Generative AI Image Tools for Creative Work: Social and Ethical Perspectives in Japan from Computer Science Graduate Students and Experts

Sharon Chee Yin Ho

A Thesis

in

The Department

of

Computer Science and Software Engineering

Presented in Partial Fulfillment of the Requirements

for the Degree of

Master of Applied Science (Software Engineering) at

Concordia University

Montréal, Québec, Canada

December 2024

CONCORDIA UNIVERSITY

School of Graduate Studies

This is to certify that the thesis prepared

By: **Sharon Chee Yin Ho**

Entitled: **Generative AI Image Tools for Creative Work: Social and Ethical Perspectives in Japan from Computer Science Graduate Students and Experts**

and submitted in partial fulfillment of the requirements for the degree of

Master of Applied Science (Software Engineering)

complies with the regulations of this University and meets the accepted standards with respect to originality and quality.

Signed by the Final Examining Committee:

_____ Chair
Dr. Jinqiu Yang

_____ Examiner
Dr. Leila Kosseim

_____ Examiner
Dr. Jinqiu Yang

_____ Co-supervisor
Dr. Tanja Tajmel

_____ Co-supervisor
Dr. Emad Shihab

Approved by _____
Joey Paquet, Chair
Department of Computer Science and Software Engineering

_____ 2024

_____
Mourad Debbabi, Dean
Faculty of Engineering and Computer Science

Abstract

Generative AI Image Tools for Creative Work: Social and Ethical Perspectives in Japan from Computer Science Graduate Students and Experts

Sharon Chee Yin Ho

The growing interest to incorporate generative artificial intelligence (GenAI) image tools into creative workflows has raised concerns about the social and ethical implications it may have on Japan's creative industries. This exploratory study is the first to discuss what oversights may emerge on such issues from prospective Japanese generative AI researchers - computer science (CS) graduate students studying in Japan.

From June 2023 to August 2023, nine CS graduate students studying in Tokyo were interviewed to understand how CS graduate students in Japan discuss GenAI image tools' 1) technical aspects, 2) social and ethical aspects, and 3) cultures in AI research, as well as three experts to investigate the 4) legal, social, and cultural impacts of using GenAI image tools for creative work in Japan.

The results indicate that CS graduate students do discuss various ethical and social aspects with GenAI image tools, but many neglected to see how widespread industry usage in Japan has the ability to further marginalize artists in creative workplaces and jeopardize critical aspects of workplace pedagogy in creative industries.

This study provides insight into the mindsets of prospective GenAI researchers in Japan and indicates areas of future work that can better prepare them as future knowledge holders and innovators in the field. AI researchers from Canada, Japan, and around the world are encouraged to adopt participatory AI design practices to involve stakeholders throughout the planning, design, and evaluation processes of GenAI image research so they respond to the needs, values, and concerns of artists and creative professionals.

Related Publications

- **Ho, S. C. Y.,** Ema, A., Tajmel, T. (2024). The Impacts of Text-to-Image Generative AI on Creative Professionals According to Prospective Generative AI Researchers: Insights from Japan. Proceedings of the AAAI 2024 Spring Symposium. https://doi.org/10.1609/aaaiss.v3i1.31256
- **Ho, S. C. Y.,** (2023). From Development to Dissemination: Social and Ethical Issues with Text-to-Image AI-Generated Art. Proceedings of the Canadian Conference on Artificial Intelligence. https://doi.org/10.21428/594757db.acad9d77

Dedication

To my family, friends, and mentors.

Acknowledgments

I would like to express my sincere gratitude to my co-supervisors, Dr. Tanja Tajmel and Dr. Emad Shihab, for their invaluable wisdom, guidance, and unwavering support—thank you for believing in me and for encouraging my growth in and out of research. I also wish to thank Lori Akiyama and the members of the EDI Lab and the DAS Lab for their feedback and encouragement, and to my friends for bringing smiles and laughter throughout this journey. This thesis would also not be possible without the generous funding and support of the CREATE SE4AI Program and the Mitacs-JSPS Summer Program.

At The University of Tokyo, I am deeply grateful to Dr. Arisa Ema for her insights and expertise, to Emi Okada and Rie Hayafune for the warm hospitality I received throughout my stay, and to Jun Kuribayashi for helping me conduct and analyze the Japanese interviews and data.

Last but certainly not least, I want to thank my parents and my sister for being my greatest motivation and support system. It is without a doubt that I am who I am and where I am today due to their unwavering love and support.

Preface

While witnessing the growing excitement in the tech community on the capabilities and promises of generative AI (GenAI) image tools, alongside the concerns and apprehensions from artists who fear these technologies could threaten their careers and their purpose as artists, I felt that there was no better time than the past two years to undertake an interdisciplinary study on how the perceptions of GenAI image tools by aspiring GenAI researchers may differ from the realities experienced by artists and creative professionals. My passion for Japanese animation and comics, along with the widespread use of GenAI tools to create artworks in these styles, led to placing the focus on my study on Japan, where these dynamics are particularly relevant.

In 2023, I was honoured to receive a 10-week fellowship through the Mitacs-JSPS Summer Program, which allowed me to conduct data collection for this research at The University of Tokyo under the guidance of Dr. Arisa Ema, a renowned Japanese researcher in the field of science and technology studies (STS) on the risks and benefits of artificial intelligence.

My Master's research seeks to illuminate the often overlooked cultural, pedagogical, and labour-related implications with GenAI image tools for creative work, with a particular focus on its integration and use within creative industries in Japan. Through this thesis, I aim to encourage researchers in the field of GenAI to develop a deeper understanding on such issues so that future GenAI image tools will be developed with such considerations at the forefront.

Contents

List of Figures

List of Tables

Chapter 1

Introduction

1.1 Thesis Introduction

Recent advances in natural language processing techniques and image generation capabilities with diffusion models have allowed mainstream and state-of-the-art Generative AI (GenAI) image models—such as OpenAI's DALL-E (Betker et al., 2023; Ramesh, Dhariwal, Nichol, Chu, & Chen, 2022), Midjourney[1], and Stability AI's Stable Diffusion (Podell et al., 2023; Rombach, Blattmann, Lorenz, Esser, & Ommer, 2022; Sauer et al., 2024)—to produce images that rival the quality of human-created art and real photographs (Oppenlaender, 2022). In particular, the ease of use and efficiency of GenAI image tools in producing images resembling popular styles found in manga (Japanese comics) and anime (Japanese animation) have been generating growing interest in Japan to incorporate these tools into creative workflows for industry (Deck, 2023a; Osaki, 2023) and for personal use (Deck, 2022). However, there are growing concerns about the legal yet ethically questionable practice of scraping billions of copyrighted images on the internet for training data and its potential for copyright infringement (Clarke, 2022), along with concerns that artists will lose opportunities for employment given how GenAI image models allow laypeople to produce high-quality images easily and efficiently without prior artistic skills or training (Shaffi, 2023).

In 2016, Japan's Cabinet Office established an agenda for science, technology and innovation

[1] https://www.midjourney.com/home

(STI) toward a Society 5.0[2] that aims for "a human-centered society that balances economic advancement with the resolution of social problems by a system that highly integrates cyberspace and physical space" as part of its 2016 Fifth Science and Technology Basic Plan for the period of 2016-2021 (Fukuyama, 2018) and in its subsequent 2021 Sixth Science and Technology Basic Plan set for the period of 2021-2026 (Government of Japan, 2021). Although this demonstrates Japan's interest in developing a more equitable society alongside technological and economic development, the introduction of social and ethical issues due to the incorporation of GenAI image tools into Japan's creative industries may thwart such efforts. Given the long-established culture for industries in Japan to grant permission to individuals to reproduce copyrighted characters when creating self-published derivative works, Japan is currently in a unique position as an early testing ground on the ethics and copyright liability of AI-generated art (Deck, 2022).

To address the social and ethical issues that stem from GenAI technologies, current and future AI practitioners in Japan, especially researchers at the forefront of such innovations at leading R&D labs in the country, will become key experts involved in policy and regulation. This is due to the fact that expert knowledge is a fundamental component in Japan's policy proposals on social innovation (Ghinoi & Omori, 2023). An interdisciplinary understanding of the ethical and social implications of GenAI technologies, which combines technical knowledge and awareness of its impacts on society, will allow these AI practitioners to not only better inform government and policymakers on how to properly mitigate potential harm caused by the usage and distribution of GenAI image technologies, but also on how to better design and create such tools that take into consideration how such tools can have profound impacts on the livelihood and socioeconomic situations of artists and creative professionals in Japan's creative industries.

Therefore, my study investigates which oversights computer science (CS) graduate students (i.e., prospective GenAI researchers) studying at a Japanese university have toward the social aspects of GenAI image technologies when used for creative work, and subsequently what aspects of AI research culture may contextualize such understandings. In addition, I investigate what social and ethical implications are currently acknowledged by experts if GenAI image tools are to be incorporated into Japan's creative industries. Therefore, my research questions are as follows:

[2]https://www8.cao.go.jp/cstp/english/society5_0/index.html

- RQ1. What are the strengths, benefits, and limitations seen by CS graduate students in Japan if generative AI image tools are used for creative work?
- RQ2. What social and ethical aspects of generative AI image tools for creative work are mentioned by CS graduate students in Japan?
- RQ3. What aspects of AI research culture do CS graduate students in Japan discuss when speaking of the research behind generative AI image tools?
- RQ4. What are the social and ethical implications if generative AI image tools are used in Japan's creative industries according to experts?

To answer my research questions, I conducted interviews with two groups of participants: 1) graduate students studying computer science or a related field at a Japanese university and 2) legal, social, and cultural experts on AI's impact on Japan's creative industries. To identify major themes discussed during the interviews, I chose an inductive approach. This means that I identified themes without predefined and preexisting categories. Instead, using the thematic analytical approach developed by Braun and Clarke (2006), I identified major themes and sub-themes as discussed by all interview participants.

The results demonstrate that the CS graduate students I interviewed discussed various technical and social aspects of GenAI image tools if used for creative work. However, many did not display an awareness towards how aspects of culture and labour in Japan's creative industries, which are critical to one's vocational development as a professional artist, could be jeopardized from the use of GenAI image tools, as discussed by the experts. Therefore, I demonstrate that there is a critical need for GenAI researchers to engage in participatory AI design practices such that the insights and needs of artists and creative professionals are properly incorporated and reflected in the development, design, and evaluation of GenAI image models. From this thesis, I further encourage Canadian and Japanese GenAI researchers and policy makers to reflect on the implications of my findings and to consider how the use of GenAI image tools can affect Canadian and Japanese artists and creative workers at various socioeconomic, vocational, and pedagogical levels.

1.2 Thesis Overview

This thesis is organized as follows:

- In Chapter 2, I outline the related literature.
- In Chapter 3, I define my four research questions and my methodology. I describe in detail the sampling process, interview protocol, and how I performed the thematic analysis of the interview data.
- In Chapter 4, I present the results of my four research questions.
- In Chapter 5, upon reflecting on the results, I discuss areas of oversight that prospective GenAI researchers in Japan may have on the social and ethical implications of using GenAI image tools for creative work. I encourage the practice of participatory AI design in GenAI research.
- In Chapter 6, I discuss the limitations of my study. I examine the internal, external, and construct validity of my research.
- In Chapter 7, I present my conclusion, implications of my findings for Japan and Canada, as well as areas for future work.

In this thesis, I define creative work as specialized labour in the form of producing original forms of tangible creative expressions[3]. Since GenAI image tools produce images as tangible outputs, the creative expression primarily discussed in this thesis involves the use of GenAI image tools for illustrative or photographic renditions. In addition, creative work in this thesis pertains less to work produced by hobby artists (i.e., individuals occasionally creating works of art for casual and personal fulfillment), but rather to artists regularly creating works of art, typically at a workplace, as a form of trade, profession, or vocation, and usually as a main source of income[4], whom I refer to as creative workers or creative professionals.

[3] https://fairuse.stanford.edu/overview/faqs/copyright-basics/
[4] https://www.legislation.gov.uk/ukpga/2005/5/section/221

1.3 Thesis Contribution

This thesis presents a valuable contribution to GenAI researchers, the CS education community, and to creative industries in Japan. In particular, it:

(1) provides the first literature review on the current usages and impacts of GenAI image tools in Japan's creative industries and society at large, including key ethical and social implications discussed in existing research and in contemporary news regarding its development and usage.

(2) introduces the first study to investigate what CS graduate students in Japan view as the technical, social, and research aspects of GenAI image tools, especially in the context of creative work.

(3) presents a list of challenges that creative professionals can face if GenAI image tools are to be used in Japan's creative industries, as perceived by legal, social, and cultural experts in Japan.

(4) suggests the gaps that are present between the understanding of the social and ethical implications of using GenAI image tools for creative work by CS graduate students in Japan and Japanese experts, especially in the context of pedagogy, culture, and labour behind creative work in Japan.

(5) encourages regulatory bodies and creative industries in Canada and Japan to learn from my findings and presents a pressing need for GenAI researchers working on GenAI image technologies to engage in participatory AI design, which centres around a collaborative effort to actively work with and engage with artists and creative professionals to ensure that the technology can meet their creative and personal needs.

Chapter 2

Literature Review

In Chapter 2, I first present in 2.1 how popular GenAI image tools have various social and ethical implications due to their potential for harmful usages and from how the training data was sourced. In 2.2, I follow up this notion by presenting inherent ethical issues with open-source GenAI image models and techniques. In 2.3, I share ongoing initiatives that aim to protect artists during legal uncertainties with the development and usage of GenAI image technologies. In 2.4, I present existing literature and scholarly work that have investigated various social and ethical implications of using GenAI image models as creative tools, with a particular focus on interview studies involving creative professionals and computer scientists. Finally, due to the novelty of this study being focused on Japan, in 2.5, I also provide the first non-exhaustive overview and timeline on notable instances where GenAI image tools have been commercially used and discussed in Japan between 2022 and 2024.

2.1 Social and Ethical Issues with AI-Generated Art

Since 2020, diffusion models have quickly proven to be more effective and efficient at image synthesis compared to generative adversarial networks (GANs), which prior to this time were considered the preferred state-of-the-art technique (Dhariwal & Nichol, 2021). Soon thereafter, systems specializing in creating AI-generated images, which often operate as text-to-image systems, have

been quickly adopting diffusion models for image synthesis. Notable examples of text-to-image systems that utilize diffusion models include OpenAI's DALL-E 2 and DALL-E 3 (Betker et al., 2023; Ramesh et al., 2022), Stability AI's Stable Diffusion (Podell et al., 2023; Rombach et al., 2022; Sauer et al., 2024), Midjourney[1], and Adobe Firefly[2]. Since 2022, these models have sparked significant discussions on the automation and commodification of the creative process (Vincent, 2022), their impact on the livelihood and morale of artists (Santos, 2022), and the often non-consensual usage and collection of copyrighted images to build training datasets (Xiang, 2022). Such datasets have often been found to include explicit and graphic content from the internet (Xiang & Maiberg, 2022).

Because it is legal to use copyrighted images and content without requiring consent from right holders for model training, it is currently unclear how capable current copyright and intellectual property laws can properly address potential copyright infringement from images synthesized with GenAI image tools (Deck, 2022; Xiang, 2022). Although Adobe Firefly prides itself as an "ethical" alternative to its competitors by having its training data sourced from Adobe's proprietary set of stock images, alongside licensed content and those from the public domain, reports have found that AI-generated images, such as those generated with Midjourney, were submitted onto Adobe's stock photo library and included in Firefly's training dataset (Metz & Ford, 2024). Midjourney has been found to have used works belonging to more than 16,000 artists as model training data without obtaining consent from their rights holders (K. K. Ho, 2024). As of December 2024, Stability AI and Midjourney are also defendants in ongoing class-action lawsuits in the United States due to alleged copyright infringement from their models and services (Court Listener, 2024).

2.2 Ethical Problems with Open-Source Models and Techniques

While Midjourney and several other popular state-of-the-art diffusion models for text-to-image generation are proprietary, Stable Diffusion[3] differs by fully disclosing the training data that were

[1]Midjourney Homepage: https://www.midjourney.com/home
[2]Adobe Firefly Product Page: https://www.adobe.com/ca/products/firefly.html
[3]Stable Diffusion Repository on GitHub: https://github.com/CompVis/stable-diffusion

used and for allowing commercial usage of its open-sourced code and model weights. The training dataset of Stable Diffusion consists of a subset of over 2.3 billion images (LAION-2B)[4] from the openly accessible LAION-5B dataset (Schuhmann et al., 2022), a collection of 5.85 billion image-text pairs scraped from the internet. This dataset raises questions on the ethical and the non-consensual nature of gathering such an abundant amount of unfiltered images on the internet to be used as training data (Xiang, 2022), which on top of containing sensitive and explicit imagery (Xiang & Maiberg, 2022), also makes the model itself routinely exhibit cultural and racial biases (Bianchi et al., 2023).

In addition, fine-tuning techniques for diffusion models have also appeared, such as DreamBooth (Ruiz et al., 2023), Textual Inversion (Gal et al., 2022), and LoRA models (Hu et al., 2021). These methods allow diffusion models to be further fine-tuned to represent specific subjects and styles from a new targeted set of image-text pairs as additional input training data in order to better generate the depicted subjects and styles in its outputs. These techniques have allowed many AI start-ups to launch more specialized and refined generators built on top of Stable Diffusion. Such abilities to personalize subject matter have sparked concerns and speculation that AI-generated art could be a new form of deepfake, as tools such as Stable Diffusion and Textual Inversion are open-sourced, allowing for technical restrictions on the content subject matter to be removed and generated images to be subject specific, which could be utilized as a new medium for disinformation and sexual abuse (Knight, 2022; Wiggers, 2022). Contemporary artists, such as the late Kim Jung Gi (Deck, 2022) and Hollie Mengert (see Figure 2.1) (Baio, 2023), were faced with instances where models were being fine-tuned to imitate the style of their artworks and were distributed online without their consent. Popular fantasy artist Greg Rutkowski has also found his art style incorporated in AI-generated art and his name frequently used as a prompt, even more so than Picasso, Michelangelo, and Leonardo da Vinci combined (Heikkilä, 2022).

