics, difficulty settings, and player-specific experiences may all be enhanced. (Liapis, Yannakakis, & Togelius, 2015)

AI can assist in lightening the strain on game producers. AI, for instance, may be utilized in procedural content creation to automatically build game material, such as levels and environments. The time and effort needed to make sophisticated games may be greatly decreased by doing this. By automating some processes, such asset generation or bug patching, developers may concentrate on more innovative and difficult game design elements (Summerville, Mateas, & Jhala, 2018). AI may also be utilized to make games that are more realistic. While AI-generated animations may make the game environment feel more alive and engaging, in-game AI can make opponent characters more difficult and realistic to battle against. This may be accomplished by utilizing strategies like behaviour trees or animation synthesis, which allow AI to produce realistic movement and behaviour patterns for characters (Yannakakis & Togelius, 2018).

Despite the benefits, there are a few drawbacks that should be taken into account while employing AI in game development. The possibility for ethical problems while employing AI in game development is one of the primary concerns. For instance, concerns regarding data privacy and the possibility of personal information being acquired without users' knowledge or agreement are raised by the use of AI in game analytics. A lack of variety in game design and the role of human creativity in the business are other issues that the use of AI in game creation may bring up (Yannakakis & Togelius, 2018). Another issue with integrating AI in game development is the risk of creators being overly dependent on technology, which might interfere with their capacity to innovate and think creatively.

A lack of variety in game design may result from AI-generated content's potential to lack the depth and complexity that human designers bring to the table (Liapis, Yannakakis, & Togelius, 2015). Finally, the use of AI in game development might lead to mistakes. Since machine learning algorithms can only be as effective as the data they are trained on, inaccurate or inadequate data might lead to AI that produces inaccurate or unfavourable outcomes. Furthermore, the complexity of AI systems can make it challenging to spot and fix mistakes, which could result in bugs that ruin games or other problems (Summerville, Mateas, & Jhala, 2018).

In general, the advancement of artificial intelligence into the video game business has been a beneficial move, but it is crucial to employ caution and attention when using it. The industry can continue to develop and enhance the gaming experience for gamers all around the world by tackling ethical issues and utilizing AI in a responsible and conscientious manner.

Using AI art generator in game production

The visual appeal that draws players into the game world is created by art, making it an essential part of game development. Artificial intelligence (AI)-generated art is becoming more and more common as technology advances. AI-generated art is produced by using machine learning and algorithmic methodologies. Increasing the effectiveness of art output is one advantage of adopting AI art generators (Hassabis, 2017). Manually creating game graphics may take a lot of time and effort. Game developers can produce art assets in a fraction of the time it would take to do it manually thanks to AI art generators. This enables speedier game development by allowing creators to concentrate more on the functionality and mechanics of the game.

The affordability of deploying AI art generators is another benefit (Zhao, 2019). It might be costly to hire talented and experienced artists to create handmade art. Developers may easily create art assets at a lesser cost since AI art generators do not require in-depth artistic expertise. Small-scale creators who might not have substantial resources for game art now have easier access to game creation. AI art allows game creators to produce high-quality graphic assets on a tight budget, which is essential for the business potential of their games.

Additionally, AI art generators may be utilized to produce distinctive art styles that are not achievable using conventional art production methods (Hassabis, 2017). Artworks created by AI systems can be original and unconstrained by human limits. This may result in the development of aesthetically spectacular, distinctive, and unforgettable gaming environments. AI-generated art can aid game designers in avoiding the issue of repeated material, which can be monotonous for

players. Developers may produce a wide range of assets with distinctive visual styles by utilizing AI art generators, guaranteeing that gamers enjoy a varied and interesting experience.

Using AI-generated art has numerous benefits, but there are also certain ethical issues that need to be resolved. The possibility of bias in the algorithm is one of the difficulties (Selbst et al., 2019). The data that AI systems are educated on determines how objective they are. The algorithm will be biased if the training set of data is skewed. As a result, biases and preconceptions may continue to be present in game art. The possibility for AI-generated art to violate intellectual property rights is another difficulty. AI algorithms may produce artistic materials that are too similar to works of art already in existence, prompting concerns about possible copyright violations.

The use of AI-generated art in the creation of video games provides advantages for game producers, including improved productivity and reduced cost. The usage of AI-generated imagery, however, calls into question the place of conventional concept artists and illustrators in the field. One advantage of AI-generated art is that it may be created more rapidly and inexpensively. Additionally, it may be utilized to develop distinctive art forms that are not attainable using conventional art production methods (Hassabis, 2017). Since a result, game development may go more quickly as developers can concentrate more on the functionality and mechanics of the game. AI-generated graphics can also assist game designers in avoiding the issue of repeated material, which can be monotonous for players. Developers may produce a wide range of assets with distinctive visual styles by utilizing AI art generators, guaranteeing that gamers enjoy a diverse and engaging experience.

On the other side, the usage of AI-generated art can cause demand for conventional artists to decline, which might have an effect on their ability to make a living. AI-generated art may be created fast and effectively, but it lacks the human touch and originality that come from conventional art production (Zhao, 2019). Traditional artists are able to infuse their work with a distinctive and particular flair that AI algorithms cannot match. The capacity of traditional artists to produce aesthetic assets that are not constrained by the data they are trained on can result in more varied and imaginative gaming settings.

It's vital to remember, though, that artificial intelligence-generated art is meant to supplement rather than replace conventional art creation. Though it shouldn't be seen as an alternative to traditional image creation, AI-generated art can provide game makers a more effective and economical option. In order to build distinctive and aesthetically attractive gaming worlds that are both effective and innovative, game creators should make an effort to find a balance between the usage of AI-generated imagery and conventional art production.

The effects of AI art tools on Concept artist and Illustrators

The role of concept designers and illustrators in the business may be profoundly affected by the usage of AI art generators in game development. The necessity for human artists may still exist even though AI art generators can offer quicker and more effective means of producing art elements.

The speed and effectiveness that AI art generators provide is one of the main advantages of employing them in the creation of video games. Game designers may rapidly and efficiently create high-quality art assets with AI art generators without having to put in a lot of labour-intensive human work. This may greatly cut down on the time and money needed to create art assets, freeing up game creators to concentrate on other areas of game development. AI art generators offer enhanced originality and versatility in game creation in addition to speed and efficiency. AI algorithms can scan enormous quantities of data and produce original and inventive art styles that human designers could not have previously thought of (Liao et al., 2019). Because of this, game designers may experiment with new creative ideas and provide more immersive and interesting gaming experiences.

The importance of concept artists and illustrators in the business, however, may be significantly impacted by the advent of AI art generators in game creation. Concept artists and illustrators contribute significantly to the creation of video games by offering a distinctive creative viewpoint and creating the game's visual aesthetic. While AI algorithms are capable of producing original and innovative art forms, they are still constrained by the data they are trained on and might not be able to match a human artist's degree of inventiveness and aesthetic vision.

Additionally, AI-generated art is unable to comprehend the narrative context of games and may not be able to produce works of art that reflect the desired mood or ambiance of the game (Lopez, 2021). An AI graphic generator might not be able to convey a game's required dark and menacing visual style with the same amount of emotion and depth as a human artist.

Concept designers and illustrators may find new opportunities in the business as a result of the adoption of AI art generators. Artists may utilize their expertise to improve and modify the art assets produced by AI algorithms so that they better match the artistic concept of a game by working alongside AI technologies. This partnership may result in fresh and inventive artistic approaches that would not have been conceivable without the usage of artificial intelligence (Liao et al., 2019).

In addition, concept designers and illustrators may have less work and stress as a result of using AI art generators, which will free them up to work on more imaginative parts of game development. Human artists may devote more time to establishing the overall visual style of a game by employing AI art generators to produce basic graphic assets, leading to a higher-quality finished output.

While AI art generators might offer quicker and more effective means of producing graphic materials, it is crucial to recognize that they do have some restrictions. AI algorithms might not be able to produce art that is entirely original or distinctive since they are only as good as the data they are trained on. Additionally, AI art generators are unable to comprehend abstract concepts or emotions, which may restrict their capacity to produce meaningful and compelling art (Lopez, 2021).

In conclusion, AI art generators speed up and improve the process of creating visual assets, but they shouldn't take the position of real artists in the creation of video games. Instead, they provide fresh chances for industry cooperation and creative experimentation, which may raise the bar for all gaming experiences.

3.4 Conclusion

Numerous industries, including the video game business, have been revolutionized by artificial intelligence. AI art technologies let game developers and artists produce game material more quickly and effectively. These technologies, however, also present substantial difficulties for game developers and artists. The author will discuss about the opportunities and challenges of employing AI art tools in game development in this essay based on finding theory at first.