[4] Stable Diffusion v1 Model Card: https://github.com/CompVis/stable-diffusion/blob/main/Stable_Diffusion_v1_Model_Card.md

Figure 2.1: Artwork by Hollie Mengert (left) vs. images generated with a Stable Diffusion model fine-tuned to her style using DreamBooth (right) (Waxy.org, 2022)

2.3 Protecting Artists in an Era of Rapid GenAI Development

Software systems and art hosting websites have been created to provide resources and tools for artists and individuals to have a level of awareness and control over their artworks and images found online. Spawning AI's "Have I Been Trained?"[5] allows individuals to search whether their images have been scraped as part of LAION-5B, a training dataset used to train GenAI models, by providing text, an image, or a website. This site allows users to flag and label images and web domains that they do not want used as training data for future AI models into a "Do Not Train Registry". This registry allows commercial AI trainers to avoid including in such works in their training datasets if they wish to respect the wishes of their respective rights holders.

While "Have I Been Trained?" aims to advocate for consent in AI training practices, the SAND Lab at the University of Chicago developed two systems, Glaze[6] (Shan et al., 2023) and Nightshade[7] (Shan et al., 2024), with the intent to allow artists to safeguard their artworks when used without consent as future GenAI model training data. Glaze and Nightshade processes images with machine learning algorithms to minimally alter them in such a way that they are undetected by the human eye, but are modified sufficiently enough for GenAI models to fail at properly learning its depicted visual characteristics during training. Glaze's algorithm prevents GenAI models from learning its characteristics as depicted for the human eye (Shan et al., 2023), while Nightshade's approach aims

[5]Have I Been Trained? Homepage: https://spawning.ai/have-i-been-trained
[6]Glaze About Page: https://glaze.cs.uchicago.edu/aboutus.html
[7]Nightshade About Page: https://nightshade.cs.uchicago.edu/aboutus.html

to distort feature representations inside GenAI image models once it has been trained on a sufficient amount of images altered with Nightshade, with the intent to discourage model developers from using unlicensed images that are scraped from the internet (Shan et al., 2024).

After Meta's announcement to use all user-posted content as training data starting June 26, 2024 for their GenAI systems, Cara quickly rose in popularity as an art sharing and social media platform, causing its user base to grow from 40,000 users to 650,000 users in a single week (Jiménez, 2024; Silberling, 2024). Cara[8] was founded in December 2022 by Zhang Jingna, a world-renowned photographer. Its mission is to provide a platform for creatives to share their own human-made artworks while prohibiting AI-generated artworks on the platform until ethical and privacy issues around GenAI datasets are resolved through legislation during a time where creative workplaces are gradually adopting AI usages.

2.4 Social and Ethical Implications For Creative Industries

Resources such as "Have I Been Trained?", Glaze, Nightshade, and Cara are only the first steps in a domain that is ever evolving where new technologies become increasingly refined and in constant need for newer alternatives to protect creatives and their data from being misused without their consent. However, for future GenAI image system designs to avoid jeopardizing the well-being and livelihood of living artists at large, interdisciplinary research and education should be conducted to advocate for a nuanced development of social and ethical awareness among researchers and practitioners developing future GenAI tools, along with understandings and perceptions from creative communities.

In 2.4.1, I discuss various academic works that have outlined various impacts that GenAI image tools could have toward creative professionals. In 2.4.2, I present interview studies conducted by scholars with artists, industry professionals, and computer scientists on their opinions on GenAI image tools and their perspectives on how it could impact creative work.

[8]Cara About Page: https://cara.app/about

2.4.1 Impact on Artists

Ko et al. (2023) conducted an interview study consisting of 28 visual artists and did a systematic literature review of 72 system/application papers on how GenAI image systems, such as large-scale text-to-image (T2I) GenAI models, can be used in creative works. They concluded that T2I systems can be used to support creative works by automating aspects of the creation process, expanding on creative ideas, and facilitating or arbitrating aspects of the communication process.

Despite co-creative capabilities with GenAI image systems, there are studies that have questioned whether AI-generated art may impact artists and creative professionals on a social and ethical scale. Jiang et al. (2023) reviewed harms stemming from the use and proliferation of AI-generated art for professional artists. The authors discussed how the artistic process is uniquely human and that GenAI image models should not be anthromorphisized and used as a replacement for artists. The impacts that AI-generated art could have towards artists include damages to their reputation through mimicry and impersonation, financial loss from potential job loss and displacement, hegemonic views and stereotypes of generated images, plagiarism, and copyright infringement. As a result, artists may be reluctant to share works due to unethical practices by GenAI industries with non-consensual mass scraping and training of works posted online by artists. The authors also remarked how current gaps in copyright laws in the United States of America and around the world do not take into account and do not protect artists from the social and economic harms that can be caused by AI-generated art.

Piskopani, Chamberlain, and Ten Holter (2023) explored contemporary examples of how artists, AI developers, and consumers and audiences of AI-generated art have started approaching and reacting to the social, ethical, and legal implications of using GenAI image tools. Implications outlined include worries from artists of copyright infringement, privacy concerns when personal photos are used as training data, stereotypes and bias in training datasets, the ability for these models to devalue the philosophical aspects of art, the act of deception when AI-generated images are not discernible from human-made art, and questions of whether ”democratization” efforts by AI platforms are appropriating and monetizing the works of living artists and humanity’s collective imagination and knowledge without compensation.

Sætra (2023) identified macro, meso, and micro level challenges in society when it comes to the proliferation of GenAI models at large. At the macro level, GenAI can jeopardize democratic and political stability, replace workers or change the nature of work, promote status quo through the use of historical data, and contribute to greenhouse gas emissions and large amounts of energy consumption. At the meso level, there is potential for GenAI to change professions and power dynamics at the workplace, appropriate and reproduce styles from human-made content that are trained and obtained without consent, and allow further discrimination and negative effects on marginalized group due to infrastructural and societal dynamics in historical data from marginalized groups. Finally, at the micro level, there are concerns that GenAI systems can contribute to cognitive atrophy for mentally and cognitive challenging tasks and aspects of creative work, can become adept at persuasion and manipulation, and can create a preference for GenAI companionship rather than with humans.

2.4.2 Understanding How Creative Professionals View GenAI

Inie, Falk, and Tanimoto (2023) conducted a qualitative survey with 23 creative professionals on their opinions on GenAI. Worrisome aspects of GenAI discussed by these creative professionals include copyright infringement, a desire for quantity over quality, and its ability to circumvent and undermine the creative process. Reasons brought forward by those surveyed on why not to worry about GenAI include: its inability to operate without human-made input found within datasets, outputs lacking originality, and artist/client relationships and creative workflows being too complex for AI to emulate. Positive aspects of how GenAI can allow artists to create higher-quality works include GenAI's ability to raise an individual's productivity and efficiency, in addition to its ability to provide inspiration through generated examples.

Shi, Jain, Duan, and Ramani (2023) interviewed 25 individual artists involved with GenAI in their artistic processes and found that artists would encounter a dilemma of compromising one's personal preference and taste in art, in exchange for productivity and efficiency to gain a competitive edge when using GenAI. The artists interviewed also expressed fears of unemployment, plagiarism, and privacy, along with ethical concerns about fraudulent and malicious usages.

Vimpari, Kultima, Hämäläinen, and Guckelsberger (2023) interviewed 14 game professionals in

the Finish video games industry to gain insight into their perspectives on how text-to-image GenAI systems may be integrated into the Finnish video game industry. While T2I can empower smaller game studios, create job opportunities, alleviate repetitive tasks, and foster opportunities to enhance creative expressions, it can also hinder existing jobs, deny new and extensively trained workers from entering the industry, increase the quantity of games at the expense of reduced quality, cause guilt in cases of mandated uses which go against one's personal code of ethics, and lead to potential loss of agency and meaning in artistic work.

Roosa Wingström and Lundman (2024) interviewed 52 computer scientists and new media artists based in Finland who use AI in their works to derive similarities and differences between their definitions of creativity. In their study, although computer scientists and new media artists using AI defined creativity similarly, they found that AI offers differing roles when it comes to scientific and artistic creative processes. Although many of the computer scientists interviewed did not see a co-creative relationship with AI in their work, many artists interviewed worked co-creatively with AI. For computer scientists, accurate and trustworthy results are essential for AI systems, whereas artists approach AI as a system to explore new ideas and playful usages.

Santo, Santos, and Inácio (2023) held interviews with 21 creative individuals in a variety of creative fields with no knowledge on GenAI models. To understand what creative activities and parts of the creative process each participant would want to share with a machine, participants were made to interact with Meta's WhatsApp messaging application for a week as a hypothetical creative machine. Follow-up interviews with each participant were conducted to understand their experiences and opinions. Participants were also asked to use DALL-E 2 to understand how generative tools could help them with their creative work. From a combination of interviews and WhatsApp as a digital cultural probe, the authors gathered a set of domain-agnostic patterns for user needs and contexts of use that could be leveraged as functional requirements for user-centered AI software and provided a classification framework for creative tools and co-creative systems.

Hemment et al. (2023) conducted a workshop with artists, AI researchers, and designers to collaboratively identify social and technical issues with AI development. They present how literature on AI literacy suggests four types of methods: 1) awareness, 2) technical understanding, 3) normative assessment, and 4) making critical links to broader structures of power. Through their

discussions with artists, scientists, and social scientists in their workshops, they found that the most important focus should be on critical links to broader power structures, given that there is currently too much focus in AI research on technical explainability, instead of questioning whether a technology should exist.

2.5 Situation Surrounding GenAI Image Tools in Japan

In 2.5.1, 2.5.2, and 2.5.3, I present selected examples illustrating how various GenAI image tools, usages, and notable controversies have appeared in Japan, in addition to how illustration-oriented services and tools integrating GenAI image models have responded to backlashes and criticisms. In 2.5.4, I highlight notable cases that illustrate how GenAI image tools can contribute to job loss or job augmentation in Japan's creative industries. In 2.5.5, I present surveys conducted on how creative professionals working in Japan have reacted and expressed concerns about GenAI developments at large. In 2.5.6, I introduce initiatives that are working towards protecting Japanese creatives and their works from being used without consent when developing GenAI image models. Finally, in 2.5.7, I discuss ongoing initiatives in Japan that are working to ensure future safe and ethical developments and distribution of GenAI image tools in Japan.

2.5.1 Japan as a Priority Market

Perhaps due to the worldwide popularity of Japanese pop culture, specifically that of Japanese animation (anime) and Japanese comics (manga), GenAI diffusion models are popularly marketed and used to create images resembling popular works in anime and manga. In February 2022, Midjourney released ***nijijourney***[9], a fine-tuned version of Midjourney that specializes in generating anime and manga-styled art, and in October 2022, the American company Anlatan followed suit by implementing its own customized version of Stable Diffusion, named ***NovelAI Diffusion***[10]. In January 2023, ***Stability AI***, the creators of Stable Diffusion, declared Japan a priority market and expressed interest in growing support for the country's gaming, advertising, and art sectors with their GenAI models (Deck, 2023b, 2023c). Soon after, in November 2023, Stability AI released a

[9]Nijijourney Homepage: https://nijijourney.com/
[10]NovelAI Homepage: https://novelai.net/

fine-tuned version of Stable Diffusion XL (SDXL), called ***Japanese Stable Diffusion XL*** (JSDXL) (Stability AI Ltd., 2024). This model produces outputs that better represent Japanese people and Japanese artifacts and imagery (see Figure 2.2) given the generally white-dominated and Western-centric distribution of images found in the Stable Diffusion training dataset, making it the first time that Stability AI had released a GenAI image tool specialized for a specific region and culture.

Figure 2.2: "Profile photo of a high school boy" (Left: DALLE-3, Center: Translated Prompt + SDXL, Right: JSDXL) (Stability AI Ltd., 2023)

2.5.2 Examples of Commercial Usages in Japan

The use of GenAI image tools in Japan for product and graphic design is also being explored. For example, car manufacturer ***Toyota*** has started to use GenAI text-to-image models for vehicle designs (Toyota Research Institute, 2023). Beverage brands in Japan, such as ***Coca-Cola Japan*** (Kawamura, 2024) and ***Ito-En*** (Ito En, Ltd., 2023), have used GenAI for marketing, packaging, and product design purposes. Japanese musical artists such as ***Yuzu*** (Natalie Music Editorial Department, 2023b) and ***Blue Encount*** (Natalie Music Editorial Department, 2023a) have also used GenAI images for their album cover and music video backgrounds, respectively, with the latter using Midjourney. There is also interest in integrating GenAI image tools into broader online services such as chatbots. For instance, in May 2023, Rakuten's Viber incorporated the use of OpenAI's DALL-E into its official AI chatbot called ***Viber AI Chat*** (Viber Media S.a.r.l., 2023). Japanese startup picon Inc. also created a chat bot called ***AI Chat-kun***[11] that generates images using Stable Diffusion and is hosted on LY Corporation's LINE messaging platform. LINE is the country's most popular messaging app, as it boasts more than 95 million active monthly users in Japan, which

[11] AI Chat-Kun Product Page: https://picon-inc.com/ai-illust *(in Japanese)*

represents more than 70% of the country's population (Byford, 2023). Local governments in Japan have also embraced the use of GenAI image tools for promotional purposes. For instance, ***Sakai City*** in Japan's Fukui Prefecture encouraged the submission of AI-generated art for a contest to promote local tourism (Kaiba Co., Ltd., 2023).

2.5.3 Notable Controversies in Japan

I will introduce notable instances from August 2022 to June 2024 where Japanese online services and platforms hosting GenAI image services and the commercial use of AI-generated images in Japan have been met with criticism and controversy.

2.5.3.1 Art Platforms Hosting AI-Generated Images

Since October 2022, many ***Japanese art hosting platforms***, such as Pixiv, Skeb, and DLsite, have rushed to refine platform guidelines that ban, restrict, or introduce policies on AI-generated works to address the increase of AI-generated art posted on these platforms (Aoi, 2022b, 2022d). A report published in June 2023 by the British Broadcasting Corporation (BBC) claims that ***Pixiv*** was used as a popular platform to promote AI-generated images created with Stable Diffusion that depict child sexual abuse as sexualized cartoons and drawings of children are not illegal in Japan (Crawford & Smith, 2023). Creators were found to commonly create over a thousand of such images a month, which they would promote on Pixiv in groups and through hashtags using niche keywords, and then redirect prospective customers to pay for more explicit images on monetization platforms such as Patreon through links in their Pixiv profile. A spokesperson for Pixiv told the BBC that they had banned all photorealistic and sexual depictions of minors on May 31 of the same year and that they would actively monitor and allocate resources to counter the issue. Patreon had also said that such content violates their "zero-tolerance" policy and has identified and removed increasing amounts of this sort of material.

2.5.3.2 GenAI Image Services

In August 2022, the Japanese company RADIUS5 released ***mimic***, a service that allows users to upload their own illustrations so that an AI model can analyze and output a reference material

and new images in their style. Despite the terms of service prohibiting uploading art that does not belong to the user, there were not sufficient measures to prevent users from uploading other people's art when using the service (Aoi, 2022c). Mimic's launch was the first for many Japanese artists to voice concerns about GenAI image services. Mimic's launch generated an increase in artists adding "No AI learning" descriptions to their social media profiles. Many artists were concerned about art that would be made to resemble their style without their knowledge. In addition, many users were concerned that such services would discourage artists from creating and publishing their works online if AI-generated images could easily automate and replicate their work. Creators also feared that once their work was analyzed by AI, it could not be undone. In September 2022, in response to criticism, mimic revised its policies to positive public reception by allowing only users on X (formerly known as Twitter) who pass their screening process to be able to use their service and for all images and generated content to be publicly seen for transparency and reporting purposes (Aoi, 2022a).

In June 2024, another service by RADIUS5 called ***copainter*** takes a user's uploaded sketch and transforms it into completed and finished lineart[12]. In response to its release, many artists online posted warnings informing other artists to avoid uploading incomplete sketches online in case users using services like copainter end up claiming ownership over completed drawings using their sketches[13]. This warning came in reference to an incident in October 2022 where prominent Korean anime artist, AT, was broadcasting a work in progress of their fanart for the video game "Genshin Impact" on popular livestreaming service Twitch. Soon after the broadcast was over, a viewer of the stream used NovelAI Diffusion, a GenAI image tool specialising in anime and manga styled art, to "auto-complete" the rest of the incomplete fanart and falsely accused the original artist for referencing their AI-generated image in the final illustration that was posted by the original illustrator[14].

[12] Post on X announcing the release of copainter: https://x.com/copainter_info/status/1805069584548176068 *(accessed Oct 15, 2024)*

[13] Post by X user "dandaesu" on incomplete sketches: https://x.com/daendesu/status/1805167832797503915 *(accessed Oct 15, 2024)*

[14] Post on X garnering on what happened with artist "AT": https://x.com/GenelJumalon/status/1580401094454222848 *(accessed Oct 15, 2024)*

Initiatives to monetize and distribute fine-tuned models and prompts were also met with controversy and subsequent backlash. In May 2023, Japanese company Cyan Corporation released ***petapi*** as a platform that allowed users to monetize AI-generated artwork and prompts, along with fine-tuned LoRA models (Kobayashi, 2023). It also allowed users to provide services using GenAI image tools for clients requesting AI illustrative work. However, after a month and a half of operation, petapi announced its shutdown due to criticisms and concerns that works were stolen to create LoRA models, the associated implications of copyright infringement from such acts, in addition to claims that it displays a lack of consideration for human creators by providing such services and models (tks24, 2023).

Attempts to integrate GenAI image tools into existing illustration software have also been met with criticism and subsequent cancelled releases. Celsys, a Japanese company that produces digital drawing software ***Clip Studio Paint***, had cancelled a release to implement Stable Diffusion's text-to-image AI within Clip Studio Paint after receiving backlash from many artists within the digital arts community in December 2022 (Celsys, Inc., 2022). Similarly, in January 2024, popular Japanese illustration app, ***Ibis Paint***, had withdrawn a feature within a day of release that allowed users to fully generate a complete image using the user's currently drawn image as input. Despite the feature's aim to provide users with a visual reference, many users had reported the feature generating existing copyrighted characters when prompted (Tatsuki, 2024).

2.5.3.3 Commercial Uses of AI-Generated Images

The use of AI-generated illustrations for promotional purposes has also been met with criticism from creative communities. In April 2023, a Japanese kimono event called the ***Konjyaku Kimono Grand Market*** held in Ginza, Tokyo, used an AI-generated illustration for its promotional material (see Figure 2.3) (V, 2023c). Many individuals online had noticed how the kimono had been wrapped incorrectly on the girl that was depicted and that the shirt and necktie she appeared to be wearing under the traditional garment was non-traditional in nature. This caused many to be upset that the organizers had failed to adjust the images before their publication and how they had decided to use GenAI rather than hiring a real artist who would have avoided such mistakes in the first place.

In March 2024, the ***Japan Coast Guard*** retracted its use of an AI-generated illustration (see

Figure 2.3: Konjyaku Kimono Grand Market event poster using AI-generated art (Konjyaku Kimono Grand Market, 2023)

Figure 2.4 from its website and planned informational brochures on marine safety (Ando, 2024). Although the Japan Coast Guard had used GenAI with the intent of creating an image that conveys a message directly to viewers without being associated with any particular artist or art style, it received backlash from the public, who saw it as having taken away work from real artists and illustrators.

In June 2024, the singer of the opening theme song for the popular anime series ”Evangelion”, Yoko Takahashi, had withdrawn from ***Tokyo's Ikebukuro Anime Philharmonic*** concert series in response to the organizer's use of AI-generated artwork for its promotional material (Baseel, 2024). The organizers issued an apology and replaced their marketing material. They cited time constraints, issues with securing an artist, and the selection of AI-generated images as unintentional and non-malicious. However, a lack of awareness of issues surrounding GenAI and the failure to notice that the images selected for promotional material were tagged as ”AI-generated” had led to the oversight.

Japanese publisher Shueisha also caused significant controversy with one of their adult-oriented photobooks using an AI-generated model. In May 2023, Shueisha released a gravure photobook containing images of an AI-generated model that they had created named ***Satsuki Ai*** (Baseel,

Figure 2.4: Japan Coast Guard leaflet on water safety using AI-generated art (Japan Coast Guard, 2024)

2023a). In Japan, the term gravure is often used to describe provocative photos, which often feature women in swimsuits and lingerie. Ai was created with the intention to depict a ”dreamlike girl who meets every man’s ideal while appearing as lifelike as possible”. This project generated much criticism primarily due to its eerie resemblance to real-life actress and former gravure idol Hikari Kabashima. Many netizens started noticing how Satsuki’s fictional heights and hobbies matched those of Kabashima. Netizens were also particularly upset about how Satsuki seemed to be modeled after Kabashima herself, who has expressed how she no longer wishes to undress in front of a camera nor to be seen in a sexual manner. In June 2023, in response to the public backlash, Shueisha decided to suspend sales of the photobook (Baseel, 2023b; V, 2023b).

2.5.4 Potential for Job Loss vs. Job Augmentation

GenAI image tools have sparked increased ethical discussions on GenAI’s potential to create job loss or displacement for manga and anime artists and assistants in Japan’s creative industries. In March 2023, non-artist writer Rootport used Midjourney to completely illustrate his own 128-page

Figure 2.5: Pages of "Cyberpunk Momotaro" manga using images generated by Midjourney (Shinchosha Publishing Co., Ltd., 2023)

manga published by manga publisher Shinchosha called ***"Cyberpunk Momotaro"*** (Holland, Sugiura, & Jozuka, 2023) (see Figure 2.5), and in September 2023, Japanese web television, ABEMA TV featured a news segment on how Japanese AI startup founder ***Takahiro Anno*** had produced a 16-page manga (see Figure 2.6) which he had fully illustrated using Stable Diffusion (V, 2024). Anno's 16-page manga had only been created in the course of a week, while Rootport's 128-page manga had been created in six weeks versus the one year that a skilled artist would have taken to produce the amount of work. Both Rootport and Anno had created their works with the intent to show how those without professional training or experience and skills to create comics could produce full professional works using GenAI image tools, raising questions as to whether there is a need for manga artists and assistants given that their jobs could be fully automated using such tools (Holland et al., 2023; V, 2024). In January 2023, a variation of Stable Diffusion developed by Japanese company Rinna Co., Ltd, was used to generate backgrounds (see Figure 2.7) in the anime short-film ***"The Boy & The Dog"*** that was produced by Netflix and primarily animated by Wit Studio, a Japanese animation studio. Netflix's advertised motive for using such AI models was to

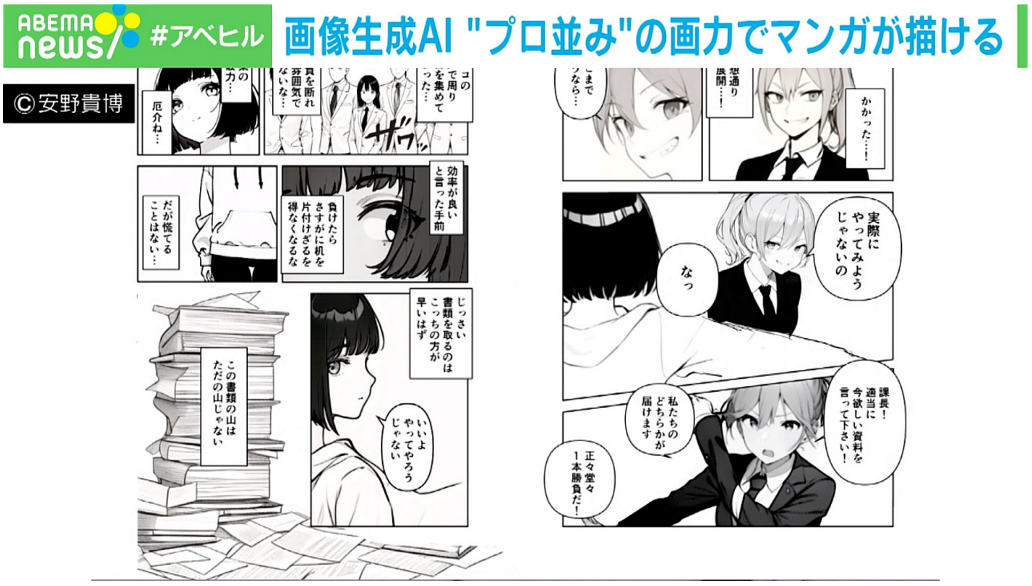

Figure 2.6: Pages from Takahiro Anno's self-published manga using images generated by Stable Diffusion (Anno, 2023)

compensate for the labour shortage in the anime industry, while crediting the background creation to "AI(+Human)". However, this decision was criticized by many as insensitive given that the labour shortage is often attributed to many animators quitting the industry due to the industry culture of frequently underpaying freelance workers (Deck, 2023a).

Although there are potential fears that adopting GenAI image tools in industry may completely replace and automate entire illustrative processes, there are also companies leveraging GenAI for brainstorming and for generating references and drafts at various stages of the creative process. In a document submitted to the Japanese government's study group on intellectual property rights in the AI era, Japanese video game company ***Level-5 Inc.*** showcased how GenAI image tools, namely Stable Diffusion, were used to generate a variety of title screen layouts, crowds and buildings for in-game assets (see Figure 2.8), or for visualizing various expressions and backgrounds from 2D to 3D under various lighting (Townsend, 2023). Such usages demonstrated how GenAI can be used at the creative workplace during drafting processes or for minor elements inside completed works.

In November 2023, GenAI tools, such as ChatGPT and Stable Diffusion, were used for brainstorming and drafting the storyline and character designs for the new installment of the manga "Black Jack" by the late ***Osamu Tezuka***, who is considered "the god of manga" in Japan (NHK

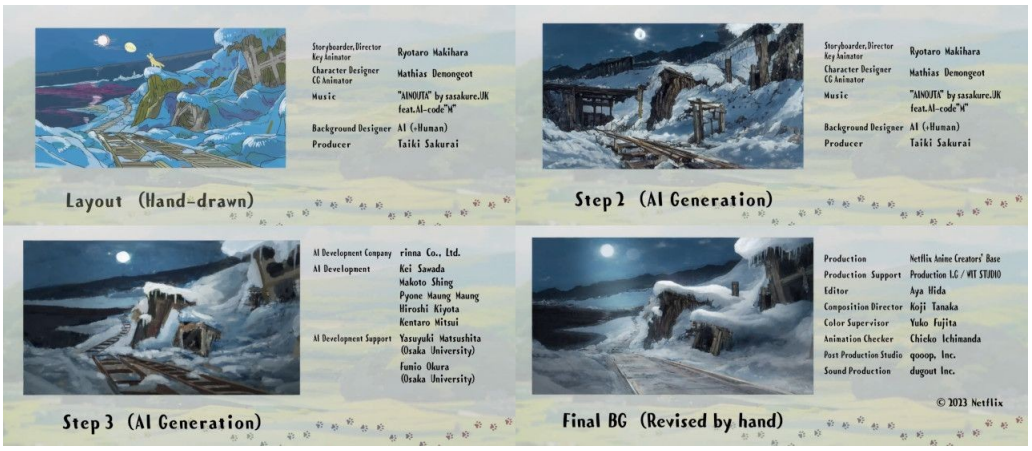

Figure 2.7: Background process for Netflix's "The Dog & The Boy" using a variation of Stable Diffusion developed by Rinna Co., Ltd. (Netflix, Inc., 2023)

Figure 2.8: Cropped sections of images created with Stable Diffusion utilized as background assets in a Level-5 game (Level-5 Inc., 2023)

WORLD-JAPAN, 2023a, 2023b). This project comes three decades after the death of Tezuka and was spearheaded by a group of university professors at Keio University and led by Tezuka's son Makoto Tezuka, who represents and handles most of his father's posthumous activities. Stable Diffusion was used to generate images that had been learned from 20,000 different facial images of characters in the manga to help design new characters. The final drawings for the manga were made by staff at Tezuka Productions and artists outside the company (see Figure 2.9), which means that AI-generated images were not used in the final output (The Yomiuri Shimbun, 2023).

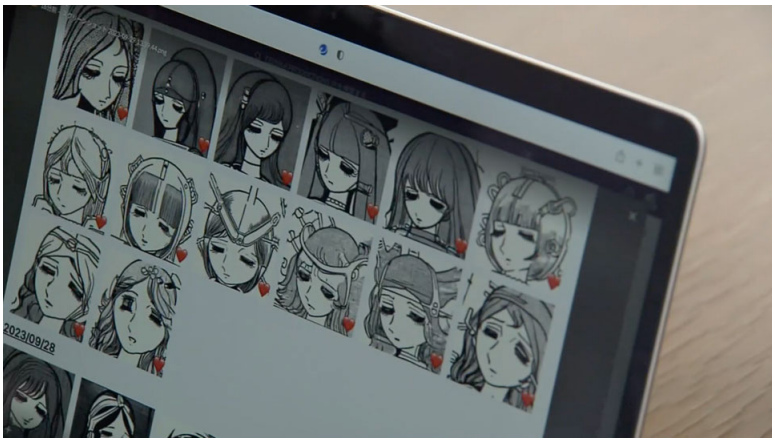

Figure 2.9: Tezuka-like female character candidates generated with Stable Diffusion for the new manga installment of "Black Jack" (Tezuka Productions Co., Ltd, 2023)

2.5.5 Reactions from Japanese Industry Professionals

From the sudden rise in interest to incorporate GenAI into various creative workflows, many creative professionals in Japan have become wary of its impacts on their jobs and livelihoods as working artists. In a survey conducted between May 8 to May 14, 2023 by ***Arts Workers Japan***, an association of freelance artists and entertainment workers in Japan, close to 94% of the 25,560 workers surveyed fear copyright infringement caused by AI (Harada, 2023), 92% expressed fears of AI scraping their work without permission, while 62% were concerned about AI stealing their techniques, and 51% were anxious that AI could contribute to reduced earnings. Furthermore, 59% were concerned that GenAI will cause fewer work opportunities. Participants of the survey also mentioned instances of having their art style copied or plagiarized with the use of AI. Many would

like current copyright laws to be revised such that AI models cannot be trained on copyrighted works without permission of rights holders during a model's development phase.

In June 2023, another similar survey was conducted by ***Nippon Anime & Film Culture Association (NAFCA)***, which was established in April of the same year. Of the almost four thousand individuals who participated in the survey, more than 70% of its respondents wanted AI to be regulated by law. Although some participants expressed a desire to use GenAI in their creative workflows, the majority were concerned about how the technology would infringe on their rights, such that 80% of the participants wished for AI learning to use only authorized works and for penalties to be put in place of breaches (Morisawa, 2023).

Negative sentiments and scrutiny surrounding GenAI image tools have also increased skepticism towards suspected uses of AI in illustrations, such that there have been false accusations of professional artists using AI in their works. For instance, in August 2023, famous manga illustrator ***Rui Araizumi*** was falsely accused of using AI-generated art for an illustration. This led him to prove its authenticity with a series of videos and screenshots showing the many layers of his work process in his work files (V, 2023a).

2.5.6 Tools and Initiatives to Protect Japanese Creatives

Tools and initiatives have appeared in Japan with the intent of protecting artists from unauthorized training of their works. For example, in January 2023, ***emamori*** was created by Japanese company SnackTime using an open-source watermarking technique called Mist (Townsend, 2024). This technique, created by researchers at Shanghai Jiao Tong University, allows individuals to add a watermark and noise to an image so that GenAI image models that learn from such images can only output blocky or scrambled outputs that resemble the original image (see Figure 2.10).

In addition, a preparatory committee known as ***AnimeChain*** was created by various Japanese AI and blockchain experts with the intent of designing an ecosystem (see Figure 2.11) that uses blockchain technology to record the development process of a GenAI image system (Woodman, 2024). Its intention is for Japan to develop its own ethical and domestic GenAI image model in response to the way most GenAI image systems used in Japan are developed overseas. The goal is to have an opt-in process for creators and anime studios for training data, while ensuring that any

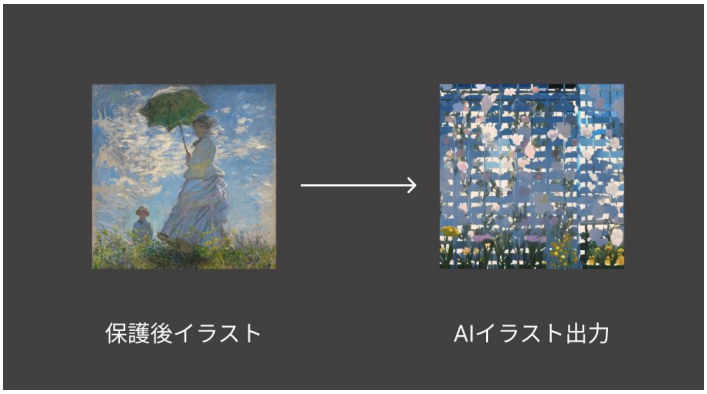

Figure 2.10: Image protected with watermarking using Mist (left) vs. GenAI attempts to mimic an image that has been watermarked with Mist (right) (SnackTime Inc., 2024)

revenue generated by the GenAI system gets distributed back to the image holders with the help of the blockchain recordings, which calculates how much each data contributed to the final output (Sugimoto, 2024).

2.5.7 Towards Regulations and Policies in Japan

There are currently discussions within Japan to explore regulation and safety regarding the use image-generating AI technologies within the country. These initiatives show Japan's proactive stance in its leadership towards discussions on balancing AI usages with AI regulations.

In January 2023, a member of the Japanese legislature, ***Ken Akamatsu***, uploaded a video to his official YouTube channel calling for the creation of national guidelines on GenAI (Deck, 2023c). In the video, he introduces a series of ideas, including an opt-out system for artists and a licensing system to compensate those who participate. In 2022, Ken Akamatsu was elected to the national legislature. He is the first professional manga artist to have been elected to the Diet. Several Diet legislators have taken to arranging listening tours to hear artists' concerns after Akamatsu first spoke out (Deck, 2023c).