Opportunities for artists and companies

The capacity to instantly create a lot of material is the main advantage of employing AI art tools in game development. Several game materials, including textures, models, and animations, can be produced using AI algorithms. AI technologies may help artists create numerous iterations of a model or object so they can select the best one. Moreover, AI may assist designers of video games and artists by automating tedious chores so that they can concentrate on the more imaginative parts of game production. With the use of AI technologies, game designers may produce realistic and intricate game material more quickly and at a lower cost.

The capacity to produce custom game material is another advantage of employing AI art tools in game development. According to the player's choices, AI algorithms may evaluate user data and

give customized game material. For instance, the game may adjust to the skill level of the user, offering a more difficult experience for seasoned players or a simpler one for newcomers. This feature can improve player contentment and engagement, which will improve the game experience.

Game designers may make games that are more approachable to a wider audience by using AI art tools. AI, for instance, can support the development of games that are more user-friendly for players with impairments. AI algorithms are capable of analyzing player data and delivering customised material that caters to the requirements of gamers with various skill levels. Game developers may reach a wider audience and enhance income and user engagement by making games that are more accessible.

Challenges for artists and companies

Despite the advantages of employing AI art tools in game development, a number of issues must be resolved. The ethical implications of integrating AI in game creation are one of the major obstacles. For instance, using AI to create assets might result in copyright concerns and gaming material could be seen as unreliable and missing in human touch. Moreover, AI algorithms may reinforce prejudices or preconceptions, which would be bad for the player experience.

The learning curve for utilizing AI art tools is another difficulty. Effective use of these technologies by artists and game developers necessitates additional training and resources. Artists who may not have a technical background have a particularly difficult problem that forces them to pick up new skills in order to use AI technologies efficiently. Moreover, AI-generated materials do not always live up to the artist's standards, necessitating costly and time-consuming human revisions.

The possible negative effects on the employment economy are among the key difficulties of utilizing AI in game creation. AI art technologies enable game developers to produce game material more quickly and effectively while using less human labor overall. Games designers and artists that undertake repetitive chores that may be mechanized with AI may lose their jobs as a result of this. But, it's important to keep in mind that AI can also provide new employment prospects, such as programmers for AI artists or a brand-new genre of art.

The possibility that AI-generated material would lack the originality and aesthetic vision of human artists is another difficulty. Although AI algorithms can produce game assets more quickly and effectively, they might not always be able to replicate the distinctive vision and aesthetic of human artists. This can cause the quality and originality of game material to diminish, which would be bad for the user experience.

To sum up, AI art tools provide a wide range of potential for game developers and artists. Players may have a better gaming experience if it is possible to produce vast volumes of game material fast, customize the gameplay, and make games that are more easily available. Moreover, AI can support gaming firms boost revenue and user retention. Nonetheless, it is impossible to overlook the difficulties that come with adopting AI art tools, including their potential for employment displacement, ethical ramifications, learning curves, and lack of originality. The incorporation of AI art tools will be more and more required as the video game business develops, and overcoming these difficulties will be essential for success.

4 Findings and Analysis.

The qualitative research technique has been chosen to carry out this empirical study, as described in the methodology section. Moreover, survey and interview data are gathered, and after being subjected to thematic analysis, the results are presented. The techniques for acquiring and interpreting data are more thoroughly explained in this chapter.

4.1 Survey and Interviewees

4.1.1 Survey

Prior interviews, a survey was conducted to gather more information about the number of artists and users of AI-generated art tools and to look into how AI, specifically AI art generators like Midjourney, Stable Diffusion, etc., has affected both the video game industry and art in general. The purpose of the survey was to learn whether artists viewed artificial intelligence as a tool or a challenge, and to find out what they thought about how AI would affect both the gaming industry's workflow and the creative process.

Also, survey participants were offered the option to volunteer for an interview to further explore these concepts. For the survey, there were two language options offered: English and Vietnamese. The art community, including artists, game developers, and those who have utilized AI art tools to make art, was the survey's target audience. Twenty people from various backgrounds, including students, artists, game developers, and graphic designers, participated in the poll. Four or five responders who attended traditional art institutions were open to interviewing and were interested in the subjects. The survey provided a foundation for the interviews, and the results will be discussed along with the interview findings.

4.1.2 Interview

The semi-interviews were conducted in-depth with six interviewees coming from various cultural and racial backgrounds and having varying levels of education. Five contestants were specifically Vietnamese, and one Finnish.

The fact that all interviewees in creative fields, have experimented with AI art tools, and are interested in the subjects is what connects them. Also, one participant from Finland works as a machine learning with one big game company in Finland, and the two other participants from Vietnam are graduates of the Vietnam University of Fine Arts and have experience as illustrators, 3D artists, and designers. Participants offer a variety of viewpoints that serve to gain insight on the study issues by reflecting on their varied experiences and opinions. The list of participants is

included in Table 2, see appendix 8, however names and other details omitted out of respect for their privacy. Moreover, initials are used in the names of some businesses that interviewees have complained about.

4.2 Survey and Interview process

4.2.1 Survey

The survey was conducted online from February 21, 2023 to March 7, 2023. The author reached out to many art communities and universities related to art to find survey participants and interviewees. The survey ran for two weeks before conducting interviews. A general set of survey questions was designed to obtain an overview of artists' perspectives on AI-generated art. The survey included written questions and an email section for those who wanted to proceed to an interview.

4.2.2 Interview

The interviewees' backgrounds as artists and AI engineers were discussed throughout the interviews. The questions were based on a manual prepared by Merriam and Tisdell (chapter 1.5.4) and were meant to ask respondents their perceptions and expectations about AI-generated art tools.

In this empirical research, the interview questions are divided into two parts, each with a set of questions tailored to the interviewee's background. Part one focuses on general information about the participant's background and experience in the creative field, as well as their familiarity with AI-generated art tools. Part two is designed to study the personal views and thoughts of artists and game industry professionals on how AI tools affect their work and workflow.

The first set of questions is for a group of artists, including illustrators and 3D design students. This set of questions focuses on how they view the effects of AI on artists. The second set of questions is for employees working at Finnish game company and is designed to focus more specifically on how AI and machine learning affect game design development and the roles of artists within the company. Through their answers, we hope to conclude what artists and game companies expect from these new AI art generated tools, their potential benefits, and drawbacks, and how they may impact traditional art and video game production workflows. By doing so, artists and game companies can take advantage of the opportunities presented by these new AI art tools while also addressing the challenges they may pose.

Several leading questions may be found on the question list compiled for this study. Interviewees must, however, explain or defend their responses. Also, certain questions call for familiarity with the subject of the study. Supporting questions were offered in order to aid respondents in comprehending these inquiries. The interviews were relaxed and pleasant despite being an hour on average. Also, respondents had the chance to ask the author any questions they might have had.

4.3 Result analysis

Interpretation is the most crucial component of qualitative data collection and analysis. This indicates that categorization and explanation of the data are necessary. The steps of the data analysis are provided here, with references to Braun and Clarke's (2012) manual on how to do thematic analysis.

To make sure the data is accurate and intelligible, the survey responses were thoroughly examined and converted into transcripts. Similar to this, the interviews' audio recordings were listened to several times and then transcribed. In order to examine the interviews for best practices, notes were collected during the interviews. To guarantee clear and intelligible material, all spoken words were transcribed, and silence as well as useless information like laughing and laughs were eliminated.

The second stage is to first code or label specific data features. Similar codes may be used to group data, which can then be used as an useful starting point for developing themes in the next stage. The developed codes were divided into prospective topics during the theme finding stage. Before being labeled and defined in connection to the study questions, the themes were then evaluated and improved. In this stage, every subject and each unique narrative in the report will be examined and understood. The findings from the interviews are examined using themes and sub-themes to show the advantages and disadvantages of AI art tools in the field of digital art and the video game industry.

4.3.1 AI and Digital Art

In this result analysis, the responses from both the survey and the interview will be included. The survey response will be analyzed first to provide a framework and source of support for the interview response. The interview will provide the majority of the detailed data.

Effects of AI on the roles of digital artist

To begin, it is necessary to determine if the participants have experience with or knowledge of AI tools. This will demonstrate the respondents' understanding of the topic and influence their perspective on how AI will affect artists and video game development. In the survey, participants were asked if they had used any AI tools. Of the 20 respondents, only 24% had tried AI-generated art. Despite the low percentage, the participants demonstrated knowledge about the topic, particularly the interviewees who had strong perspectives on the matter.