In June 2023, the ***Japan Image Generation AI Consortium (JIGAC)***, consisting of AI developers, company officials, university researchers, and lawyers, was created to discuss and plan a sustainable and safe framework for the usage of AI-generated images in Japan (Kaneko, 2023). In December 2023, the ***Cabinet Office in Japan*** shared results from their call for public opinions on

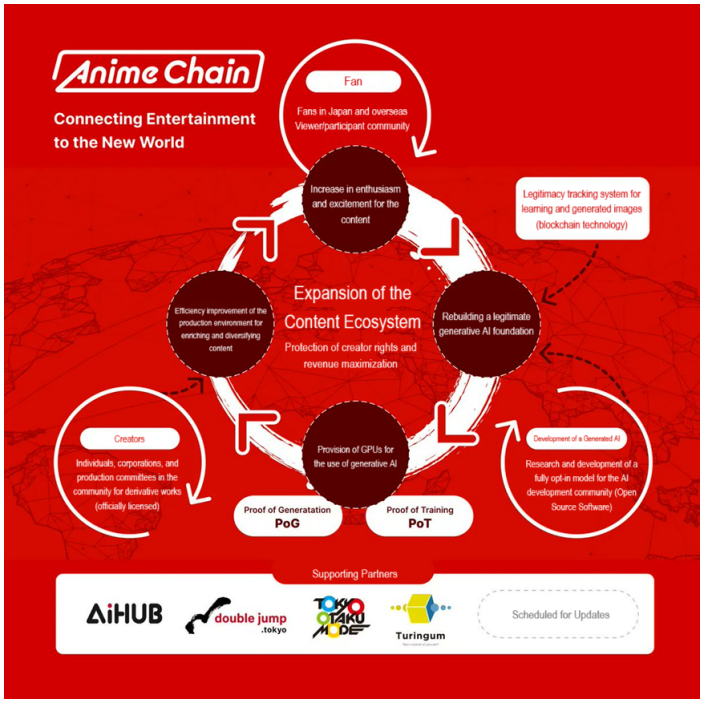

Figure 2.11: Proposed blockchain model by AnimeChain for GenAI image systems (translated into English by Automaton Media) (AnimeChain LLC & Active Gaming Media Inc., 2024)

intellectual property rights in the age of AI, which had received over a thousand comments, many of whom were creators expressing their concerns over how AI may infringe on their intellectual property and rights[15].

In May 2024, Japanese Prime Minister Fumio Kishida introduced an international voluntary framework called the ***"Hiroshima AI Process Comprehensive Policy Framework"*** under the "Hiroshima AI Process" that was launched in May 2023 at the G7 Hiroshima summit in response to the rapid development and proliferation of GenAI technologies (Government of Japan, 2024). The framework was successfully agreed on at the G7 Digital & Tech Ministers' Meeting in December 2023 and was endorsed by the G7 Leaders in the same month. This framework aims to promote safe, secure, and trustworthy AI by introducing voluntary guiding principles and a code of conduct that aims to mitigate risks regarding GenAI development and usages.

[15]Cabinet Office of Japan's Agenda for the 4th Intellectual Property Rights Review Meeting in the Age of AI: https://www.kantei.go.jp/jp/singi/titeki2/ai_kentoukai/gijisidai/dai4/index.html *(in Japanese; accessed Oct 15, 2024)*

Chapter 3

Methodology

In Chapter 3, I present an overview of the interview process, iterate over the research questions, and outline each step of the process taken to analyze the interview data collected.

3.1 Overview

For this study, a qualitative research method was applied. Data was collected through semi-structured interviews. From June 2023 to October 2023, I conducted and audio-recorded: **1) nine interviews with computer science graduate students studying in Japan** and **2) three interviews with Japanese industry professionals and experts**, for a total of twelve semi-structured interviews. The interview study received ethical approval from the Dean of the Institute for Future Initiatives at The University of Tokyo (Review No. 23-85) on June 6, 2023, and ethical approval from the Concordia University Human Research Ethics Committee (Certification #30018440) on June 20, 2023.

Jun Kuribayashi (Professor Arisa Ema's research assistant) helped conduct interviews in Japanese and provided his notes and summaries of the interviews in English for analysis. The notes were written in real time for interviews conducted in English and were later AI-transcribed using Rev AI[1]. I manually and individually analyzed all interview notes and transcripts using an inductive thematic analysis approach (Braun & Clarke, 2006) to extract major themes and subthemes.

[1] https://www.rev.com/

3.2 Research Questions

To understand some of the advantages and disadvantages of GenAI image tools, I identify:

- **RQ1. What are the strengths, benefits, and limitations seen by CS graduate students in Japan if generative AI image tools are used for creative work?**

Then to understand what non-technical aspects are understood by CS graduate students from the use of GenAI image tools, I identify:

- **RQ2. What social and ethical aspects of generative AI image tools for creative work are mentioned by CS graduate students in Japan?**

To understand what may contextualize the mindset that CS graduate students have toward GenAI image tools, I further identify:

- **RQ3. What aspects of AI research culture do CS graduate students in Japan discuss when speaking of the research behind generative AI image tools?**

Finally, to see where social and ethical oversights may emerge from CS graduate students, I conduct interviews with experts so that I can identify:

- **RQ4. What are the social and ethical implications if generative AI image tools are used in Japan's creative industries according to experts?**

3.3 Sampling and Participants

3.3.1 CS Graduate Students in Japan

I used a convenience sampling (Gill, 2020) of computer science graduate students (e.g., Master's, PhD, post-doctoral researcher) studying at a university located in Tokyo, Japan (hereafter referred to as **University A**) as a target sample for the study. The target number I set for this sample was 10 students or less. These students could be domestic or international students studying at the university and had to be available for an in-person interview between June 2023 and August 2023.

First, I prepared an English recruitment document with the purpose of the study, the interview methodology, some sample interview questions, the amount received as compensation for their participation, and the contact information of the research team. Next, I passed along this recruitment message to several professors teaching computer science at University A under the recommendation of Professor Arisa Ema, so that they could forward this document to their own students. Students who were interested in participating in the interview study then emailed me to schedule an in-person interview. These students were also free to recruit other eligible students, through snowball (chain) sampling (Gill, 2020) by forwarding the same recruitment document to their friends or colleagues.

Once we had set a date, time, and place for the interview, I would then send a research overview document that further details the purpose of the study, the overall interview process, how the data would be collected in the study, their right to withdraw from the study at any point in time, their monetary compensation and the contact information of the research team. On the day of the interview, participants were asked to complete a consent form and were given the option to sign a withdrawal form at any point during or after the interview session.

The final sample of student participants yielded nine graduate students (8 men and 1 woman) studying at University A. All participants had previously heard of GenAI image tools, and only P8 had never used one prior to their interview session. The students came from 3 different countries: Japan (5), China (3), and Germany (1). Five students were pursuing their Master's, three were pursuing their PhD, and one was working as a Postdoctoral Researcher at the university. The participants were all engaged in research on AI or related fields. In particular, P3, P5, and P6 were doing or had done research on image generation using AI. An overview of the background of the participants can be found in Table 3.1.

Due to the limited number of students interviewed, the unknown nature of who would respond to the interview request, and the fact that I had focused recruitment to students at a single university in Tokyo, it is worth noting that the findings may not be totally representative of all CS graduate students studying in Japan, but the interview data can help identify what ethical and social topics are discussed by such students.

#	Position	Research Area	Gender	Home Country	Has Worked on Research in Image GenAI
P1	Postdoc	Trustworthy ML	Male	China	No
P2	Master's	Computer Graphics	Male	Japan	No
P3	Master's	ML	Female	Japan	Yes
P4	Master's	NLP	Male	Japan	No
P5	PhD	ML	Male	Germany	Yes
P6	Master's	Math and GenAI	Male	China	Yes
P7	PhD	ML	Male	Japan	No
P8	PhD	AI and Soft Robotics	Male	China	No
P9	Master's	Social Systems	Male	Japan	No

Table 3.1: Overview of CS graduate students interviewed

3.3.2 Japanese Experts

I used a purposive sampling (Gill, 2020) for the expert interviews. After discussing potential interview candidates with Professor Ema and for all having been previously interviewed by established media outlets regarding the impacts of image-generating AI in Japan, we agreed to send interview requests to the following experts, as they have expertise on the legal, social, and cultural aspects of Japanese creative industries, respectively:

(1) **Taichi Kakinuma**: an AI-focused partner at law firm *Storia*, located in Tokyo, Japan.

(2) two representatives from **Arts Workers Japan (AWJ)**: an association of freelance artists and entertainment workers in Japan; the names and genders of the interviewed representatives are not disclosed according to their request.

(3) **Professor Bryan Hikari Hartzheim**: an associate professor of Japanese new media studies at Waseda University, Tokyo, Japan.

The selected experts were first contacted via their work emails with a recruitment document outlining a brief summary of the purpose of the interview study, the interview methodology, some sample interview questions, and contact information of the research team. Participants were informed that their identity would be disclosed to give credit to their insights and to ensure the credibility of their expertise. Once they had agreed to the interview request and scheduled a day for the interview, they received a research overview document detailing the purpose of the research study, the overall

interview process, how data will be collected in the study, their right to withdraw from the study at any time, and the contact information of the research team. The expert interview participants had the choice to have the interview conducted on Zoom or in person between June 2023 and October 2023. On the day of the interview, participants were asked to complete a consent form and given the option to sign a withdrawal form at any point during or after the interview session.

3.4 Interview Protocol

3.4.1 CS Graduate Students in Japan

Nine semi-structured in-person interviews were conducted with domestic and international computer science graduate students studying at a highly regarded Japanese university in Tokyo. In these interviews, students shared their individual experiences and opinions on the social and technical challenges of using GenAI image tools in research and in creative work through a set of interview questions (see Appendix A). It is important to emphasize that the **interview questions were formulated so as to not ask for the social or ethical implications of GenAI image tools from the interview participants**. I do ask for what risks, benefits or impacts can stem from these technologies in creative work, but I do not specify what kinds when asked, allowing the participants to define at will whether they are social or technical in nature. This was done so that any social or ethical aspects mentioned by the participants surfaced naturally on their own. Therefore, I divided the interview protocol into the following five sections:

(1) personal **research experience** (e.g., research areas, educational background, professional experience).

(2) personal experience and opinions on **technical and research aspects** of GenAI image tools.

(3) personal opinions on the **usage** of GenAI image tools as a creative tool.

(4) Personal opinions in the **context of Japan** on GenAI image tools (e.g., perceived uses in industry, research, and society).

(5) personal **outlook and perceived challenges** for the future of GenAI image tools in Japan.

I also asked follow-up questions depending on the participant's responses to clarify or ask for further details, hence its semi-structured nature. Some questions in the interview guide were sometimes omitted depending on the time remaining or whether the student had already answered aspects of the question in previous responses. For each interview question asked, notes were written inside a Word document in real time and in bullet point format to accurately summarize what was being discussed.

In total, eight interviews were conducted in English by me and one interview with P4 was conducted in Japanese by Kuribayashi. Although the interviews were mostly in English and were expected to last between 1-1.5 hours, all students were not native English speakers; therefore, interviews ran longer than originally scheduled to give participants time to express and articulate their thoughts and opinions properly. All participants gave their consent to be audio-recorded. A 2,000-yen Amazon.co.jp digital gift card was given to each participant to compensate for their time at the end of the interview session.

3.4.2 Japanese Experts

Three semi-structured interviews with Japanese industry professionals and experts were held. The interviewees were asked to provide their perspective in their domain (i.e., legal, social, or cultural) on the implications of using GenAI image tools in Japan and discuss the potential benefits, risks, and challenges of using such tools for creative purposes. Although an interview guide was initially prepared for the expert interviews, no standard set of questions ended up being asked for these participants, as all the experts I interviewed had topics of their own that they wanted to discuss. These participants also gave their consent to be audio-recorded and these interviews lasted about 1 hour to 1.5 hours each.

3.5 Thematic Analysis Process

For all interviews, I used an adapted approach to the inductive thematic analysis method to analyze the data as defined by Braun and Clarke (2006). The thematic analysis approach is a very common method in social studies to analyze qualitative data given its ability to identify similarities

and differences across the dataset and to allow interpretation of the results. The thematic analysis approach to coding in this interview study applies an analytical process that organizes the data I collected (i.e., bullet points in the notes) into meaningful groups as codes.

3.5.1 CS Graduate Students in Japan

I first transcribed all English interview audio recordings using Rev AI's transcription service. Because all interview participants were not native English speakers, AI transcriptions needed extensive corrections and modifications to be accurate, which would contribute to significant time spent given the time constraints of the research project. In addition, because the interview with P4 was in Japanese and the audio recording for P5 ended up being slightly distorted (which was only realized after the interview was finished), I could not rely on AI transcriptions for the coding process.

Therefore, I opted to primarily focus on extracting themes from my written notes rather than analyzing directly from the audio transcriptions, given that the accuracy of the notes taken would be more reliable than the transcribed audio due to the aforementioned reasons. To do this, I first individually reviewed all the notes I took from each interview while listening to their corresponding recordings to make sure that all aspects mentioned by the interview participant were transcribed accurately into bullet point form for further analysis. I also made sure to write down the corresponding audio timestamps for each interview question asked during the interview session.

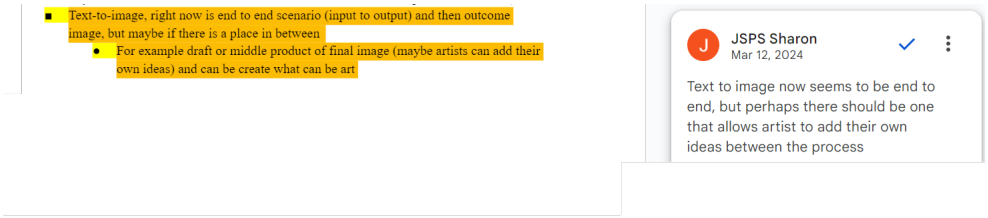

Figure 3.1: Example of a code applied to a highlighted data segment

To start my analysis, I manually highlighted relevant data segments (i.e., bullet point or group of bullet points) and added a code (i.e., a comment in Word) via a short phrase that paraphrases the data segment at a high-level that represents what was said by the interviewee for each interview. See Figure 3.1 for an example of a code applied to a short segment of data. Several codes would

sometimes be written for an individual data segment.

Once all interviews had been coded, I then extracted all codes so that each was an element in a visual diagram made for each interview. I then grouped all similar codes together to create initial themes of what was discussed per participant to create a thematic map (see Figure 3.2 for an example of a thematic map). For all thematic maps for each student interviewed, see Appendix B.

Figure 3.2: Example of a thematic map representing codes from my interview with P1

I then went back to the AI transcripts for each interview to find quotes for all extracted codes in an interview (with the exception of P4 and P5, which I had substituted quotes for their bullet point counterparts). I then consolidated all the quotes from all interviews in one Word document. Afterwards, I started sorting, collating, and grouping quotes under shared themes. Throughout the sorting, collating and grouping process, I defined and redefined the themes in iterations, and I created subthemes for quotes that had similarities between each other within the same overarching theme. The themes, subthemes, and quotes were constantly checked against each other to ensure they were properly identified and representative of the quotes grouped together. Duplicate themes or quotes were consolidated or removed. Finally, because the AI-transcribed quotes required significant rework for grammar and coherency, I went back to the audio recordings and notes to rephrase

Process	No.	Description
Transcription	1	Write notes during interviews as bullet points - since interviewees are not native English speakers, these notes will help clarify exactly what was meant in their responses.
	2	Use AI transcription software to transcribe interview audio for future quote extraction.
	3	Listen to interview audio recordings to review the accuracy of the notes taken and to make sure they cover all aspects discussed; make any corrections to the notes as necessary.
Coding	4	Extract codes from each/groups of bullet points in the notes for each interview and group them into initial themes as a diagram representation.
	5	Find quotes in each interview transcript that represent the extracted codes from the previous step.
	6	Consolidate all quotes from all interviews and group them under shared themes and sub themes.
	7	Themes and subthemes have been checked against each other and back to the transcripts and notes for accuracy.
	8	Remove or consolidate duplicated themes and quotes.
	9	Paraphrase or correct the extracted quotes as needed for clarity and to concisely capture what the person is saying by re-listening to the audio recordings.

Table 3.2: Thematic coding process for CS graduate student interviews

and correct the extracted quotes for clarity.

3.5.2 Japanese Experts

For the interviews with Kakinuma and AWJ, I coded the notes provided by Kuribayashi by highlighting relevant sentences in the notes and adding a code (or several codes) to indicate what was discussed. As for the interview with Professor Hartzheim, I generated an AI transcription of the interview using Rev and coded the transcript directly.

Because I only had one sample for each expert category (i.e., legal, social, and cultural), each aspect mentioned by each expert was considered of equal importance for the expertise they represented, and thus the codes produced substituted as the emerged themes.

Chapter 4

Results

In Chapter 4, I present the findings of my research questions. My findings provide insight into what CS graduate students in Japan (RQ1, RQ2, and RQ3) see as technical, social, and cultural aspects surrounding GenAI image tools, especially text-to-image models, in the context of creative work. I also asked Japanese experts (RQ4) their perspective on what kinds of impacts GenAI image tools will have on creative professionals. My findings shed light on the mindset CS graduate students have towards GenAI image tools and subsequently how their understanding may differ from those perceived by experts in the field. This can help identify potential gaps present in the ethical and social awareness that CS graduate students in Japan have on the impacts GenAI image tools can have on creative professionals.

4.1 RQ1. Pros and Cons Perceived by CS Graduate Students in Japan

For RQ1, I ask what kinds of **strengths, benefits, and limitations** do CS graduate students discuss when talking about using GenAI image tools for creative work. I reveal what positive and negative aspects are perceived by CS graduate students from the use of GenAI image tools for creative work, given their technical and research backgrounds in computer science and its related fields. For a complete list of themes for RQ1, see Table 4.1.

4.1.1 Technical Strengths

Many participants brought forward various reasons as to why they believe GenAI image tools, especially prompt-based models, are exceptional for generating high-quality images. Compared to previous techniques, such as GANs, diffusion-based GenAI image models, which are now the state-of-the-art standard, allow **better user control over generated outputs** (P1, P6, and P8):

> *"One of its most important advantages is being able to control the outputs that seem to be very natural. It's not easy, but compared to one or two years ago, it used to be almost impossible."* - P6

In addition, the ability of text-to-image models to control generated images via prompt guidance can be seen as a demonstration of **good UX design** for a lay user (P4 and P7):

> *"Because it uses language as the interface, it's very easy to use for people who don't know programming languages. Because it uses language, we can kind of use it not instinctively, but like say, intuitively."* - P7

In particular, the technology has the ability to **seamlessly combine various visual concepts** (P3). In that regard, prompt-guided tools are for the most part seen to be capable of generating **natural looking images** (P2):

> *"By inputting a prompt, we can create a very natural looking image. There is a little or no unnatural part other than writing words. This is the technical advantage where you can make very natural-looking images by inputting a prompt."* - P2

P6, whose research area involves the use of differential equations for AI, attributes the **explainability** aspect of diffusion models to its origins in thermodynamics and foundation in mathematics:

> *"It's the first time that we can use this kind of accurate math language to describe this model. It showed that a mathematical explanation is reasonable, not just there for explanation, so when you adjust parameters, the results accurately reflect the adjustments."* - P6

Diffusion models are also better at **style replication** when compared to other image generation techniques, making it an adaptable tool (P6):

"Diffusion models can copy the style of other artists, or the colour, the layout, and the composition. [...] Diffusion models can also grasp abstract ideas - you just need to use some prompt to constrain or control this kind of stuff." - P6

4.1.2 User Benefits

Because GenAI image tools allow laypeople to easily generate photo-realistic or artistic images using natural language-based prompts, many students found it most useful for **personal use** (P2 and P9), or as a source of **entertainment** (P1 and P5). Users can also **compare outputs using the same prompt but generated using various tools to select an image that best matches one's personal preference**. This is seen as a strong reason to have different GenAI image model providers in the market (P1, P4, P7, and P9).

Due to the non-deterministic nature of GenAI image models, such that all generated results will vary even when given the same prompt, these tools could potentially help with **brainstorming and generating a variety of visual references** (P7):

"I think one of the strong points is that it kind of infinitely produces new images, so I think it's a very good platform for brainstorming or getting new ideas." - P7

These models also give the ability to generate unique images catered to one's **personal interests** without requiring artistic skills to do so (P1 and P2):

"I play some video games and I'm a fan of some characters. So I always want to find more images of my favourite character. I can't paint well, so I just search, but I can't always find many images, but if I use a generative model, I can create my own images." - P1

Furthermore, **those without artistic skills can exert a degree of creative control** using prompts or built-in features that fine-tune the outputs to express their own ideas artistically (P2 and P7), which **lowers the barrier for anyone to create artistic images of their own** (P8):

"It opens up for a wider audience and gets more artists, who are maybe less skilled, an opportunity to make their own works." - P7

"It lowers the barrier for drawing pictures. Anyone could use it to express ideas in a painting." - P8

P7, who has previously done a project on AI-assisted music generation, saw GenAI creative tools as having a **positive impact for non-artistic individuals with an interest in creative arts** such as himself:

"I don't have much experience doing art but I respect people who can do that, so it's like a small desire for me to kind of try. I think that it would be fun for me if I can kind of also participate in creative arts, basically. So I thought that if machine learning can assist such people, as in like, if machine learning can increase the number of people that can participate in those creative activities, I thought that would be quite nice and great." - P7

These tools could also benefit creative professionals by allowing them to **fully realize independent projects without worrying about a lack of financial resources** (P8):

"It lowers the requirement cost when creating. So, I think many Japanese people have many original ideas, but lack some funding or money to make their manuscripts. So I think they can use artificial intelligence to express their ideas, their emotions, this kind of thing. If they do, they can spend less money but get very good results." - P8

Creative professionals could also use GenAI image tools to **independently realize their own creative visions without having to deal with compromises** when working with colleagues (P7):

"If a single person could make a work on his own, he would be able to express what he wants through his work without getting influenced by other team members, for example. So in that sense, maybe it's good for people who have unique ideas that he wants to express on his own in such cases. I think image AI can be considered as a very good assistance." - P7

4.1.3 Industry Benefits

All the students interviewed imagined various ways GenAI image tools could be integrated into Japan's creative industries. They particularly lauded its potential to **alleviate time, monetary, and**

early-stage production burdens. For example, GenAI could be used to help with **prototyping** (P4), **reducing costs** (P8), and **automating** (P2 and P8) repetitive or minor illustrative tasks in creative projects. The students also spoke about how GenAI image tools could be used in **advertising** (P3, P4, P5, P6, and P7), where P7 believes that it could become one of its main uses in industry.

All students, except P7, saw it as most beneficial when used to produce **anime** in Japan. As P1 noted how anime is a cultural asset of the country, GenAI image tools could help **alleviate the burden of time and financing for Japanese hand-drawn animations**. P6, who is currently doing research on how diffusion models could be used in the Japanese animation industry, saw its potential to help **automate the production of intermediate frames**, which is considered mundane and repetitive in the animation industry:

> *"When you want to make an animation, first you need to draw some key frames and then you need to draw some intermediate frames, but drawing intermediate frames is really boring, so most animators don't want to do that. So usually it's kind of boring work where it is allocated to some beginners. So we want to let all these intermediate frames be automatically generated by AI."* - P6

All students, except P3 and P7, mentioned how Japan is in a unique position to particularly benefit from these tools to **accelerate the production of manga and anime content** in the country:

> *"Because manga and anime are considered national contents of Japan, generative AI will help creators shorten the amount of time to produce those art. So it will make things easier for those creators. I think it will also accelerate the culture of manga and anime. And because there's a lot of knowledge about manga and anime in Japan, it will be faster for Japan to make new content using this AI."* - P9

Creatives may be more open to adopting GenAI image tools due to their ability to **automate certain parts of the creative process** (P9) which could help **reduce an artist's workload, especially if used co-creatively** (P2):

> *"I think creatives will start using more of these tools. So for the job of a creator, it will not only be writing from 0 to a 100, but from 90 to a 100, and for drawing, 0 to 90 will*

be from generative AI then the final touches and fixing might be a job of creators, but I don't think that's a bad thing because if one creator has to start from 0 to a 100, but can now make 90% of that with generative AI, then he can now make 10 times more pictures in the same amount of time, so I think that's a good thing." - P9

"I think the animation process needs a lot of effort. So maybe we can reduce the effort by using text-to-image AI to help animators. I think current AI cannot do the full animation process, so the cooperation with humans is needed." - P2

The integration of these tools could not only be cost-saving, but **revolutionize current workflows in manga, anime, and games**, if implemented with a cautionary but optimistic approach (P8):

"I think it should be regarded with caution and also with optimism. In 5 or 10 years, it will change the rules of creating in Japan, like industries for comics, animation, and gaming. I think more artificial intelligence techniques will be introduced in these kinds of industries. It'll lower the cost for development and for artistic creativity. I think it will help the country to a great extent. Many old things need to be put out and we need to establish some new workflows in the future." - P8

4.1.4 Technical Limitations

Despite seeing a number of benefits associated with using GenAI image tools for various illustrative tasks, whether for personal use or industry use, many students saw shortcomings stemming from technical aspects of GenAI image tools. P6, who frequently uses diffusion models in his research, noted that the technology is **resource intensive** at the research stage, as it requires GPU and time for training and fine-tuning. This is a significant challenge for academic and independent researchers working on GenAI image models who often lack funding and computational resources compared to researchers working in industry:

"The step by step denoising is quite time-consuming sometimes. It is also part of my research direction, on how to accelerate this kind of process. And the training cost may not be very important for personal users, but for researchers, the cost of training this

kind of model is quite expensive. Even when you just use some segment, like fine-tuning, you still need enough GPU resources." - P6

Efforts to have GenAI image models not learn from certain data can be **easily circumvented by bad actors** (P6):

"One direction of the current diffusion research is how to make the diffusion model not learn something. It's a little bit difficult because although you may add some minor changes to the original picture to avoid the model from learning from it, I can still take pictures of that using my smartphone and it will defeat that purpose. If a human cannot recognize these differences, then of course a smartphone camera cannot." - P6

Several students mentioned how, despite a general perception that GenAI image tools are creative by the general public, in reality, they are only **statistical models** and not creative by nature (P1, P3, and P5):

"I think all the generated images I've seen are not creative. It's just generated from the correlation of data." - P3

Although it is common for GenAI image tools to be implemented as text-to-image systems, an output's complete **reliance on prompts** is seen as a major shortcoming (P1, P2, P3, and P7):

"I guess the language interface, when you consider that as a limitation, it makes it hard for people to customize the model. Maybe it's kind of similar to saying that it's like a black box. You can do prompt engineering, but it's not clear what kind of prompts are good. It's not like there's a strict rule for good prompts. So it's hard to figure out them out. You have to rely on experience or prompt engineering." - P7

Reliance on good prompt engineering can lead to requiring a large complicated prompts to produce very specific visual outputs and compositions, known as "jumon" in Japan (P2). Despite these tools being seemingly easy to use at first, P1 noticed how increasingly frustrating it became with each use, suggesting a **lack of user control over the final output**:

> *"I think that the system is still not easy to use. We see so many amazing images, and we think, oh, this is a great system and we can use it as well. But when I actually use it by myself, I think it's so hard."* - P1

This lack of user control and reliance on prompts may be why many students find these tools **struggling to capture a user's artistic intention** where generated images never seem to be satisfactory in that regard (P1, P4, P5, and P6):

> *"Every time I want to use the system to create something, I have a rough idea in my mind, so I know what it should look like. But every time I input the prompt, I am never satisfied with the result. So maybe at the time when I have an idea, I think I will be an artist, but after an attempt, I don't feel so anymore."* - P1

Not only do they sometimes fail to capture exactly what a user asks for, but they also occasionally **fail at certain structurally complex visual tasks**, such as fingers or text (P2 and P5):

> *"When it paints a human, it has multiple fingers. More than five or six or seven fingers or four fingers. In addition, it fails to create text in the image."* - P2

Future models may become more biased or produce lower-quality works if future training datasets include AI-generated images posted online as they become more widespread (P9):

> *"If we use AI-made art and have AI learn from those, future generations might probably become unrealistic looking. I've heard of such things. So if we use AI made works for learning, the quality might get lower over time."* - P9

Themes	Subthemes	Participants
Technical strengths	Better user control	P1, P6, P8
	Good UX design	P4, P7
	Combine various visual concepts seamlessly	P3
	Natural looking images	P2
	Better mathematical explainability	P6
	Exceptional at style replication	P6
User benefits	Great for personal use	P2, P9
	Source of entertainment	P1, P5
	Compare outputs between tools using the same prompt	P1, P4, P7, P9
	Brainstorm and produce visual references	P7
	Images catering to one's personal interests	P1, P2
	Have a degree of creative control even for those without artistic skills	P2, P7
	Lower the skill barrier to create artistic images	P8
	Provide a positive impact for non-artists to create artistic images	P7
	Tool can minimize one's financial stress when working on a creative project	P8
	Allows one to more easily complete an independent project alone	P7
Industry benefits	Prototyping	P4
	Reduce production costs	P8
	Automate minor illustrative tasks in creative projects	P2, P8
	Advertising	P3, P4, P5, P6, P7
	Help with anime production in Japan	P1, P2, P3, P4, P5, P6, P8, P9
	Produce intermediate frames in anime	P6
	Accelerate the production of manga and anime content in Japan	P1, P2, P4, P5, P6, P8, P9
	Automate parts of the creative process	P9
	Reduce one's workload	P2
	Revolutionize workflows in manga, anime, and games in Japan	P8
Technical limitations	Training and fine-tuning are resource intensive at the research stage	P6
	Bad actors can easily get around data safeguards	P6
	Just a statistical model	P1, P3, P5
	Outputs are reliant on prompt instructions	P1, P2, P3, P7
	Reliance on prompt engineering for precise outputs	P2
	Lack of user control over final output	P1
	Struggles to capture a user's artistic intention	P1, P4, P5, P6
	Fails at structurally complex visual tasks	P2, P5
	Future models may become more biased and produce lower quality images if AI-generated images are scrapped and used as training data	P9

Table 4.1: Strengths, benefits, and limitations of GenAI image tools for creative work mentioned by CS graduate students in Japan during interviews (responds to RQ1)

4.2 RQ2. Social Aspects Mentioned by CS Graduate Students in Japan

For RQ2, I ask CS graduate students in Japan what **social and ethical aspects** may be associated with GenAI image tools in the context of creative work. This question asks what kind of social and ethical understanding these students have when talking about GenAI image tools for creative work. For a list of themes for RQ2, see Table 4.2 and Table 4.3.

4.2.1 Data

P2 expressed concerns about the **lack of consent** when scraping images on the internet as training data:

> *"I think that for the training dataset and how it's extracted from the internet, some authors of the picture don't prefer their images being used by AI."* - P2

Although data scraping practices from the internet are legal, P6 expressed concerns about **illegal uploads** being used as training data and the moral and legal implications of the practice:

> *"Just because the picture is on the internet doesn't mean the picture is on the internet legally, because you can still illegally upload some pictures without permission from the author or illustrator."* - P6

P3 could only see **current datasets being harmful to artists and image rights-holders** given how they are curated. Despite being a researcher herself working on image generation, she expressed sympathy towards artists online who do not want researchers to use their images:

> *"I found many artists saying they prohibit researchers from using their images for training models and I think that's natural and reasonable."* - P3

P1 views the inclusion of artworks as training data **without the permission of artists as akin to stealing**. He saw no harms if used for personal reasons and for non-commercial purposes, but discussed how it could negatively affect an artist's livelihood if models are purposefully created to replicate their art style:

"There are many artists, they create their own style or their own image for a living. But nowadays we can generate a model to steal their art style to generate our own images. So this allows art to be stolen more easily." - P1

On the other hand, P5 sympathized with artists who are concerned about their livelihood or losing work with the advent of GenAI image tools, but **does not quite agree with those he has seen online claiming that style replication is like stealing**. As an example, he described how he believes many individuals would not have an issue with a human artist painting in the same style as another artist, for example, that of Van Gogh's, but similar individuals would be against a machine doing so, which to him is hypocritical. Although he believes that one can be accused of copying a certain style, he does not believe ownership can be claimed over an art style, so stealing is not applicable when ownership is not possible in that regard. P7 also expressed sympathy but disagreement with artists who are against GenAI image tools, especially as someone who saw **GenAI's ability to allow him as a non-artist who wants to create artistic works to be able to do something creative himself**:

"When I was doing the research project on music generation, I thought it would be quite an interesting tool to use to get new ideas out of it. But then the negative opinions that I heard was more about generative AI stealing their skills. So I mean, now that I hear about it, I guess I kind of understand that that's kind of a natural response to AI. But yeah, I was surprised that it was stronger than I expected. I definitely understand, but I don't agree." - P7

P4, P5, P6, and P7 mentioned how images in the dataset may contribute to **stereotypes or social biases** in generated outputs. P5 raised the issue that there may not only be visually striking biases, such as gender imbalance for job occupations, but also subtle biases, such as cultural examples in food or clothing or sexualization of only certain ethnicities, which could reinforce "invisible" biases found in the real world. In addition, P3, P6, and P7 expressed concerns about **privacy issues** if real individuals depicted in the training data also end up reproduced in AI-generated outputs.

4.2.2 Copyright and Regulations

Most of the students mentioned copyright when they asked what they thought of the use of large amounts of data from the internet as training data. Although copyright was mentioned on multiple occasions during the interviews, no student provided a concrete explanation on what copyright means from a legal standpoint. Nonetheless, these students described various aspects of copyright during various stages of the development and proliferation of GenAI image models. We categorized what was said about copyright into the following stages: research, training, production, and usage.

4.2.2.1 Research Stage

P3 and P9 were concerned about the inclusion of copyrighted images in training datasets for GenAI image systems. Both expressed a desire for **researchers to care more about copyright and laws** in their research practices. P9 saw **researchers having an influence on user behaviour** from how technologies are designed, such that it could incite malicious usage:

> *"As a researcher of the technology, if you make something that is very convenient, that would be good for the technology, but for the users, they might use that convenience to infringe on someone's copyright and make inappropriate pictures and make more of those pictures. So I think that the creator of a technology should think about that kind of stuff."* - P9

4.2.2.2 Training Stage

P6 believes that researchers or developers should have a **deeper consideration towards subject matter found inside datasets**. He questions whether companies should train models made for profit and for commercial use using data that is indiscriminately sourced online, especially those illegally derived:

> *"It's good to generate what you want, but there will also be some problems. I think, especially for my research, it's okay, but for society, there are some huge problems for copyright or intellectual property, or something like that. For example, when we want to train a new diffusion model, we need a dataset. Where does this dataset come*

from is the problem. Now when we write papers, we just use open-source datasets, like Imagenet or something like that. For business, you can see there are many companies like NovelAI, where their datasets must be illegal. They just download without any permission and they're using it and they sell it to make money. And I think this is a big problem. I follow many illustrators and some animators and I think they really hate this kind of technology that steals their ideas." - P6

4.2.2.3 Production Stage

P9 mentioned that while it is difficult to control what happens in open source, companies should have the responsibility not only to set restrictions on certain outputs, but also to **compensate image rights holders**:

"I agree that restrictions are very hard for open-source, but platforms should have restrictions and only use pictures that compensate the authors." - P9

4.2.2.4 Usage Stage

P2, P6, P7, and P8 saw how **copyright infringement can occur at the usage stage**. P2 specifically mentioned being conscious of potential copyright infringement in generated outputs. P7 expressed this same concern especially if they contain **copyrighted characters**. P6 and P8 spoke about how it can be worrying that **copyrighted elements** may be found in AI-generated works, such that **authors get no compensation** for such instances. P6 elaborated on the resulting moral problem of a user unknowingly uploading a picture that infringes on someone's copyright:

"Suppose I want to use a diffusion model to draw a picture, but actually, I don't know whether the elements in the output contain some ideas from other artists and other creators. If I just upload this picture to the internet, maybe someone else can find this a problem. When I upload this picture, I infringe on someone's intellectual property. If we don't know where these elements come from in this diffusion model, we cannot directly use it, and sometimes we cannot take the risk of this problem. Maybe the uploader is innocent because he doesn't know this element comes from other artists. But you

generated these pictures and that's a fact, so there is some kind of moral problem or legal problem here." - P6

4.2.3 Art: Machine vs. Human

Philosophical aspects of art were discussed in various interviews with students. Humans and machines were subjects frequently compared and contrasted in regard to **creativity, the nature of creative work, over-saturation of GenAI works in online spaces, artistic style and identity, and artistic intention**.