In regard to AI-generated art tools, the survey and interviews were conducted to understand the perspectives of respondents and interviewees on how they believe these tools affect the work and creative workflow of artists. All interviewees agreed that AI tools are just like any other technological advancement in human history. People tend to be afraid of what they don't fully comprehend, and these tools are no exception. While AI tools are not capable of replacing human creativity, they can serve as a beneficial tool to support and enhance human works, making them more efficient and effective.

During the interview, some interviewers mentioned historic technology events to prove that technology cannot replace human positions. Some even compared AI art tools to the events of the invention of the camera and computer. Interviewer 2 stated:

“This is like you could take this example is when computers were invented, with the computing power of machines, people thought it would kill mathematics, and look at it now it's been almost 40 years and math is still there and growing”

Interview 3 said:

“Do you remember the event of the birth of the camera, for example, when the camera was first introduced, many questions were raised about whether it could replace the artist, painter or not. But after all, painting is still alive, photography becomes a part of art and goes hand in hand with other art fields. So, the evidence in that history only proves that technology can never replace people.”

According to the interviewees, it is indisputable that AI cannot completely replace humans. However, some agreed that AI art tools are powerful and can do a lot of things that artists do. These tools have existed for quite some time, with GAN being an example, but it only gained popularity recently due to being developed as a tool that can generate thousands of images in seconds and being easily accessible to people. Another factor that made it popular is that people can use it to express their imagination by simply using keywords or sentences without needing to learn how to paint or draw.

When asked about the change and workflow, the interviewees were also asked if they are willing to adopt AI art generator as part of their creative flow and how it would affect the workflow. One of the interviewees believes that low-level commission artists may be replaced by AI, but those with higher skills and a high level of creativity cannot be completely replaced or changed. Overall, the interviewees acknowledge the potential of AI in the art industry, but they agree that it cannot replace the creativity and uniqueness that humans bring to the table. Interviewee 2 said:

“For me, the artist only has a problem when the AI uses the artist's resources without giving credits. Here, with the current level of AI art tools now, in terms of low-level commission artists, there will be impact and change, but for those with a solid foundation and a higher-level skill with Higher creativity, the replacement or change is not significant.”

One 3D designer interviewed for this document stated that AI art tools are only suitable for creative experimentation and not yet effective or convenient enough to replace the traditional workflow of artists. When asked about the application of AI art tools in their workspace and their efficiency, Interviewee 4 responded:

“To experimental with then quite a lot, at least using Midjourney. Then it generates ideas very quickly. The fun part of this is that when the user uses AI, the user who uses AI must also have that knowledge, then with knowledge, I can control the AI to create the product it wants. But, it only helps a part, but I don't see that it can't help much at the moment. Currently, the level is reasonable to play with, but to apply it to the job workflow, I have not seen anyone fully apply it. This is also dependent on the habits of the person as well; it is not convenient enough for people to change their habits and apply them to the workflow.”

All seven interviewees agreed that even though AI changes the artist's workflow, it only affects very fundamental aspects such as ideas, drafts, and concepts. This is the extent to which AI has reached for now: supporting the artist in the initial stages of completing the work.

When asked about the most important traits or characteristics for artists and developers to possess in a world where AI-generated art is increasingly used in the creative process, three out of seven interviewees believed that mindfulness is key when applying technology in general, not just AI. They also emphasized the importance of creativity and adaptability when the world is constantly changing.

Interviewee 3 said:

Times change, so we also need to change when using new technology. We have to be mindful; we have to see where the role of humans in work is and where is the role of AI in these markets and workflow and to what extent and we have to be the one who control it. More importantly, you can't let it do all its work. The market will learn to eliminate what isn't needed and is not important. So those who use AI at a dependent level will also gradually be eliminated. As for bad habits, there is no such thing as a bad habit because AI is a new technology that helps people, it is not called a bad habit, it is called change."

In essence, they all convey the idea that those who create art and digital art would profit the most from AI since it cannot be replaced and acts as a tool. Although AI art tools are currently effective, they merely serve to inspire artists, just like any other social media art site. Interview 1 result:

"I think it will be useful tools, it will move on from being feared by everybody to be integrated as a tool. I think people who actually do art and digital art will benefit the most from this and I don't think anything will change, and it will be beneficial in the long run, and use alongside with the creative. you can't just have a machine learning generate art and then define it this is good art."

While AI tools have the potential to revolutionize the art industry and aid in rapid prototyping, the integration of AI art tools and big data platforms raises important questions about where the line should be drawn and when legal issues come into play. The EU is taking steps to address these concerns by integrating laws about AI and big data platforms. However, it will take time for the industry to fully understand the implications of AI-generated art and how it can be used alongside traditional creative methods. While the potential benefits of AI tools are clear, it is important to ensure that they are used ethically and in a way that does not harm the creative industries.

Ethical concern

The interviewee and responses stressed the significance of considering the ethical and legal implications of this cutting-edge technology while discussing AI-generated art. In addition to emphasizing the limits of AI in comprehending human emotions and experiences, they also underlined the necessity of human engagement in the creative process. With the creation of AI-generated art, the interviewees also touched on the significance of ethical data sources and copyright problems. They concurred that the tools would be helpful for artists despite reservations about the volume of data necessary to train AI art tools.

Concerns were voiced regarding the moral issues and potential negative effects of AI creative tools, though. Interviewees 1 and 5 voiced concern over the possibility that propaganda or

misinformation may be transmitted through the usage of AI-generated art. They recommended establishing rules and laws to make sure AI-generated art is utilized morally and sensibly.

Interview 1: "*But people get furious over it because it is also about copyright issue, which is quite problematic but when you have an ethical source data to be trained on then this will no longer be an issue. And also, I can understand why so many people are scare. Art is kind of an underfunded industry, it is quite a competitive job, not a lot of people employ artists such as sales and developer. I can see why, as soon as a tool that can generated art whenever, that is scary. Basically, the law hasn't caught up with the AI."*

Interview 5: "If to talk about the biggest problem right now, it is mainly about copyright issues, people have not come up with a plan to control that. Because artists work on creative things, the biggest thing of working in creative industry is still about copyright and credits. Now AI is new, so the regulations for this field are relatively new but surely in the future there will be develop and solid."

The determination of authorship, originality, and ownership is one ethical concern with AI-generated art. It can be challenging to identify the true author of AI-generated art because it is produced using algorithms and data input. The ownership of the data used to train the AI algorithms has also drawn criticism. Should the corporation or person that used the original data to train the AI model own it instead of the artist who produced it? These queries bring up significant ethical issues regarding ownership and intellectual property in the context of AI-generated art.

During the interviews, some participants raised the topic of NFTs and their relationship to originality and authorship in art. They questioned whether the use of a single NFT art prompt or keyword by many different people would result in the same output and thereby diminish the uniqueness of the NFT as well as the originality of the artwork created. This raised a larger question about the nature of originality in art and the role of technology in shaping it. Additionally, the participants discussed the implications of this issue for the wider art world and the market for NFTs, exploring potential solutions or alternatives to ensure the continued authenticity and value of NFT art. Overall, the conversation around NFTs and originality was a thought-provoking and insightful aspect of the interviews.

The potential for AI-generated art to reinforce prejudices and stereotypes raises yet another ethical concern. Out of all the interviewers, only interviewee 1 raises this concern. AI systems may reproduce and exacerbate societal prejudices and preconceptions since they are trained on current data. It could have significant social and cultural repercussions. As a result, it's critical to make sure AI-generated art is produced in an ethical and socially conscious way. For instance, an AI-

generated picture could unintentionally promote racial or gender stereotypes, and an AI-generated musical composition might mimic current cultural appropriation or commercialization tendencies. When being asked how we can tackle the problem and what is her perspective on this. Interview 1 said:

“So, to tackle this problem, it's super important to make sure that AI-generated art is created in a way that's ethical and socially responsible. This could mean creating algorithms that are trained on more diverse datasets or getting human input when making art. It's also important to think about how AI-generated art might affect different groups of people and work on creating art that includes lots of different perspectives and experiences.”

4.3.2 AI and Video Game Industry

This section mostly interprets data and findings from all the interviews as well as the survey. Each of them given a particular perspective on how AI art tools could affect the video game industry. The data presented here covers one aspect of how AI and AI art tools are currently being applied in the video game-making process, and it does not reflect or represent the entire video game industry.

Effects of AI on video game design and development

During an interview with Interviewee 1, several questions were asked about the application of AI in video game development, including the new technology of AI-generated art. Firstly, the interviewee was asked about the general application of AI in video games and her work at her video game company.