P2 believes that creativity could be attributed to GenAI image tools due to the **agency given to a user via prompt**. However, P1, P5, and P9 spoke about how the creative process for humans and machines are significantly different and should not be confused for one another. Specifically, P1 spoke about how the **use of many words as prompts is contrary to the common sense that humans have**:

"We are people, we have a lot of common sense in our minds. But when we use a machine, we use prompts to write down as many words to give this common sense knowledge." - P1

And P9 spoke about how **humans do not seem to require as many images** as machines when creating images:

"Humans get creativity from a zero start and we can make pictures, but creative AI has to learn all those from many pictures and make a new picture from its training data. I think it's different from human creativity." - P9

Artistic vision and storytelling could be lost with the use of GenAI image tools (P7 and P8):

"The model doesn't understand a character's personality or the situation it's in, but only the visual aspects." - P7

"If we consider famous artists, like Picasso, they do have some storytelling, and they express something emotionally, such as their spirit through their works. Currently, AI images are not able to express such things." - P8

P2 and P3 mentioned that outputs are a result of a **generalization of training data**, where P2 specified that the tools are not creative in nature but can assist with creative tasks. However, P3 completely disagrees that any creativity can be attributed to current models and even finds them uncomfortable to look at:

> *"I feel that generated images are an average of artists' works and the output is uncomfortable and very strange. I think it looks average, but it also makes me feel uncomfortable."* - P3

This kind of generalization of the training data can also **represent a sort of "upper bound" of how creative the generated outputs can be**. P8 remarked how nothing revolutionary or completely novel will be depicted in AI-generated images as long as its elements are derived from its training data:

> *"It has some limitations because AI draws from the data training, so it limits the upper bound of the generated pictures. It will just reproduce the ideas of artists."* - P8

These thoughts go hand in hand with P3, P6, and P8 attributing any aspect of **creativity from GenAI stemming from the creativity of humans** found in the training dataset. P6 and P8 saw **machines incapable of judging and determining creativity and beauty on their own** from their outputs, such that this process can only be done by humans during the model's construction and training:

> *"I don't think it's really creative because it just sees everything as a probability distribution. So maybe you can say the beauty itself is the probability distribution or not. We might generate some beautiful pictures from a human perspective, but from the perspective of the model itself, they're just some features. It's just some vectors."* - P6

> *"We know that AI with some noise can create all kinds of things. So it's just like the evolution of humans. But what we define as a good painting from what artificial intelligence creates is based on our judgment. So I think it does not have creativity because it cannot evolve by itself. We give them the direction of what is good art and it can iteratively get better. We have the final word here."* - P8

The fear that there will be an over-saturation of GenAI image works in online spaces was expressed by both P2 and P7. P2 saw a desire for human-made and GenAI-made works to be viewed and treated separately, while P1, P4, and P6 want **AI-generated works to be watermarked by default**:

> *"I think if all these platforms are provided by big companies then one solution of all this copyright is for the government to enforce companies to add some watermark or sign to show that this picture is generated and to distinguish this picture from a real picture, because the company owns their own models they can adjust that with some parameters."* - P6

P1 and P5 believe that even though GenAI image tools may be able to change certain workflows in creative industries, P1 thinks that it will only increase the efficiency of the process, but will **not change the fundamental nature of creative jobs**:

> *"It will improve efficiency, but it will never change how we create things or how we produce things. So it just improves our efficiency, but never changes how we do it."* - P1

P2 and P3 expressed a reluctance to see GenAI tools replacing certain creative jobs at their current stage, but only if they are of "lower quality". If such systems could one day hypothetically produce high quality works matching those of professional artists, illustrative tasks could then be allocated to such GenAI image systems. This outlook suggests that their association of **output quality is intrinsically linked to their utility and value** as tools:

> *"The current AI versus artist — I don't think they should be replaced because they are still not enough. I don't want to see these insufficient systems replace artists."* - P3

> *"Using poor AI just for cutting the cost of animation is not fine, because that is no good, but it's fine if it does better work."* - P2

4.2.4 Social Implications

Students in the interviews perceived various aspects surrounding the impacts and implications of the use or nature of GenAI image tools on or from three social groups: companies, society, and artists.

4.2.4.1 Companies

P5, P7, and P8 expressed concerns about the role that major GenAI companies currently play in public perception, distribution, and development of state-of-the-art GenAI image models. For instance, P5 shared his impression that to him it feels more like a **business strategy for commercial GenAI developers to avoid discussing technical components in detail rather than for their purported safety reasons** by implying their capability for "super intelligence" which can increase public and investment interest. P7 and P8 voiced concerns about how **major GenAI producers take advantage and profit from free non-licensed data aimed at research and non-profit use**:

> *"Well, the fact that it's reliant on immense amounts of data, there are certainly limitations. Well probably because it kind of limits the people or the companies that can actually make those language and mixed image models. So there's like a strong and really big power imbalance, I guess in that sense, like everyone has to rely on those few AI models that exist in society."* - P7

> *"Most of the time, they get the data for free, but they benefit by distributing this data. But the original creators did not get anything."* - P8

In addition, P8 expressed concern about GenAI research from academic institutions or startups being acquired by major tech companies which can contribute to a **monopoly** in the field:

> *"I think it's [both a good and bad thing for research ideas to be sold to big companies]. It helps us to accelerate its development, so researchers getting funding from big companies can develop many things very quickly. But on the other hand, big companies will monopolize these tools. And also they have a lot of data so that consists of them globally monopolizing this field."* - P8

4.2.4.2 Society

Malicious usages and disinformation dominated discussions on what kinds of societal impact could arise from the production of AI-generated images and artworks. These include worries that bad actors will use GenAI image tools for **pornography** (P1 and P5) and **disinformation and fake**

news (P1, P4, P5, and P6). Individuals may also become more skeptical of the images they see online in case they are AI-generated (P4, P5, and P7). Concerns about the negative impacts of AI-generated images and artworks were particularly prominent when discussing open-sourced tools (P1, P3, and P6), which are able to subvert the safeguards implemented in the system. For instance, P6 mentioned an **ethical dilemma between open-source and potentially malicious actors and users**:

> *"I think that the merit or the benefit of [Stable Diffusion] is that it is open-sourced, but the problem is also because it's open-sourced and that this leads to the fundamental problem of regulation for the open-source community. So there are many GitHub projects with these kinds of pre-trained models, and they will say in an announcement that we believe that our users, and the community will use this kind of code or project for a proper and positive purpose. But I don't really think it'll be true. You cannot count on a personal user's moral standard. Once the model can be implemented on a personal computer, then it's very difficult to stop some illegal usage. I think this is actually the most serious problem."* - P6

When discussing the impact of GenAI image models on society at large, **none of the students believe that there would be major changes in society**, with P1, P2 and P5 believing that changes in the future with GenAI image tools would be minimal compared to how things currently are. P1 and P5 compared fears about GenAI changing the world with how deep learning was first viewed similarly as such, where many individuals had overestimated its capability to be revolutionary in society. In particular, P2 believes that most individuals in Japan will adopt tools such as ChatGPT more so than text-to-image tools in their daily lives:

> *"I don't think the near future will change much. I think there will be little change or very slow change. Maybe it will take some time for many Japanese people to use text-to-image AI in their daily lives. Maybe many people will use ChatGPT but not so much text-to-image."*- P2

P7 and P9 particularly upheld the belief that positive impacts from the use of GenAI image tools in creative work will prevail over their negative impacts. In particular, P9 discussed **learning about**

negative aspects of GenAI tools at school, such as copyright and the commodification of art, but for him, **their ability to help with an artist's creative process can overcome such shortcomings**:

> *"From my university courses, I learned that legally and for the copyright of authors, there are negative opinions because it might take away their job. And especially for copyright, what might take many hours for them can be copied in seconds and made in seconds. That'll be a problem from the author's perspective. But even for creators, generative AI can be a very useful tool to upgrade their creativity and make more time for idea-making. So in my opinion, it will be better to use more AI."* - P9

Despite P1's belief that minimal changes will occur with the use of GenAI image tools, he shared his philosophy that job natures eventually change over time, but with the advent of generative AI, this change may happen faster than how quickly professionals can adapt to such changes. In response, he suggested the need for artists to learn and adapt to new technologies as they come.

4.2.4.3 Artists

Students discussed areas where they saw the use of GenAI image tools affecting various aspects of well-being for artists and creative professionals. Many remarked how they could see GenAI image tools' affinity for **style replication being especially jeopardizing to an artist's identity and career** (P1, P2, P3, P6, and P7), especially if it is purposely used to copy an artist's art style:

> *"What I find problematic is selectively using data from one person, or for example, using one person's artwork to create a model that kind of copies that person's artwork. Because then it becomes like a competitor for that person who has the original data. So I guess that can kind of be considered as an attack on that person. If you selectively choose that person's artwork and try to copy it maybe for the sake of copying, I think that can be considered as an attack, I think that's one issue."* - P7

On the topic of job loss or reduction in creative industries, P1, P4, and P5 could imagine **workforce reduction** from the use of GenAI image tools in industry projects. P8 discussed hearing about artists working in colouring or with low-pay are worried about losing their jobs, and P6 remarked how they

have heard of these technologies **impacting beginners and ordinary creative professionals** more so than those renowned in the industry:

> *"In the short term, it might affect some illustrators who are not very famous because for famous illustrators and famous artists, their style is good enough that it's still a little bit difficult for diffusion models to completely copy them. The current model will not affect these talented people, but for some normal people, they might be affected, actually. Especially for beginners, maybe they don't have a chance to work for the company because their output or their ability might not be good enough when compared to generative AI. For talented people, maybe they're at level 10, while current diffusion models may be at level 5. Then beginners at level one to level four might be affected."* - P6

If faced with job loss, P3 and P9 believe that **such artists should compensate by producing more creative works or adopting the use of GenAI tools**:

> *"If I was in the place of an artist, I would have to think about how to use the AI. In reality, the time it takes to make a picture for AI and for humans are very different and humans cannot beat the time and the amount of pictures the AI can produce. So humans have to be creative and use these AIs to make their own picture high-quality and shorten their work time. So, I think that will be what creators should think about in the future."* - P9

However, P7, who has experience with GenAI for music production, wonders whether GenAI image tools at their current stage, which are typically implemented as end-to-end systems from prompt to generated image, **should change to produce intermediate products that better take into account the needs and workflow of current working artists**:

> *"Maybe if your objective is just to make high quality images and if your objective is basically quality, maybe the current direction is already the right direction, but I'm not sure if that's what artists want. Maybe an image generative AI that produces simply high quality images is not that interesting for them. For example, if you want to use AI*

for inspiration or getting new ideas, maybe there are better ways to train the model so that it gives outputs where the quality is not that high, but has maybe more interesting results in different ways." - P7

When it comes to companies in creative industries employing such tools in the workforce, P6 discussed the **difference between companies that would readily replace bottom line workers in preference for GenAI tools for higher profits versus other companies preferring to mentor and foster human talent**:

"Although the salary of support for beginners is relatively low, AI is even cheaper. But currently the technology is still not powerful enough. It is so difficult to adjust all the details. I know some game companies have started to use this kind of model to improve or draw some pictures, for the character design or the background design that have already used this technology. But there are still also some companies that still insist on using human beings, although those beginners might not be good enough at drawing. But they are willing to cultivate and teach these beginners and to develop their ability from level one to level five and using, instead of using AI, it is different for different companies. Some companies are motivated by the love for the game, where all team members love the game. That's why they want to make the game, so they insist on using human beings. But for some large companies, maybe even the boss doesn't even know about these games and they just want to earn money, so they only care about the cost." - P6

4.2.5 Social Responsibility

During our conversations, there were instances where several students discussed how they imagined that various types of stakeholders should approach social aspects surrounding GenAI image tools for creative work during development, production or usage.

4.2.5.1 As Users

For instance, P9 shared how he believes that **users looking to profit off generated outputs or share their generations publicly should consider the copyright implications of their actions**:

> *"I think for personal use, just making it for yourself, you can just do anything. But if you want to share it on SNS or make money with the outputs, you really should care about copyright. I think it is important to show that it is AI-made art and not human-made. Because some people might have trouble with that because it's not common knowledge yet."* - P9

P7 views **legality separate from the social or ethical implications** arising from the use of GenAI image tools:

> "Maybe it's a risk for people using text-to-image AI in that maybe from their perspective, they might be following the rules, but the social response is different from just obeying the law, where there might be a negative response on a social level." - P7

4.2.5.2 As Researchers

I was particularly interested in understanding what kind of non-technical aspects the student interviewees consider necessary for developing GenAI image tools for creative work without mentioning social impacts or ethics in the question asked. **Legal implications** from creating such models (P1, P3, and P9) and **issues on bias** from generated outputs (P4 and P5) were raised as potential topics for GenAI researchers to consider outside of their technical expertise. P2, P8, and P7 mentioned the importance of knowledge in **art theory and visual aesthetics**, which could help to develop better methods in **prompt engineering, model architecture, and output validation**:

> *"Maybe we can have knowledge about the world. We need to select proper words for a prompt and we need to know many words to illustrate the desired picture in our mind."* -P2

> *"So basically you need that kind of knowledge on arts to kind of build a good model, build a good training procedure for the architecture, I think it comes into every aspect."*

- P7

"If you want to really create something unique or at a high aesthetic level, you need to be an artist first, then you could tell from a very professional standpoint what painting is good and judge it with your own knowledge. But, for me I just tell from it emotionally, like I like this one or I don't like this one, but I want to tell in detail what are the good things about it." - P8

P6, who does research on how diffusion models can be used in animation, thinks it is also important for researchers to **understand how art is created** when designing GenAI image systems:

"One thing is how to draw a picture. One theory for generating pictures is generating the entire picture, but there is no direction about how to generate layers to a picture. This kind of knowledge from art is important, and for the animation industry, what is their workflow and what we can do to help them." - P6

4.2.5.3 As Companies

When it comes to the responsibility of companies producing GenAI image tools for public use, P4 believes that it is important for companies to **thoroughly inform users of the risks** associated with uploading AI-generated images on the internet or when used commercially, with disclaimers accompanying such images to inform others of its AI-generated nature.

4.2.6 The Future for Creative Work

Students imagined various ways for GenAI image tools to be transformed, developed, or used for creative work by users or industries aiming to leverage their generative capabilities. As most GenAI image tools are implemented as text-to-image systems, P1 and P2 believe that these systems may require future users to **become better at prompt engineering**. P1, P2, and P5 imagine that **creative work remains largely unchanged** besides their incorporation into creative workflows to increase task productivity which may also reduce the number of artists needed in a project. P8 saw opportunities for automation such that professional artists may **design workflows** for staff working

with GenAI image tools. However, P9 worries that an over-reliance of such tools may not only reduce jobs, but potentially lead to a sort of skill and creative atrophy for its users:

> *"There is a risk of losing the job, but also there's a risk that the quality of human skills will get lower. Because if we start using AI as a tool, then people will use it more over time, and practice less their pictures, and make the whole creative world less creatively human and more AI."* - P9

As legal gray areas are still present with the development and use of GenAI image tools at large, P6 discusses his vision that GenAI image tools have **better prospects being used in industry** instead of for personal use or open-source systems due to heavier legal and contractual obligations that companies are required to maintain and follow, such as the selection of datasets and user agreements to restrict certain user behaviour:

> *"Working with companies is always more standardized because we can write a contract and the contract is always protected by the law. And you can always use this kind of regulation to constrain our behaviour and the company's behaviour. Maybe in the future, if we really want to make some huge models or some huge development in industry, the only way is to cooperate with companies, not directly download data from the internet."* - P6

P6 also wishes to see **standardised training datasets** being developed, such that there are standard procedures in training and experiments. In particular, as someone whose research involves incorporating diffusion models into the animation process, he saw an **importance for artists and academia to work collaboratively** on such datasets, especially due to image generating systems being highly dependent on the works of artists in their training dataset:

> *"I personally hope that the research community can have a good relationship with the artist community. For the long-term development of these generative models, we need to have a good relationship, because all the data for generative AI models come from the works of artists' communities. If they just don't want to cooperate with us, then it's very difficult to develop the current model in the long-term."* - P6

Themes	Subthemes		Participants
Data	Most images are obtained without consent		P2
	Illegal uploads are present in datasets		P6
	Image scraping has harmful impacts to artists and image right-holders		P3
	Style replication	Can be seen as stealing if purposefully imitating an artist	P1
		Cannot steal or claim ownership over a style	P5, P7
	Stereotypes and social biases replicated from training data		P4, P5, P6, P7
	Issues with privacy		P3, P6, P7
Copyright and regulations	Research stage	Consider copyright laws in the research process	P3, P9
		Researchers have an influence on user behaviour	P9
	Training stage	Consideration for subject matter inside datasets	P6
	Production stage	Compensate image right-holders	P9
		Copyright infringement	P2
	Usage stage	Copyrighted characters	P7
		Copyrighted elements	P6, P8
		Uploading an image with copyrighted elements	P6
Art: machine vs. human	Creativity	Attributed in part to the use of prompts	P2
		Creative process differs between machine and humans	P1, P5, P9
		With creative tasks	P2
		Bounded by training data	P8
		Stems from the creativity of humans	P3, P6, P8
	Humans have common sense that machines lack with prompts		P1
	Humans do not require as many images to learn visual concepts		P9
	Artistic vision and storytelling can be lost with GenAI image tools		P7, P8
	Generalization of training data from artists		P2, P3
	Machines cannot judge and determine creativity and beauty on their own		P6, P8
	Worries over AI-generated works oversaturating online spaces		P2, P7
	Human-made and AI-generated works should be viewed and treated differently		P2
	AI-generated works should be watermarked		P1, P4, P6
	Fundamental nature of creative jobs will not be impacted by GenAI		P1, P5
	Output quality is a key factor to how useful and valuable GenAI tools are		P2, P3

Table 4.2: Social and ethical aspects of GenAI image tools for creative work mentioned by CS graduate students in Japan during interviews (responds to RQ2, Part 1)

Themes	Subthemes			Participants
Social implications	Companies	Obscuring technical details feels like a marketing ploy		P5
		Profiting off free and non-licensed research data for training		P7, P8
		Buying and monopolising academic research		P8
	Society	Malicious uses and disinformation	Pornography	P1, P5
			Disinformation and fake news	P1, P4, P5, P6
			Increasing skepticism on image authenticity	P4, P5, P7
		Open-source tools and techniques	Safeguards can be removed	P1, P3, P6
			Hard to regulate bad uses and actors	P6
		Impact on society	Minimal changes to society	P1, P2, P5
			Overestimation by the public on its capability to revolutionise society	P1, P5
			LLM-based tools are more likely to be widespread than GenAI image tools	P2
			Positive impacts will prevail negative impacts	P7, P9
	Artists	Jeopardize an artist's identity and career		P1, P2, P3, P6, P7
		Reduce jobs at the creative workforce		P1, P4, P5
		Potential job loss for low pay workers in creative industries		P8
		Impact beginners and ordinary creative workers		P6
		Artists may have to compensate by producing more creative works or adopt GenAI tools in their work		P3, P9
		GenAI tools should adapt to the needs and process of artists		P7
		Companies replacing workers for higher profits vs. companies retaining human workers to foster creative talent		P6
Social responsibility	As users	For profit uses should consider copyright implications		P9
		Social and ethical implications are separate from legal implications		P7
	As researchers	Legal implications with GenAI models		P1, P3, P9
		Issues with bias from generated outputs		P4, P5
		Should have knowledge on art theory and visual aesthetics		P2, P8, P7
		Understand how art is created when designing systems		P6
	As companies	Inform users of the risks with uploading AI-generated images		P4
The future for creative work	Future creatives may need to become better prompt engineers			P1, P2
	Creative work will stay largely unchanged			P1, P2, P5
	Professional artists may help design workflows and staff with GenAI image tools			P8
	Over-reliance on such tools may lead to skill and creative atrophy			P9
	Better prospects for industry use			P6
	Standardised training datasets			P6

Table 4.3: Social and ethical aspects of GenAI image tools for creative work mentioned by CS graduate students in Japan during interviews (responds RQ2, Part 2)

4.3 RQ3. CS Graduate Students in Japan on AI Research Culture

For RQ3, I ask what aspects of **AI research culture arise during interviews with students** when discussing GenAI image tools in the context of creative work. My research question aims to uncover aspects of culture experienced day-to-day by CS graduate research students that may contextualize or influence their framing of opinions and experiences regarding AI and GenAI research.

4.3.1 Innovation First

When responding to potential misuse or harms, some expected regulations and fixes (P1 and P7) to come in response to the negative outcomes stemming from technological artifacts, suggesting an **"innovate first and fix later"** mentality in such situations:

> *"There are good parts and there are some bad parts. I think because of the good parts, we should just use it and for the bad parts, let's try our best to fix it. We should wait and see. And sometimes we may never fix it. I think every technology has its bad parts, but we still use them."* - P1

> *"If something truly unpredictable happens, and if it's truly unpredictable, it's like we can't really do much about it. Then we'll have to make new laws. If that unpredictable thing is very negative, then after that you need laws to prevent that from happening again."* - P7

P6 saw himself and many other researchers **mostly focusing on the theoretical aspects of research and neglecting to think about the long-term applications and non-technical implications of their work**. He shared how some researchers are not at all concerned about the social impacts of their research:

> *"I know some researchers who don't actually and don't really care about art and they're actually very excited when they see that their work can replace other's work."* - P6

Little consideration towards the social impacts from AI research may stem from a mindset that **software-based research cannot directly harm individuals**, compared to other fields of science

and engineering, such as bioengineering or medicine (P1):

> *"I do research in computer science, and computer scientists think that it won't do any harm. It's just research, that's just code, just a program. That they can't do any harm. I can't create a robot to hurt people. So in my research, I think everything is okay. But in other research, maybe things are different, for example gene editing or a medical thing. I tend to think that my own research has no limitations."* - P1

4.3.2 Data: The More, The Better

With regards to using copyrighted material as training data, P5 expressed his belief that **no research would be done if researchers were to think too much about copyright issues**. This mirrors similar sentiments among all the students interviewed, except P6, who viewed **large amounts of unfiltered and often copyrighted images from the internet when training as a necessity** for building GenAI image systems. In defense of such practices, P1 compared it to how many visual references are necessary for artists when producing artistic works, P7 spoke to how it is currently a legal practice, and P8 thinks that humans and machines alike can appropriate ideas from artists:

> *"For humans, we find different images using the search engine. We search different images, look at them, and create our own images. So actually our brain also creates many images from that. It's not a big issue for me."* - P1

> *"There certainly is controversy about how the data is collected. But the general status is that it's using publicly available data. So in terms of the legal aspects, I guess it's not offending the law in any case. There are lots of positive impacts and the fact that it's not illegal, it's hard to say that generative AI is bad."* - P7

> *"I think it is not the best thing about artificial intelligence but even without artificial intelligence, humans could still steal the ideas of other paintings."* - P8

Although many of these students acknowledged the unethical aspects found in popular training datasets for GenAI image models, with issues such as privacy (P3), consent (P2) or copyright (P9) being mentioned, **no student had voiced an opposition to mass data scraping because it is viewed as necessary to build good AI systems**:

"Personally, I think there might be some ethical problems, but I think it is more important to develop AI technology." - P2

"First, in machine learning, the amount of the data is essential and crucial in training the model. So the data of, for example, in ImageNet and so on, the dataset having a large amount of data is very useful. However, the privacy problem is very dangerous. Some researchers try to solve the problem, but it's not enough. It's under research at the moment." - P3

"Copyright is a big problem, and I've heard it a lot, and I do think that can be a problem, but I think it is a good thing to make use of a lot of pictures that would make the quality higher. In my opinion, it is more positive for users." - P9

However, P2 and P9 saw an **importance for artists to have an option to withdraw or receive compensation** if their works are found inside datasets, respectively:

"I think it is desirable for people to be able to withdraw the usage of their image." - P2

"I think you have to make a system that can respect the copyright. So for example, like a payment system to the author of the picture when using it for machine learning or something like that. I think that is not right now in the law, but it should be." - P9

4.3.2.1 Blind to Data Harms

P3 and P6 speculated how researchers may use popular datasets, such as LAION-5B, indiscriminately because of their tendency to treat datasets as batches (P3) and for their sufficiency to train and test AI models for research purposes (P6). P3 mentioned how it is uncommon to inspect the individual contents of a dataset, which may explain why **researchers are often ignorant of harmful material present in internet-derived datasets**:

"I also think that I don't see the content of the dataset. We will treat it as just a dataset. Not each data or each person in the data. So from this aspect, we think it is safe, that it's not a big problem. [...] So this is a problem. I can't see the problem. I can see the data, but I don't see the data." - P3

"If it's just for writing a paper or doing research, the current standard dataset is actually enough. We can use this kind of model to check whether a new method is better or something like that. It's enough to do that. So we don't really need to use some extra data. [...] Usually when I do experiments, I don't really think about social and moral problems because usually when I check it out, I generate some realistic pictures, like animals or some very famous artists like Van Gogh or Picasso or something like that. So they're kind of very classic pictures." - P6

Despite P6 demonstrating social and ethical concerns towards data used to train GenAI image models, a blindness to data harms, as described previously, may explain P6's unawareness on the social and ethical issues found inside LAION-5B itself:

"When I checked the original paper of Stable Diffusion, I think they tell us about details of this dataset, and I don't think there are so many problems with this part." - P6

4.3.3 Positionality as AI Researchers

P6 explained how **some researchers who may not have an interest in the arts will focus only on advancing their research goals while disregarding their impacts on affected communities**:

"I'm also interested in animation or something so I can understand their situation and that's why I might be care about my research, but if I just totally don't care, don't like animation, or don't like this kind of art, and I also don't care about anything [like that], I'll just keep doing my research." - P6

This thought coincides with how P1 noted that the tendency for researchers to present their research achievements in ways they envision would be in the best interest of the demographic impacted by their results. Therefore, he suspects that major R&D research labs working on text-to-image models may have focused on creating user-focused tools to disseminate their research due to its perceived utility for illustrative and photographic generations. But due to the current limited applications of GenAI image tools beyond rendering photorealistic and artistic images, several students (P1, P4, and P7) noted **minimal reasons to apply GenAI image generation techniques in day-to-day research activities**:

"Image is limited in application actually. I think maybe some generation model for text is more helpful. I think images are really fancy, especially in demos, but they are just images. We can't create too many things with images. I'm not sure." - P1

"I don't think many people in our lab are using text-to-image AI in our own research activities, except for people who are doing research on text-to-image AI. But in terms of our usual research activities, we haven't been using it much. For example, I guess image AI is kind of aimed towards making photo realistic images rather than making simple diagrams or like more abstract kinds of images." - P7

P7 suggested that it would have more utility in research if it could generate diagrams to present research ideas and results:

"If we could make, for example, a diagram to kind of represent or explain our research ideas or something, then it would be more useful. For example, if we could use the generated results in our presentations. But yeah, at the current stage, there are not many cases where we want to kind of use photorealistic images produced by image AI, so that's one reason why I guess we're not using it much." - P7

Due to its limited applications in research, some students (P1, P5, P6, and P9) wondered if their tendency to **view GenAI image systems more optimistically than most artists is due to their little impact or potential for disruption in a researcher's day-to-day work, hence more opportunities for them to view and experience their benefits**:

"Because, well, I'm not a creative person. I won't be worried about losing a job." - P9

Although P5 does not agree with claims by artists who see GenAI image systems training on artworks without consent as stealing, he noted how he may be influenced by the community's perceptions on such matters as a member of the ML research community and its culture. He **wondered whether he would have similar opinions to these artists if he was an artist himself**.

4.3.4 A Need for External Guidance and Expertise

Several students (P1, P3, P6, and P7) discussed a desire to learn more about potential harms caused by GenAI research and subsequently suggested a desire for experts outside of their field of

study to develop regulations and guidelines for AI researchers to follow in their research practices.

P1 pointed to how rapid developments in computer science and the increasing amount of impact on society have made him realize **a need for deeper consideration to implement regulations and policies for AI research**:

> *"I think because our computer science community has developed so much and we can influence society so much and now we should consider it [...] We should first discuss with others and other AI researchers and we should learn more and know more. [...] In recent years, machine learning has changed so fast. We also influence the development of AI."* - P1

From our interview, he reflected on the need to consider the broader impacts of GenAI research on society:

> *"For me, I never think of generative models at a high level. I never think about this thing at a high level and I never think about the responsibility at a high level. You really helped me to reorganize my thoughts today."* - P1

From our interview session, P7 wants to see **more discussions among computer science students about their responsibilities as future experts** who will have a responsibility for how technology is disseminated in society:

> *"I think these kinds of discussions should be done and be within the computer science students. We're kind of also responsible for the spread of these technologies. What I mean is that we have the responsibility to kind of understand that maybe when we are asked for advice or opinions we should be ready. I wasn't that ready, but we should be more ready to say our opinions."* - P7

P3 pointed to her personal principle that researchers should work towards finding ways to improve well-being as a reason for better policies and regulations. She noted that many AI researchers lack the time outside of their research activities to understand what repercussions could arise from their work even if they may have interests in social issues. **Because of the increasing influence that AI now has in society, she believes all researchers should pay additional attention to its potential impacts**:

"Because the amount of time is limited for research, even for researchers and the limited resources, researchers pay attention to societal problems. So I don't think scientists in the field ignore societal problems, but the overall community of AI research should pay more attention to societal problems. I think scientists in the AI field actually pay the same amount of attention compared to the other research fields or the same as a person not working in research, but scientists in AI field should pay even more attention than usual." - P3

P3 and P6 reiterated similar thoughts by mentioning how, despite researchers realizing that societal issues are important, **many lack the knowledge to envision what kind of impacts their research could have**:

"We can't fully imagine all the malicious ways to use AI." - P3

"I think for researchers this kind of social problem is important, but you cannot think about this every type of thing in your daily life, because we're not god. It's very difficult to cover everything just by ourselves." - P6

P6 went on to state his belief that the researchers behind notable contributions to the field of image generation could not have imagined the current repercussions stemming from their work:

"I think it's quite difficult for those who designed the diffusion model to have imagined that the model now is so powerful when they created it at first and that it's caused so many problems." - P6

Because many researchers are unaware of the full extent of how their work can impact society, P6 wishes to see **future collaboration with experts from other disciplines in the social sciences and the humanities to create research standards and guidelines**:

"And in this case, I think the generative model community itself cannot design this kind of standard, and we need to cooperate with others - sociologists or psychologists, something like that." - P6

Furthermore, P6 wants **governments to become active in reinforcing and imposing guidelines in research**:

"I think the government is very important for the development and the future of these generated photos, you cannot count individuals to improve their moral standards. It's too difficult." - P6

To achieve better awareness on the social impacts of one's research, P3 believes that **scientists should find ways to expand areas in which their research could intersect with other fields, learn from their experts, and find better ways to apply AI methods that better understand the needs of society**:

"The advantage of machine learning is the wider range of applications. So scientists in this field should collect more information outside of their research field. So for example, they should take care of news, trends, and perhaps history and so on. There's not one direction to solve the problem and a concrete answer for this question. But gradually this problem will be solved. In daily life, researchers should also know more about other research fields. So, for example, I don't think I can imagine the connections between text-to-image generation and agriculture. But scientists who know about agriculture and AI can sometimes help identify societal problems. So researchers can find new research areas among other fields." - P3

4.4 RQ4. Legal, Social, Cultural Impacts as Seen by Experts in Japan

Finally, for RQ4, I ask experts what **ethical and social implications** would arise from the use of GenAI image tools for creative work, especially from a **legal, social, and cultural** perspective within Japan's creative industries. This is helpful when comparing what students discuss with what experts see on such issues. The results from sections 4.4.1, 4.4.2, and 4.4.3 are taken directly from our previous publication (S. C. Y. Ho, Ema, & Tajmel, 2024).

4.4.1 Legal Implications from Using GenAI Image Tools

In 2018, Japan's legislative body, the National Diet, amended the country's national copyright law to allow machine-learning AI models to scrape copyright data from the internet without permission for training purposes (Deck, 2022). Because the country has an active stance on developing

and using AI technologies, there are almost no restrictions on AI data mining and learning. Taichi Kakinuma, an AI-focused lawyer in Japan, notes that **copyright infringement generally applies to the generation and usage stage in Japan**. So far, there have been few discussions in Japan on legally restricting GenAI learning, although there are discussions that it should be limited to guide-lines or datasets curated through voluntary effort.

Rather than regulating everything regarding GenAI technologies in Japan, Kakinuma suggests that there should be efforts to understand how they may affect the fundamental values of human beings and that **GenAI model and tool providers should have a responsibility to develop a system that allows users to use their products with peace of mind** without possible copyright infringement. Therefore, changes to Japan's legal system, such as making the process easier to prove damages from copyright infringement or shifting part of the burden of proving reliance from the plaintiff to the defendant, could help mitigate concerns from potential copyright infringement at the usage and generation stage. It may also be helpful to **encourage the practice of disclosing the model learning dataset** in advance so that the generated images can be easily compared with the training dataset in cases of suspected copyright infringement.

4.4.2 Social Implications for Creative Workers

The two representatives at Arts Workers Japan (AWJ) discussed how there are individuals in Japan's creative industries who currently feel that there is a lack of consideration for those working in arts and entertainment given **GenAI's potential to take away human-centric and fulfilling work instead of only mundane and unpleasant tasks**. There is also the potential for these individuals to be **deprived of work when GenAI systems can easily imitate their style**. The AWJ representatives mentioned how some of the artists they surveyed felt that having AI use their creative work without permission as training data feels akin to **stealing the results of many years of honed craftsmanship**. Many are also concerned about being associated with content generated by others that depicts their artistic style or likeliness, especially if the subject matter is illegal.

AWJ suggests that there is a dire need for better channels in Japan through which people working in the arts and entertainment industry can better understand the situation and raise their voices.

Currently, there are still workers in vulnerable positions who are forced to sign contracts with unfairly low remuneration in the country. There are also artists who are suffering from damages caused by GenAI. Additionally, **accessing litigation to prove damages is too costly and difficult for most creative professionals**. Therefore, they are urging the Japanese government to understand the situation of these individuals and **listen to their concerns by setting up consultation desks and conducting interviews** with various organizations. They would also like Japanese policy researchers to have a **better understanding of the living situations of Japanese creative workers**.