She explained that the complexity of the application depends on various aspects of the game and the company's needs. At her company, the primary goal is to gather data to improve the player experience. This includes game configurations, user behavior, and other data aspects such as location and device usage. Additionally, the data is used to predict whether a player will continue playing or leave the game, enabling the company to take appropriate actions to improve revenue and other key metrics as desired by stakeholders.

The use of AI in gaming has revolutionized the industry, allowing big video game companies to gather data that can be used to optimize the player experience and increase revenue. By collecting and analyzing data on various aspects of the game, such as user behavior, location, device usage, and game configurations, and able to predict whether players are likely to continue playing or leave the game. This information can then be used to take appropriate actions to improve the player’s experience, ultimately leading to greater engagement and higher revenue.

Based on the first question, we discussed the next two questions, which emphasize the examples of AI being applied in video games, and the potential benefits and drawbacks of AI in video game design and development, as well as AI art tools. During the discussion, we talked about the potential uses of AI in design. She cited an example of a bot that can play Angry Birds and determine the difficulty level of each level.

“In design-wise, I think there are plenty of good uses, and as an example, I think we also have video on YouTube, like there is a bot that testing Angry Bird level and be able to tell us the difficulty level. It's a pretty complex system since the game is physics-based, making it tough to estimate or quantify the difficulty of each level. So, I would say It could be very useful for level design and kind of things.

She brought up the potential advantages of swiftly producing game assets for rapid prototyping throughout the interview. For creators who are just beginning to program or who want to practice creating a certain game genre, the ability to produce assets rapidly may be immensely helpful. With less time spent on producing assets that might not even wind up in the finished game, they can try out their concepts during the concept stage. That is exciting and could save a lot of time and work just type in what assets are required and have them created automatically.

She also highlighted the value of generating game assets at any capacity, whether it's for a small indie game or a larger project. This flexibility allows developers to tailor their approach to their specific needs and resources. Additionally, generating assets quickly can be particularly beneficial for those who are just starting out in game development and want to practice their skills. From her perspective, there are no drawbacks to this approach.

She believes that many people will use these tools to quickly create and release games, which could benefit those who specialize in fast-paced game development. She also draws a comparison to the use of free game assets in Unity and similar platforms.

In terms of how AI and AI-generated art may affect game creation in the future, it is thought that AI could accelerate the ideation process. AI technologies have the capacity to come up with more inventive game mechanisms, plots, or character designs than creators could alone. Going on, the marketing team was the ones that originally suggested to use AI art tools for experimental generated art. Since then, it has been tested by artists and AI experts at the firm. The interview touches on the idea of creating Angry Bird images for the marketing team, but also raises questions about whether the artists would be happy with the outcome. But the results weren't good

enough to put on the market due to the technology's limitations in precisely drawing specific characteristics and the brand guidelines.

“I had some experimental generative art. It all started with the marketing team suggesting it. We gave it a shot and tried to generate some Angry Bird pictures for them. But the big question was, were the artists happy with the results? Turns out, they weren't too thrilled with it. It didn't fit the brand guidelines and let's be real, AI can't even draw hands properly. So, it didn't make the cut for marketing.”

Interviewees 2 and 3 gave two articles about artists using AI art tools to help prototype their ideas and resources while talking about alternative possibilities for AI art tools. In one of the articles, it was claimed that Blender and other 3D software may use AI-generated textures as a resource. The article's author emphasized how this significantly altered his workflow, particularly while looking for materials. Before, he had to use software to custom hand-paint the textures and materials after spending a lot of time searching for the appropriate ones. There were several materials and textures that were very difficult to locate, such the vine tree texture that was used as an example.

The other articles just demonstrated how an artist laid down his concept sketch of a home and used artificial intelligence to make a prototype so he could present it to his clients, according to interviewee 3. As a result, a ton of time may be saved, and the artist could concentrate all of his efforts on perfecting the finished product that his clients have selected.

Overall, the potential benefits and challenges of AI-generated art in the game industry and beyond. There are concerns about its impact on the creative process and the job security of artists, but there is also excitement about its potential to support rapid prototyping and the brainstorming process. As the industry continues to evolve, it will be important to carefully consider the ethical and legal implications of AI-generated art and how it can support human creativity, rather than replace it.

5 Discussion

The data discussed in the previous chapter and the theoretical framework are used to explain the topic in this section. The goal is to determine if the practices are connected to the earlier-posed assumptions. The study examined the advantages and disadvantages of AI-generated art tools for online artists and game developers.

5.1 AI potential and its future

It seems inevitable that AI will be used in the art world. Yet it's critical to understand how to use this technology effectively and how it fits into the creative process. AI can help artists discover inspiration and fresh ideas, but it cannot fully replace humans in the creative process. By doing this, artists may concentrate more on being creative and improving their talents while also saving time and money. But nevertheless, using AI also calls for awareness, and users must be mindful about both their own and the technology's roles. Only then will we be able to fully utilize AI and advance the arts sector. To increase the value and advantages for the art business, we must embrace and use this technology.

In the future, the use of AI will continue to grow and become more common in the art industry. This new technology might even start a new era of art, which is AI art, alongside other art forms like photography when it was born. With AI art, machines will be able to create art pieces that are beyond human imagination. AI can analyze vast amounts of data and create unique and complex patterns, colors, and shapes. The possibilities for AI art are endless and will surely change the way we view, create, and appreciate art.

5.2 Opportunities

Opportunities for artists and businesses were found by conducting interviews and evaluating qualitative data. First, it was established that AI cannot completely replace or take the place of human workers in the creative sector, but it can work well in tandem with them and may be very helpful for concept artists.

The study also found that AI-generated art tools may benefit businesses and artists in a variety of ways. Examples of how these tools may improve the overall quality of the finished result include helping to create intricate works of art. Also, they can enhance the creative process and support artists in concentrating on the more complex factors of their work.

In terms of how AI art tools may be used by artists and organizations, they can help with ideation, enable rapid prototyping of concept ideas, and swiftly produce game assets for early testing needs.

This could encourage artists to hone their abilities to a higher level by utilizing their imagination. The financial aspects of the creative business can also benefit from the usage of AI-generated art tools. Game companies may develop more items in less time and increase earnings and revenue by speeding up and improving the creative process.

5.3 Challenges

There are several challenges with using AI-generated art that need to be resolved, especially in terms of the moral and legal implications. One of the most urgent issues is the ownership and copyright of AI-generated art, as well as the possibility of technical abuse or exploitation. Avoiding affecting the creative industries is crucial to ensuring the moral usage of AI-generated art. Another ethical problem is the potential for AI-generated art to reinforce prejudices and preconceptions, which in some circumstances can be upsetting or even provoke outrage.

The emergence of AI-generated art raises concerns about the importance of human artists in the production of art. AI-generated art may be able to mimic some aesthetics or approaches, but it lacks the expressiveness and uniqueness that come with human talent. As a result, there is worry that using AI-generated art may result in a reduction in the value of the work produced by human artists. In the creative sectors, it's crucial to create a balance between the usage of AI-generated art and the importance of human artistry.

Concerns have also been raised in the area of video game production over how AI-generated art may affect player experience. While AI-generated art might speed up game asset generation and fast prototyping, it can fall short in capturing the feelings and experiences that human artists bring to the table. Concerns regarding how AI-generated art will affect the game's look and if it will be consistent with the game's overall concept may also exist.

Thereby, it's important to carefully evaluate how AI-generated art may affect creators, video game firms, and the creative industries. AI-generated art tools may have certain advantages, but there are other difficulties that need to be overcome.

5.4 Evaluate the findings and theoretical study

After discussing the empirical results, many ideas related to the reviewed theories were discovered. In chapter 2, "Theoretical Background," various theoretical concepts and their mutual relationships were studied. The research scope is limited to the video game industry, digital artists, and AI art tools to understand the relationship of this new technology with the digital artist and game industry.

It is evident that AI art tools have made significant contributions to science and technology. However, both the theoretical and empirical studies found that most artists think AI is acceptable. They consider it as doing similar things to real artists, such as tracing, combining, referencing, etc. But some AI just copies art styles, as it is basically a filter. However, there is also AI that steals art, such as Midjourney, but there is also non-art-stealing AI, such as DeepToon, which uses its own databases. It is not acceptable to abuse AI art tools and claim the generated images as "their art" or work. Using AI properly for a specific purpose as a tool is okay, such as visualizing ideas for world-building.

For the video game industry, the theoretical findings show that AI-generated art will be a useful tool in the future, supporting game companies in many different processes and leading to many benefits, such as lowering the cost of making games. However, when interviewing, it shows that with the current level of AI, it was only good enough to help artists or companies generate concepts, ideas, and rapid prototypes at the beginning for testing concepts. For some low-level, independent game makers, this is a useful tool to support them in starting their first game as their budget is tight.

6 Conclusion

6.1 Research Summary

Under the context of the speedy development of AI technology, especially AI art generated was recently introduced with the presence of Midjourney and Stable Diffusion as an example has stirring up the community and artist community, many questions and debates has been set to debate the future of this technology and how it will change the roles of artist and art and game design.

This research thesis is designed to explore the impact of AI art generators on the game industry and its effect on employment, particularly for human artists. The main research question focuses on the future of AI-generated art in the game industry and its continued impact on game development and the role of artists in that process. Three supporting questions delve deeper into the potential for AI-generated art to replace human artists, how it will influence game design and aesthetics, and its impact on the cost and time required for game development. Additionally, the ethical implications of using AI-generated art in the game industry are discussed, specifically regarding job displacement for human artists. The research results of empirical research conducted by survey and interviewing six participants generated insights into the opportunities and challenges that company, and artist might encounter with the advancement of AI art technology.

The thesis has answered research questions after conducting theoretical and empirical studies. The main research question is:

What is the future of AI-generated art in the game industry and how will it continue to impact the development of games and the role of artists in this process?

- What is the potential for AI-generated art to replace human artists in the game industry and how will this affect the job market and the role of artists in game development?
- How will AI-generated art influence the design and aesthetic of future games and what new creative possibilities does it offer?
- How will the use of AI-generated art impact the cost and time required for game development and what are the potential benefits and drawbacks of this trend?

During the discussion of empirical findings, the opportunities and challenges are found by extensive research and understanding the perspectives of artist and game developers, their expectations based on experiences and attitudes towards this new technology. In which the topics were categorized into different sets which is AI effect on artist, AI art tool ethical concern and AI art

tools effects on video game industry. Opportunities include the possibility of helping artists and companies in the conceptual stage, where they may participate with brainstorming, concept ideas in fast prototyping, and rapidly produce game components for testing. This could encourage artistic innovation and push the artists to hone their abilities to a higher degree. When artists and businesses collaborate to quickly iterate and improve their ideas, these opportunities may also result in more effective game development processes. In the end, this may lead to games of higher quality and greater player engagement.

The challenges are emphasized in the meanwhile from the ethical and legal implications of employing AI-generated art. There are legitimate worries about the ownership and copyright of AI-generated art, as well as the possibility of technical abuse. It is imperative to make sure that AI-generated art is handled ethically and without harming the creative sectors. Another moral concern is the potential for AI-generated art to reinforce biases and preconceptions, which in some circumstances may be upsetting or even provoke outrage.

The use of AI also needs to be mindful, and AI users must clearly understand their role and the role of this technology. Only then can we unleash the full potential of AI and take the arts industry forward, leveraging this to bring more value and benefits to the art industry.

6.2 Limitation and further research opportunities

This research focused on specific students and a game company, discussing opportunities and challenges from a particular viewpoint. However, the small sample size of six participants may not represent the full range of perspectives within the industry. Furthermore, the use of AI art tools may vary and cannot be fully applied to all artists or video game companies due to different operating policies, visions, and values. It is also important to note that the research solely focused on the game industry and did not investigate the potential impact of AI-generated art in other creative industries.

Given the rapid advancement of technology, it is difficult to predict the future directions of AI-generated art and how it will be developed and used by companies and artists in different creative industries. Therefore, the conclusions presented in this research are based on the author's personal viewpoint and educated guesses.

Future research could explore the long-term impact of AI-generated art on the game industry, particularly in regard to the role of artists and potential job displacement. A larger sample size of participants and more in-depth interviews could provide a broader understanding of the perspectives of artists and game developers in the industry. Ethical frameworks for the use of AI-

generated art in the game industry could also be developed, and the potential for AI-generated art to enhance collaboration between artists and technology could be explored. Finally, further research could investigate the potential for AI-generated art to create new business opportunities within the video game industry, such as the creation of new art markets or the development of new art forms.

7 References

Electronic sources:

Alan Male. 2007. Illustration, A Theoretical & Contextual Perspective. P10. Available at https://books.google.fi/books?hl=en&lr=&id=rlJP8I1cao8C&oi=fnd&pg=PP2&dq=illustrators+definitions&ots=fnTfd0CXRY&sig=AYjabLV33cCI4ES-OnHEljbXjpc&redir_esc=y#v=onepage&q=illustrators%20definitions&f=false .Accessed on 22 February 2023.

Alexander, M. & Christopher, O. & Mike, T. Jun 18, 2015. Inceptionism: Going Deeper into Neural Networks. Available at: https://ai.googleblog.com/2015/06/inceptionism-going-deeper-into-neural.html. Accessed 23 February 2023.

Alhojailan M. I., 2012. Thematic Analysis: A Critical Review of Its Process and Evaluation. West East Journal of Social Sciences. Available at http://westeastinstitute.com/journals/wp-content/uploads/2013/02/4-Mohammed-Ibrahim-Alhojailan-Full-Paper-Thematic-Analysis-A-Critical-Review-Of-Its-Process-And-Evaluation.pdf. Accessed on 10 February 2023.

Anhut, A. July 2, 2014. Let's Get Real About Concept Art. Blog. Available at: http://howtonotsuckatgamedesign.com/2014/02/lets-get-real-concept-art. Accessed 21 February 2023.

Boden, Margaret A. Artificial Intelligence: A Very Short Introduction, Very Short Introductions. Available at: https://doi.org/10.1093/actrade/9780199602919.001.0001. Accessed 23 Feb. 2023.

Braun and Clarke, Jan, 2012. Thematic Analysis. P2. Available at: https://www.researchgate.net/publication/269930410_Thematic_analysis .Accessed on 10 February 2023.

Braun and Clarke, March, 2013. Successful Qualitative Research: A Practical Guide for Beginners. Available at: https://www.researchgate.net/publication/256089360_Successful_Qualitative_Research_A_Practical_Guide_for_Beginners . Accessed on 9 February 2023.

Bucci, M. 2017. Art Industry Talk - Studying and Breaking into the Industry. YouTube. Video. Available at: https://youtu.be/405NGYVbBno. Accessed 21 February 2023.

CG Spectrum, 2023. Concept Artist. Available at: https://www.cgspectrum.com/career-pathways/concept-artist. Accessed on 21 February 2023.

CG Spectrum, 2023. Digital Illustrator. Available at: https://www.cgspectrum.com/career-pathways/digital-illustrator. Accessed on 22 February 2023.

Chetty, P. 2016. Importance of research approach in a research. Project Guru. Available at https://www.projectguru.in/selecting-research-approach-business-studies/.Accessed on 9 February 2023.

Christie's. Dec 12, 2018. Is artificial intelligence set to become art's next medium?. Available at: https://www.christies.com/features/AI-and-the-future-of-art-9332-1.aspx . Accessed 23 February 2023.

Devin, P. Oct 15, 2019. The 7 Stage of Game Development. Available at: https://www.g2.com/articles/stages-of-game-development. Accessed on 1 April 2023.

Dickie, George, 1969. "Defining Art." American Philosophical Quarterly, vol. 6, no. 3, pp. 253–56. JSTOR, Available at: http://www.jstor.org/stable/20009315. Accessed 20 Feb. 2023.

Feng, Z. 2020. Design Cinema – Episode 108 – Design Basics. YouTube. Video clip. 19 November 2020. Available at: https://www.youtube.com/watch?v=2fPq1AF7v0E&t=3156s&ab_channel=FZDSCHOOL. Accessed 21 February 2023.

Indeed Editorial Team, Jul 22, 2022. How To Become a Concept Artist: Steps and Tips. Available at: https://www.indeed.com/career-advice/career-development/how-to-become-a-concept-artist. Accessed on 21 February 2023.

James Vincent, Nov 15, 2022. The scary truth about AI copyright is nobody knows what will happen next. Available at: https://www.theverge.com/23444685/generative-ai-copyright-infringement-legal-fair-use-training-data. Accessed 23 February 2023.

Jess Weatherbed, Dec 23, 2022. ArtStation is hiding images protesting AI art on the platform. Available at: https://www.theverge.com/2022/12/23/23523864/artstation-removing-anti-ai-protest-artwork-censorship. Accessed 23 February 2023.

Jonathan, K, Feb 11, 2023. Openjourney is Stable Diffusion trained with Midjourney images. Available at: https://the-decoder.com/openjourney-is-stable-diffusion-trained-with-midjourney-images/. Accessed 23 February 2023.

Kevin Roose, Sep 2, 2022. An A.I Generated Picture Won an Art Prize. Artists Aren't Happy. Available at: https://www.nytimes.com/2022/09/02/technology/ai-artificial-intelligence-artists.html. Accessed 23 February 2023.

Kiger, M. E. & Varpio, L, 2020. Thematic analysis of qualitative data: AMEE Guide No. 131. Medical teacher, 846-854. Available at https://www.plymouth.ac.uk/uploads/production/document/path/18/18247/Kiger_and_Varpio__2020__Thematic_analysis_of_qualitative_data_AMEE_Guide_No_131.pdf .Accessed on 10 February 2023.

Laurie Clarke, Nov 12, 2022. When AI can make art – What does it mean for creativity?. Available at: https://www.theguardian.com/technology/2022/nov/12/when-ai-can-make-art-what-does-it-mean-for-creativity-dall-e-midjourney .Accessed on 9 February 2023.

Lucija Bravic, 2023. A Short History of Digital Art: Between New Technologies & Innovative Artistic Practices. Available at: https://magazine.artland.com/digital-art/. Accessed on 20 February 2023.

Mac Brunet, 2022. Film & Game Production. Cubebrush. Video clip. Available at: https://drive.google.com/file/d/1ABZrmXCAgl00bIJ-Rv8C088qfVKNB3dj/view?usp=share_link. Accessed 23 February 2023.

Omri Wallach. Nov 23, 2020. 50 Years of Gaming History, by Revenue Stream (1970-2020). Available at: https://www.visualcapitalist.com/50-years-gaming-history-revenue-stream/. Accessed 22 February 2023.

Selbst, A. D., Boyd, D., Friedler, S. A., Venkatasubramanian, S., & Vertesi, J. 2019. Fairness and Abstraction in Sociotechnical Systems. Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems, P1-15. Available at: http://sorelle.friedler.net/papers/sts_fat2019.pdf. Accessed 24 February 2023.

Shubham Singh, Feb 4, 2023. 14 Best AI Image Generators for Creating Art (2023). Available at: https://www.demandsage.com/ai-image-generators/ .Accessed on 9 February 2023.

Stanford Encyclopedia of Philosophy, Oct 23, 2007. The definition of Art. Available at: https://plato.stanford.edu/entries/art-definition/

The Art Story, 2023. Conceptual Art. Available at: https://www.theartstory.org/movement/conceptual-art/. Accessed on 21 February 2023.

The Art Story. 2023. Digital Art. Available at: https://www.theartstory.org/movement/digital-art/#:~:text=With%20the%20widespread%20emergence%20of,for%20both%20artists%20and%20viewers. Accessed on 20 February 2023.

Tim, S. & Naomi, R, Sep 25, 2018. Has Artificial Intelligence Given Us the Next Great Art Movement? Experts Say Slow Down, the “Field Is in Its Infancy”. Available at: https://news.artnet.com/art-world/ai-art-comes-to-market-is-it-worth-the-hype-1352011. Accessed 23 February 2023.

Todd, George F, 1983. “Art and the Concept of Art.” Philosophy and Phenomenological Research, vol. 44, no. 2, pp. 255–70. JSTOR, Available at: https://www.jstor.org/stable/2107219?read-now=1&seq=1. Accessed on 20 February 2023.

Printed sources:

Denscombe, M. 2010. The Good Research Guide: For small-scale social research projects. Fourth Edition. Berkshire, England: Open University Press.

Hassabis, D. 2017. The future of creativity and artificial intelligence. In H. Timmermans (Ed.), The Oxford Handbook of Computational Creativity, 273-285. Oxford University Press. Accessed 24 February 2023.

Liao, C., Lin, Y., & Chuang, Y. 2019. The possibility of artificial intelligence in game art design. In 2019 IEEE 6th International Conference on Industrial Engineering and Applications (ICIEA) (pp. 198-203). IEEE.

Liapis, A., Yannakakis, G. N., & Togelius, J. 2015. Sentient game mechanics: automating game design through machine learning. IEEE Transactions on Computational Intelligence and AI in Games, 7(3), 251-265. Accessed 24 February 2023.

Lopez, G. 2021. The impact of artificial intelligence on creative industries. International Journal of Creative Media Research, 4(1), 17-27.

Merriam S. B. & Tisdell E. J., 2015. Qualitative research: a guide to design and implementation. Newark: Wiley. p. 6-42.

Merriam, S. B, 2002. Introduction to Qualitative Research. San Francisco: Jossey-Bass. p. 6.

Saunders M., Lewis P. & Thornhill A. 2015. Research methods for business students. England: Pearson Education. p. 152.

Summerville, A., Mateas, M., & Jhala, A, 2018. Procedural content generation via machine learning (PCGML). IEEE Transactions on Games, 10(3), 257-270. Accessed 24 February 2023. Accessed 24 February 2023.

Yannakakis, G. N., & Togelius, J, 2018. Artificial intelligence and games. Springer International Publishing. Accessed 24 February 2023.

Zhao, R, 2019. The Art of Game Design: A Book of Lenses. CRC Press. Accessed 24 February 2023.

8 Appendices

Appendix 1. Survey Questions

1. Age
2. Occupation
    - Concept artist
    - Illustrator
    - Game developer
    - Artist
    - Other
3. Have you tried AI art generated before? Yes/No - If no please proceed to question 7
4. What kinds of AI art generator have you tried?
    - Midjourney
    - Dall E 2
    - Night Café
    - Other
5. How far are you willing to adopt AI art generator as part of creative process? On scale of 1 to 10
6. Do you think the use of AI-generated art will eventually replace human artists in the future? Yes/No
7. Are you concerned about the ethical implications of using AI-generated art in the process of making art? On scale of 1 to 10
8. Do you believe the use of AI-generated art will have a positive impact on the quality and creativity of art? Yes/No
9. Have you noticed a change in the role of artists in the game industry since the rise of AI-generated art? Yes/No
10. Are you concerned that the use of AI-generated art will lead to job losses for human artists in the game industry? On scale of 1 to 10
11. Do you believe AI-generated art will eventually replace traditional art forms in the game industry (e.g., hand-drawn animation, 3D modeling)? Yes/No
12. Do you think the use of AI-generated art will lead to cost savings for game development studios? Yes/No
13. Do you think AI-generated art will become the dominant form of art in the game industry in the next 10 years? Yes/No

Written part. The question will be repeated in this part as the author wants to explore in depth further how respondents think of the matter in details. (Optional for those who wants to proceed or contribute further)

1. Do you think AI-generated art will eventually replace human artists in the game industry? Why or why not?
2. How far do you think AI will be able to reach in terms of creativity, especially in art?
3. What ethical concerns do you have about the use of AI-generated art in the process of making art?
4. How do you think AI will affect the role of artist?
5. If you are willing to adopt AI art generator as part of your creative flow. Why would you prefer doing so?

The survey is being conducted anonymously, so if you are interested in the topics and want to have a discussion further then you can fill in your name and email for interview.

Appendix 2. Interview Questions

Semi-structured interview questions related to the topic of "The effects of AI on Digital Art and Video Games Industry":

1. Name?
2. What is your profession at the moment? can you describe it?

Set of questions for artists

1. How do you think AI will affects the role of artist in the future?
2. What are some potential benefits and drawbacks of using AI-generated art in the creation of digital art?
3. How do you think AI-generated art impacted the video game industry, particularly in terms of game design and development?
4. How far do you think AI will be able to reach in terms of creativity, especially in art?
5. What ethical concerns do you have about the use of AI-generated art in the process of making art?
6. Are you willing to adopt AI art generator as part of your creative flow. Why would you and why not
7. What skills/traits/characteristic do you think will be most important for artists and game developers to possess in a world where AI-generated art is increasingly used in the creative process?
8. Do you think AI-generated art will eventually replace human artists in the game industry? Why or why not?

Set of questions for Game developers/AI specialist

1. What are the application of AI regarding your work at the moment?
2. Can you give any examples of how machine learning has been used in video game development? for example at your workplace
3. What are some potential benefits and drawbacks of using machine learning in video game design and development?
4. How do you see machine learning continuing to shape the video game industries in the future?
5. Do you work with artist or other designer at your workplace to develop a game?
6. Do you think AI or particularly AI art generated will affects their career as a designer or artist?
7. What skills do you think will be most important for artists and game developers to possess in a world where machine learning is increasingly used in the creative process?
8. Do you think machine learning will eventually replace human artists and game developers, or do you think there will always be a need for human creativity in these industries?

Appendix 3. Concept artist

Figure 1: Character concept art design from Shiro Games

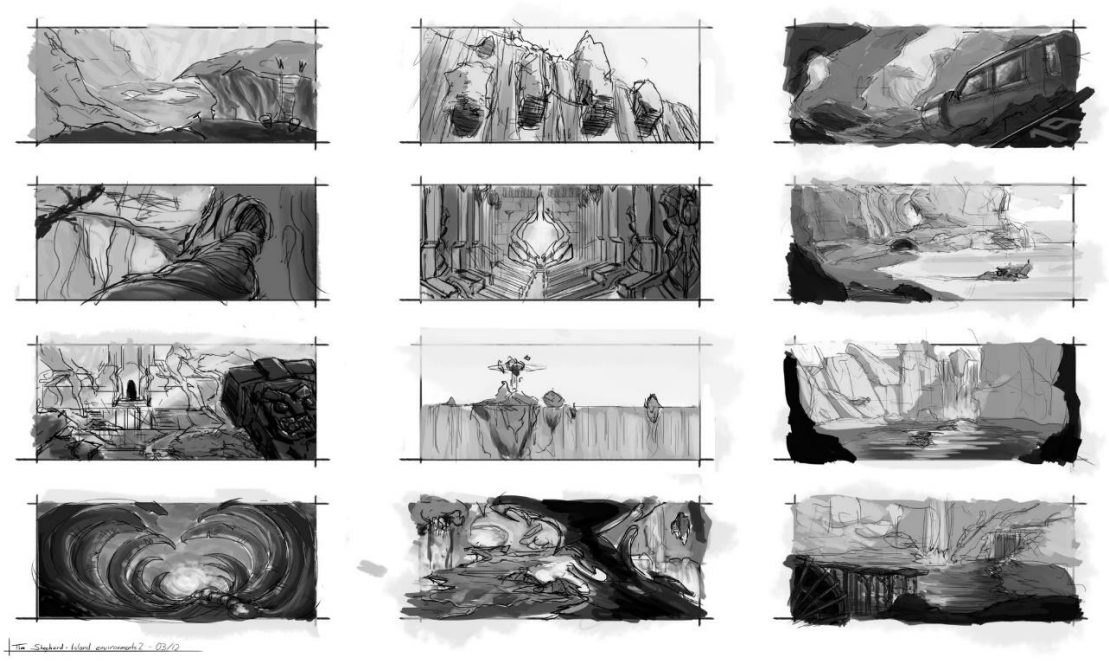

Figure 2: Environment concept art design sketch

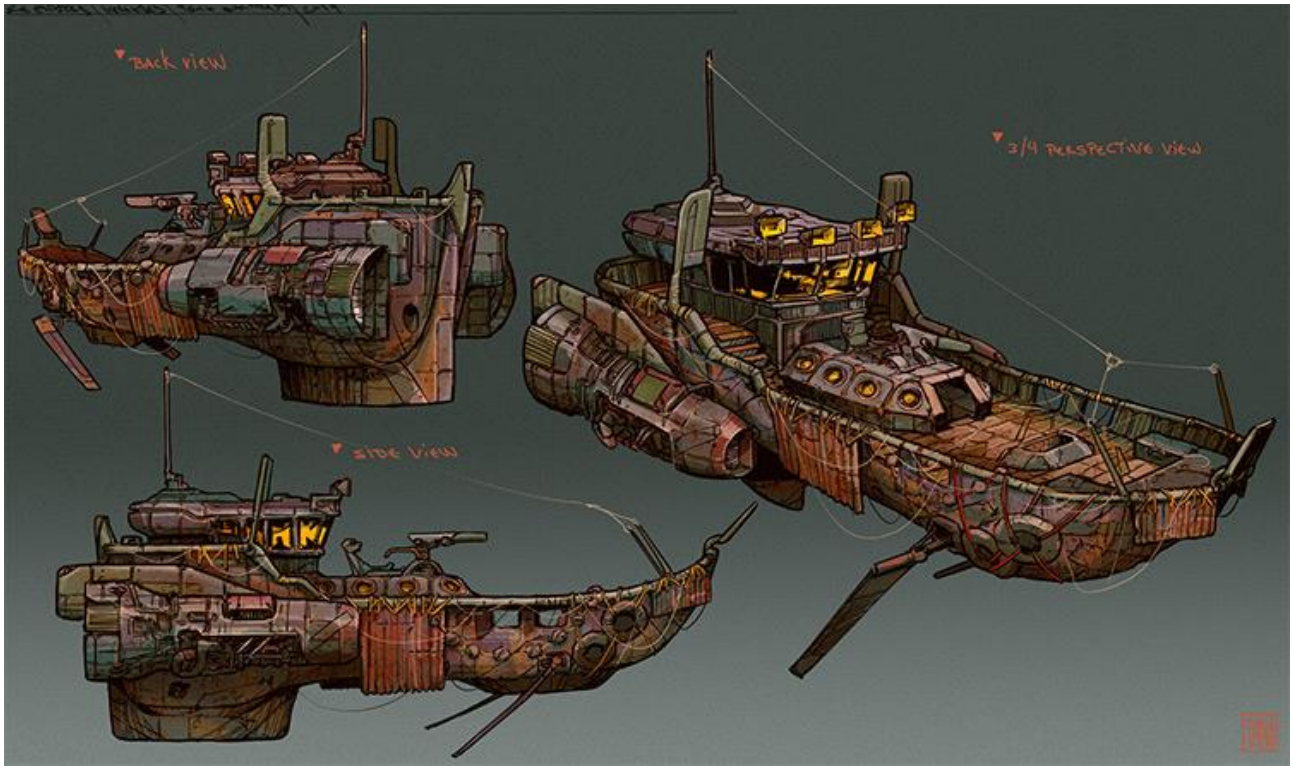

Figure 3: Vehicle from car to airplane concept art design by Tano Bonfanti

Appendix 4. Illustrators

Figure 4: Illustration from Runeterra - Riot Games by Dao Trong Le

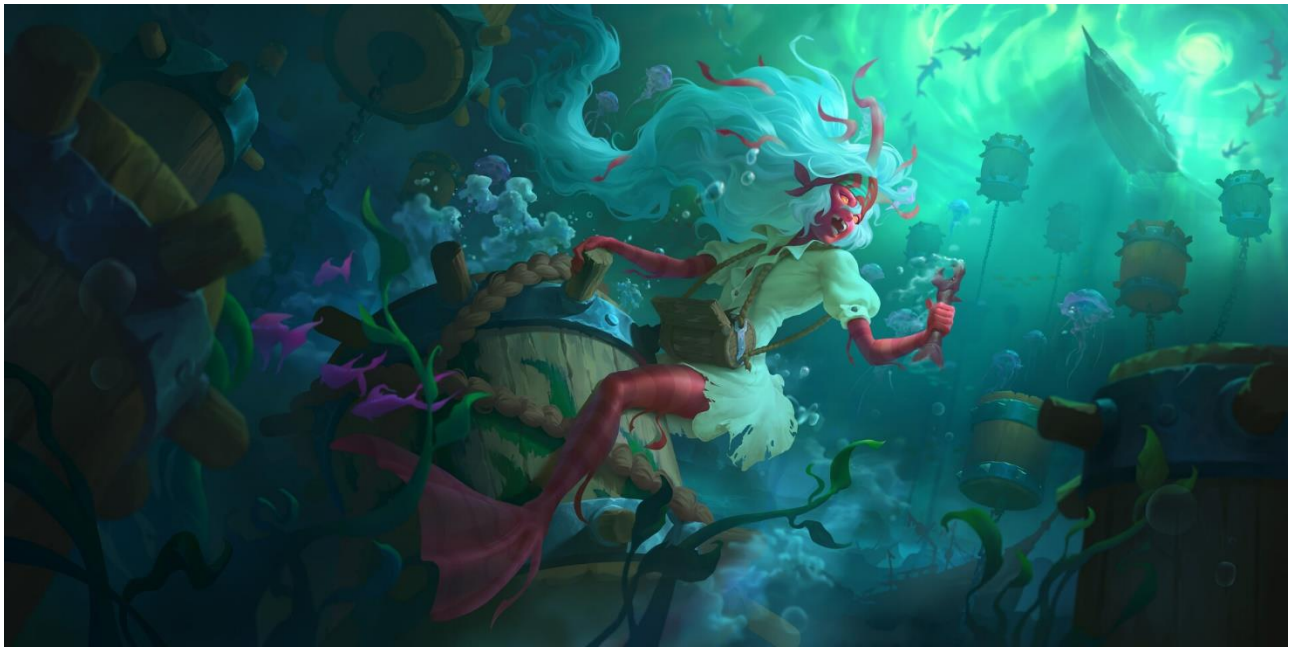

Figure 5: Illustration from Runeterra - Riot Games by Ricardo Contarini

Figure 6: Illustration breakdown from Gabriel Nagypal

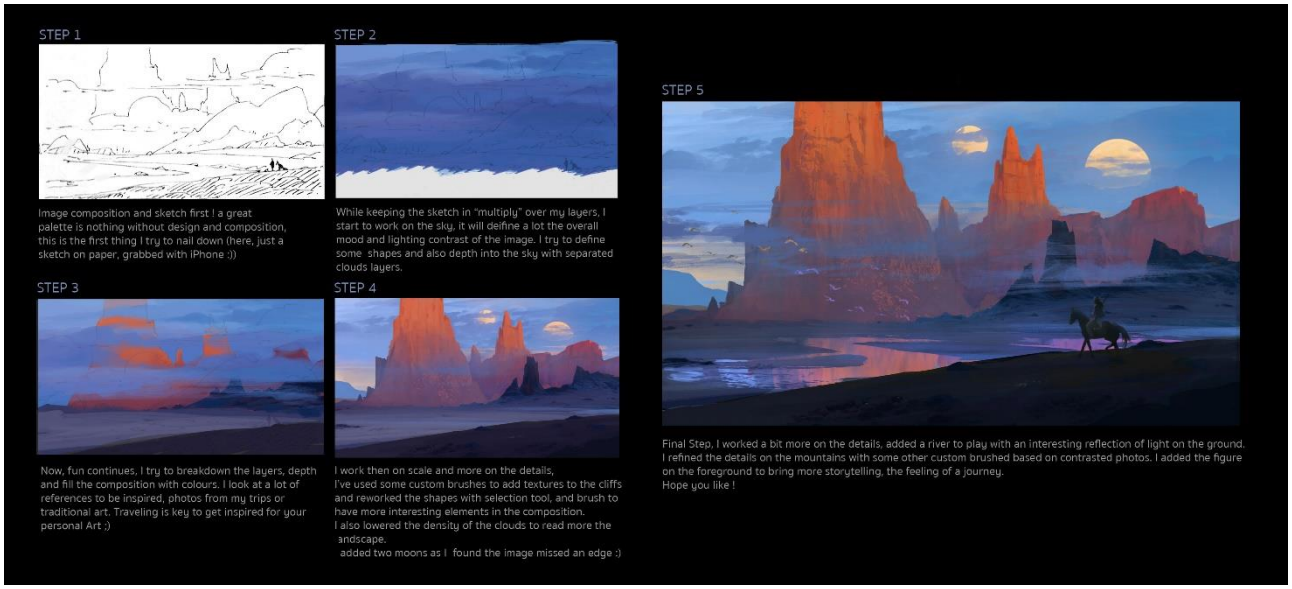

Figure 7: Illustration breakdown from Raphael Lacoste, a Senior Art Director

Appendix 5. Comparison table between Concept Artist and Illustrators

Criteria	Concept Artists	Illustrators

Role	They create initial concepts and designs for characters, environments, and other elements of visual media.	They create illustrations that accompany text or stand alone.
Focus	They focus on developing the overall look and feel of a project, often working closely with writers, directors, and other creative professionals.	They focus on bringing written descriptions to life through detailed imagery.
Tools	They typically use traditional drawing and painting techniques, as well as digital tools like Photoshop, Illustrator, Clip Paint Studio, etc and 3D modelling software.	They may use similar digital tools to concept artists, but may also work with mediums like watercolour, ink, or oil paint.
Market Demand	Concept artists are in high demand in the film, television, and video game industries, as well as in advertising and other creative fields.	Illustrators may work in a variety of fields but may face more competition as the market for their work is more saturated.
Skills	They need a strong understanding of form, colour, and composition, as well as the ability to work quickly and translate ideas into visual form.	They need a strong understanding of anatomy, perspective, and storytelling, as well as the ability to work within specific guidelines and styles.
Career Path	Concept artists may work their way up to become art directors, production	Illustrators may work in book publishing, advertising, or other fields, and may

	designers, or other high-level creative professionals.	specialize in areas like children's books or editorial illustration.

Table 1: A comparison table between Concept Artist and Illustrators

Appendix 6. Triple A game company structure and video game development

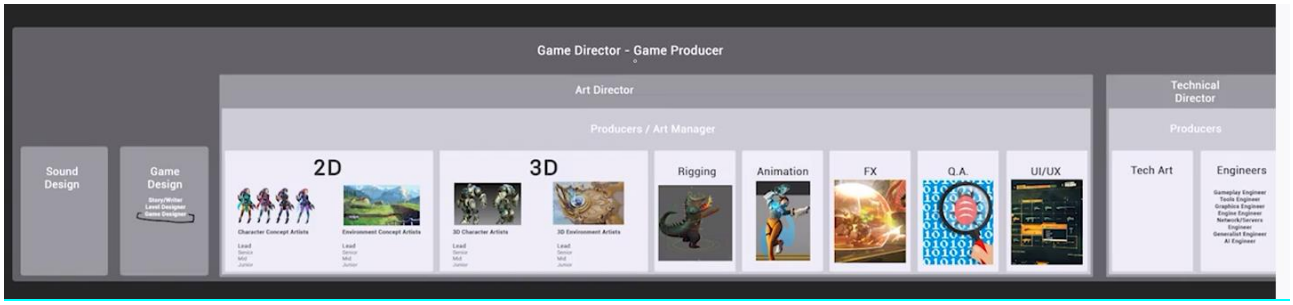

Figure 9: Video game department and teams, by Mac Brunet

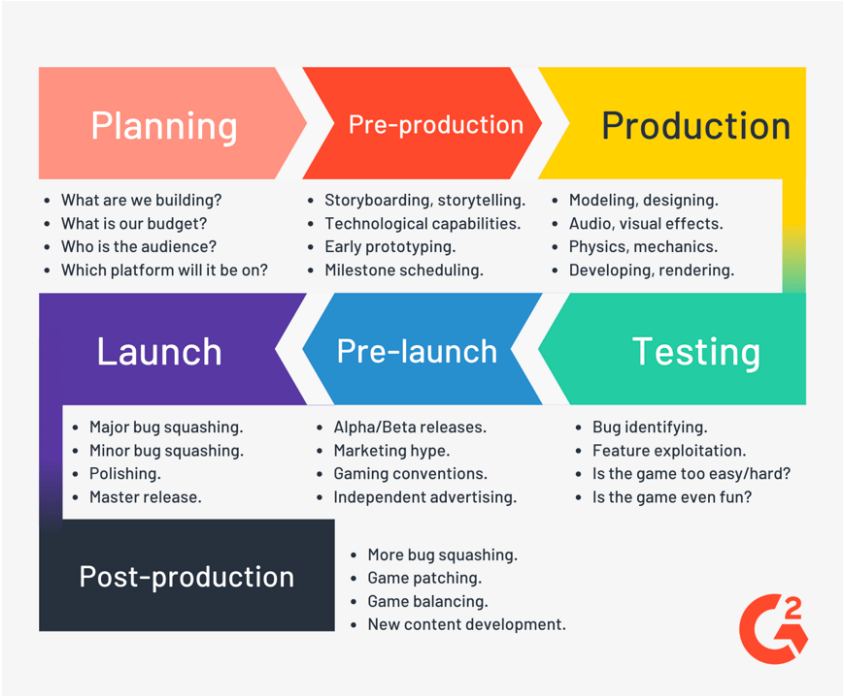

Figure 10: Video game development stage, by Devin Pickell from G2

Appendix 7. Artworks created by AI art tools

Picture 1: “From Runway to Roadway: The High-Flying Fashion of Drone-Inspired Dresses with Trolley and Scooter Swagger” by Baher Raouf, created with Midjourney.

Picture 2: “From Runway to Roadway: The High-Flying Fashion of Drone-Inspired Dresses with Trolley and Scooter Swagger” by Baher Raouf created with Midjourney.

Picture 2: Dishes from China and Japan created by Thai artist

Picture 3: Leona the Traveller from AI Verse group Facebook, created by Stable Diffusion

Picture 4: Sweet Rain by Neisha McGee, created by Stable Diffusion

Appendix 8. Interviewees list

Interviewee	Background
Interviewee 1	Machine Learning Engineer / Inclusive Game Design & Development Lead
Interviewee 2	Traditional Art Institutions student
Interviewee 3	Traditional Art Institutions student
Interviewee 4	Traditional Art Institutions student / 3D Designer
Interviewee 5	Traditional Art Institutions student / Illustrators
Interviewee 6	Traditional Art Institutions student / Freelancer

Table 2 List of participants