4.4.3 Cultural Implications for Creative Industries

Manga and anime industries in Japan may suffer the most from the use of image generating AI. Professor Bryan Hikari Hartzheim, an expert on Japanese media industry studies, noted that GenAI tools are unlikely to replace mangakas, the Japanese word for comic artist, given its "star-centred" system surrounding the creator. However, backgrounds, tracing, and colouring could become automated with the use of GenAI image tools, which may **in-part or entirely replace a team of assistants who are typically uncredited and delegated to help the mangaka**. Even if using such tools may be helpful for mangakas themselves, it might not be positive for the industry at large. This is because many manga creators get their start in the industry doing assistant work for other mangakas who are more experienced in the field. This practice of learning the "ins-and-outs" of keeping a production schedule and transmitting a craft from one generation to another may disappear with the use of GenAI due to its ability to automate assistant work, and thus **under-prepare future creators with the necessary skills and knowledge to become artisans themselves**.

The animation industry may also be affected by the use of GenAI image tools. Given the similar "star-power" that notable key animators have, those who can innovate expressions and animation styles will be difficult to replace, but other jobs in the industry are amenable to AI automation. Many doing minor animation work or responsible for in-between animations quit the industry due to the culture of severely underpaying below-the-line animators, which has contributed to the industry's current labour shortage. These workers are also struggling to meet ends' needs, so they would lack the time or money to access litigation. The professor notes that **turning to automation will**

not resolve labour problems but would rather reduce the necessary training for young animators to develop skills at the workplace within the industry to become seasoned key animators or animation directors, which may stagnate the production of animation talent.

Therefore, Professor Hartzheim's suggestions is for companies in Japan's creative industries that want to use GenAI tools for creative work should look at **how it can be implemented properly such that it can respectfully account for good welfare and working conditions that can foster positive relationships amongst employees**, rather than actively replacing humans with automated technology to cut costs.

Chapter 5

Discussion

In Chapter 4, I first provide an overview in 5.1 on how CS graduate students in Japan discuss the technical and social aspects of GenAI image tools for creative work[1]. Next, in 5.2, I identify how culture and labour are often overlooked in the context of workplace pedagogy when investigating what social and ethical implications can stem from incorporating current GenAI image tools into creative work processes. While reflecting on my findings, I reiterate a critical need in 5.3 for regulatory bodies and creative industries in Canada and Japan seeking to regulate or incorporate GenAI image tools into creative work to use my findings as an exemplary case study and for GenAI research communities to engage in participatory AI design.

5.1 Prospective GenAI Researchers on GenAI Image Tools for Creative Work

In general, most of the students I interviewed found that using the technology was most beneficial to personal users and if the generated outputs depicted legal subject matter or provided high-quality results. The quality of the generated outputs was an important indicator of the social and artistic value of AI-generated images such that GenAI image systems were perceived to be particularly helpful for prototyping and brainstorming, producing simple illustrations and images, and allowing laypeople to create illustrations without artistic skills and training. At the industry level,

[1]This section contains work that was previously published in S. C. Y. Ho et al. (2024).

students found Japan in a unique position to benefit from this technology as a way to help its animation industry, especially as a tool to automate the production of intermediate frames, in addition to its general benefits to increase productivity and reduce costs for creative projects of all scales. Although some of the interview participants valued human art more than GenAI art, they noted that it was mainly due to the artistic inferiority of the outputs in the current state of the technology compared to human-made art with high degrees of craftsmanship and visual storytelling.

Major limitations brought forward revolved primarily around the training data. Problematic training data can cause generations to depict harmful stereotypes and subject matter. The students also remarked how the dataset limits what "upper bound" the model can reach aesthetically in terms of the quality and creativity of its generated outputs. Despite such limitations stemming from the training datasets themselves, the students deemed the immense amount of publicly scraped images from the internet to be necessary to train GenAI image models. Because the data is publicly sourced, most found no issue with learning from such material and viewed this practice as similar to how humans need references to produce visual works. However, many students expressed concerns about copyrighted elements from the training data appearing in outputs. Moreover, the deliberate use of such tools to copy another artist's style was seen by some as capable of jeopardizing an artist's identity and career. Additional comments regarding the technology's limitations were made towards a user's limited control over the generated outputs when using the technology as-is, from prompt to generation. Despite these limitations, students overall viewed the technology positively such that it would have a positive impact on society and/or industry in the long term. This is especially true if there are regulations in place to restrict and regulate the production of harmful and illegal content and if there are options for artists to opt out of datasets or receive compensation for the use of their work.

Although all of the students interviewed did not see the tool as a threat to working creative professionals in the long term, some saw its potential to disrupt the creative workforce and induce layoffs. In response, some suggested that artists in the future may have to create unique works to stand out as GenAI tools improve or adopt them into their won creative practices. For those working on advancing image-generating techniques in AI, many saw a need for future researchers not only to be familiar with the legal implications of producing GenAI image models and their tendency to

amplify biases, but to also familiarize oneself with concepts in art theory and visual aesthetics.

Interestingly, several interview participants suspected that their positive outlook on GenAI tools may be influenced by the fact that they are AI researchers, such that they may feel differently towards such technologies if they were artists themselves. Students also suggested that while thinking of ethical and social implications of their own AI research was seldom, given that they were not experts on such issues, there is no way for them to envision the full extent of the impacts of their research or they believed that thinking of these topics too deeply would prevent innovative research from happening. Regardless, some expressed an openness to the development and application of ethical guidelines in AI research and believe that ethical and societal concerns are important, such that discussions with experts in other disciplines, public consultation with artists, and risk assessments should be done on issues stemming from the use and dissemination of GenAI image tools and techniques.

5.1.1 Gender Disparities in AI Development and Research

It is pertinent to discuss the lack of women participants in our interviews with computer science graduate students, as I was only able to interview one woman (P3) from our group of computer science graduate students. This seems to show parallels with how women only represent 9% of Japan's graduating information technology (IT) majors, compared to around 20% in the United States and Europe, according to a survey conducted in 2022 by Human Resocia, a Tokyo staffing agency (Toshi, 2023).

It is imperative that women are included in the development of GenAI. In fact, women are frequently underrepresented in IT and AI fields in Japan and across the globe. According to the Japan Information Technology Services Industry Association, in 2020, women represent 22% of Japan's 1.5 million IT engineers, programmers, and system engineers (Toshi, 2023). A study in 2024 by Interface found that women comprise only 22% of AI talent out of the nearly 1.6 million AI professionals worldwide (Pal & Lazzaroni, 2024).

Although it is not possible to generalize my findings due to the small sampling, it stood out to me how P3 had a particularly critical view of GenAI image tools, where she displayed noticeable concerns for how these tools can pose a threat to living artists and how there should be more

considerations for diversity in knowledge and expertise when it comes to GenAI development and regulation. These topics were central to my interview session with P3, who seemed more concerned about such issues compared to some of her male counterparts. I believe that including similar voices, perspectives, and expertise from women like P3 can help ensure that emerging GenAI technologies can tackle key social and ethical issues that are often understated and minimally understood in the field.

5.2 Social, Ethical, and Political Dimensions of GenAI Image Tools

In 5.2.1, I first discuss how incorporating GenAI image tools into creative workflows can impede the development of one's vocational knowledge for creative work in Japan. Then, in 5.2.2, I argue that image-based GenAI research has decontextualized and commodified the works of creative artists in pursuit of visual fidelity while neglecting philosophical, social, cultural, and humanistic aspects of creating art.

5.2.1 Threats to Workplace Pedagogy in Japan's Creative Industries

Based on the themes which emerged from the student interviews and from the social and ethical implications outlined in Section 2, I notice a tendency for non-artists and commercial services leveraging GenAI image technologies to commend GenAI image tools for their cost-performance benefits while neglecting to see how the introduction of such tools could disrupt social and institutional aspects of culture and labour for artists and creative professionals in the form of workplace pedagogy. Notions of workplace pedagogy are seldom mentioned in existing literature (see Chapter 2), yet were frequently discussed during the interviews with AWJ and Prof. Hartzheim as being critical to the culture and values surrounding creative work in Japan.

The concept of workplace pedagogy, coined by Billett (2002), is one that presents workplaces as a place to learn vocational knowledge through participation in daily work activities, guided learning through workplace interaction with more or less experienced co-workers, and guided learning

through transfer that allows the extension of one's knowledge onto other situations and circumstances at the workplace through such informal social and institutional activities. Vocational education and training in Japan, traditionally and still as of currently, operate extensively and almost exclusively through workplace pedagogy, so that occupation-specific skills are taught primarily by older and more experienced colleagues at the workplace after entering a company (Bromann, 2010). As discussed by Professor Hartzheim, tasks that are typically delegated to younger artists, such as coloring, tracing, sketching backgrounds, and in-between animations, form the backbone to Japan's creative industries of manga and anime. Workers assigned to such tasks are typically mentored by those more senior. Junior artists foster artistic skills at the workplace, such that they become increasingly familiar with the ins-and-outs of the domain. This allows them to develop the skills necessary over time to become seniors, artisans, and craftspeople of their own.

Because GenAI systems are capable of automating work that traditionally allows junior creative workers to get their start in the field, there is concern that the development of future talents in the field of Japanese media and entertainment could become stagnant with the introduction of GenAI image tools. As discussed during our interviews with AWJ and Professor Hartzheim, GenAI image tools have the potential to further alienate bottom-line workers in creative industries in Japan. These workers, who are already systemically unacknowledged and underpaid, can become further displaced and face layoffs if employers seek to entirely replace or automate substantial parts of their work that are traditionally human-driven through the use of GenAI. Automation with GenAI can potentially deny the entry of new and extensively trained workers into the industry and can lead to loss of agency and meaning to artistic work (Vimpari et al., 2023). Creative workers may lose essential creative problem-solving skills that are necessary for more complex tasks and aspects of creative work, which can lead to cognitive and creative atrophy (Sætra, 2023).

5.2.2 Social and Ethical Pitfalls in GenAI Image Research

5.2.2.1 Decontextualization of Creative Work

I believe that that social and ethical implications arising from the use of GenAI image tools in the context of creative work could be attributed in part to the social and institutional practices

of AI research. Diane E. Forsythe's ethnographic work on artificial intelligence lab cultures in the 1990s remarked how AI scientists would habitually decontextualize their own work and the work of experts when building expert systems (Forsythe, 1993b). Forsythe noticed how AI scientists often placed little importance on informal social and institutional activities when building expert systems (Forsythe, 1993b), which are computer programs that use "artificial-intelligence methods to solve problems within a specialized domain that ordinarily requires human expertise" (Zwass, 2024).

In the current age of GenAI image systems, I believe what the late Forsythe observed 30 years ago still holds true to this day. State-of-the-art GenAI image systems are now capable of producing artistic works that are indistinguishable from those made by human photographers and human artists (Ha et al., 2024). Therefore, I believe it is reasonable to consider such systems as modern-day expert systems where human expertise is that of human-made art. As such, I observe parallels between similar pitfalls to current GenAI image systems by removing the informal social and institutional contexts of workplace pedagogy found in Japan's creative industries and creative work.

As demonstrated by the themes emerged from the student interviews, I noticed a tendency for CS graduate students in Japan to view labour in creative industries consisting of individual artists working independently on illustrative tasks, such that the incorporation of GenAI tools into their creative workflows could provide a means to efficiently automate monotonous or laborious aspects of creative work. Based on the expert interviews conducted, it is more appropriate to view creative workplaces in Japan as symbiotic networks of workers collectively improving their artisanal skills at the workplace, rather than what students often believe as consisting of isolated workers completing an assigned checklist of illustrative tasks. Therefore, I encourage GenAI researchers to understand that GenAI image tools have the potential to disrupt cultures in creative industries, especially those that focus on vocational knowledge taught at the workplace. If artists are to use GenAI image tools solely for the purpose of productivity, efficiency, and gaining a competitive edge, which are commonly anticipated and marketed uses of such tools by researchers and tool providers, artists may risk compromising their personal user experience and taste in art (Shi et al., 2023) in ways that may fail to fulfill personal artistic needs and provide meaningful work to its users (Vimpari et al., 2023).

5.2.2.2 Commodification of Human Creativity

In the 1990s, Forsythe (1993a, 1993b) observed how engineers would often believe the knowledge acquisition process for AI expert systems to be conceptually straightforward, such that automation can circumvent the inexact and uncontrollable nature of face-to-face interactions between knowledge engineer and expert. Forsythe warned that this belief will only enable practices that encode certain perspectives in a particular domain and jeopardize how human beings are still needed in this process to fully interpret and represent this knowledge (Forsythe, 1993a, 1993b). In the case of GenAI image tools, the knowledge acquisition process of state-of-the-art GenAI image models is through the automated and indiscriminate use of billions of text-image pairs in order to learn how to faithfully reproduce visual concepts as much as possible to their corresponding textual counterpart. I draw parallels to the observation made by Forsythe with the popular belief amongst the student interviewees who viewed the use of billions of data as an inevitability and necessity where ”more is better” when training GenAI image systems. This is being done at the expense of indiscriminately using datasets with a lack of regard for individual harms found inside, as mentioned by P3 in our interviews. I believe this also shows how AI scientists conflate art with how faithful a concept can be rendered visually, rather than as a human-driven and personal process involving personal introspection, storytelling, playfulness, and imagination that many artists seek to create and experience when making art (Hemment et al., 2023; Piskopani et al., 2023; Roosa Wingström & Lundman, 2024).

Although knowledge engineers of the past may have constructed expert systems through involuntary deletions of social and cultural values during interviews with experts without observing places of work (Forsythe, 1993a), knowledge acquisition for GenAI image systems has now become fully automated, where knowledge is seen as statistical correlations in data without a human in the loop. Therefore, the automated use of text-image pairs to develop tools that are seen to produce works that rival those of human artists involves deletions to social and cultural values of creativity and art that are no longer done involuntarily but explicitly.

However, text-image pairs cannot reveal implicit knowledge about real-life processes of artistic work, storytelling, and meaning intended to be expressed by an artist. The current focus on image

fidelity for GenAI image systems as a means to produce artistic works through the use of biased and unfiltered data on the internet is one that can be seen as treating human-derived works and the human creative spirit as commodities, which neglects to value their right to privacy and dignity by simply viewing their works as training data. Generalized learning by GenAI models from the works of creative artists can thus be seen as a means to appropriate and monetize the works of living artists and humanity's collective imagination and knowledge (Piskopani et al., 2023).

5.2.2.3 Power and Politics of GenAI Image Tools

Sensational representations of GenAI for its groundbreaking ability to replicate a diverse range of art styles by mass media can obscure its inability to be diverse in practice where it fails to accommodate diversity across cultures and individuals. For laypeople and non-artists, the ability of GenAI image tools to generate images through calculative meaning (i.e., rendering images or media through statistical methods) should dangerously be avoided to represent cognitive meaning (i.e., philosophical and human aspects to creating art) (Bunz, 2019).

Commercial state-of-the-art GenAI image tools, such as DALL-E and Midjourney, are primarily end-to-end, from prompt and/or image-to-image. Although billions of images are commonly used so that GenAI image tools have the ability to represent a diverse range of visual concepts and subject matters, its general purpose from prompt to generation has the ability to homogenize creative work practices into singular processes. These fail to account for how creative work differs not just between individuals, but also between cultures (Erez & Nouri, 2010; Jeffcutt, 2004).

Not only will social harms and inequities depicted in text-image pairs used to train state-of-the-art GenAI image tools be amplified and replicated in generated outputs (Bianchi et al., 2023), but the use of systems built by such means will have the ability to delete social and cultural dimensions of creative work, while shifting power and profits away from individual creators towards model owners who are paradoxically profiting from the use of data from these creators in the first place (Ghosh & Fossas, 2022). The GenAI community's current interest in innovation and statistical automation, at the expense of the well-being of living artists, is removing artists from their sense of dignity and purpose. Based on related literature and our interviews with AWJ and Professor Hartzheim, this lack of consideration towards artists, creatives, and image right-holders is political such that it can further

marginalize artists who often are already at a socioeconomic disadvantage, in addition to having the potential to hinder opportunities for meaningful work and fulfilling artistic needs (Vimpari et al., 2023). In fact, many of the students we interviewed saw its minimal applications in research and few reasons to have GenAI image tools be used outside of illustrative purposes, while seeing clear impacts and uses for artists. However, model providers, researchers, and developers are currently defining how such tools are designed and created, thus establishing power and authority over how creative work will change without the input of creatives and artists who would be most impacted by such technologies, especially if employers or clients push for their indiscriminate deployment at the creative workplace and its dominance of the creative work process.

5.3 Participatory GenAI Design for Artist Well-being: Lessons for Canada and Japan

As Canada and Japan are world leaders in AI development and policy with established democracies and rich creative industries, regulatory bodies, AI researchers, and creative industries in both countries will gain valuable insight from my findings on how the integration of current GenAI image tools into creative workflows can jeopardize the well-being and vocational development of artists and creative professionals. Regulatory bodies in Canada and Japan should look into requiring platforms to comply with concrete AI principles, revising copyright laws and AI regulations, and clarifying what control rights holders have over their data and their works in the context of GenAI development, usages, and distribution (Piskopani et al., 2023).

For future GenAI artefacts to avoid blindsiding artists and creative professionals, GenAI should celebrate the human sources that drive its systems by including the input of its end users in its design (Inie et al., 2023). While aspects of freedom, democracy, sustainability, well-being, and justice for artists and creatives could be challenged by how current GenAI systems are built and deployed, future systems should focus on techniques and tools that take into consideration the needs and concerns of visual artists by steering toward designs that leverage an artist's skill set and creativity without compromising one's artistic vision (Sætra, 2023), while also compensating them if their works are used in development and training (Jiang et al., 2023). This can help forego how AI has

often been developed ahead of a specified purpose, where it can instead be developed to better integrate into creative workflows that leverage new creative competencies (Inie et al., 2023). GenAI image tools should thus be created with defined artistic purposes and uses that help foster creative output, rather than having users find purpose or uses within the technology's constrained features and limitations.

Therefore, AI researchers from Canada, Japan and around the world should adopt participatory AI design practices to actively engage artists and stakeholders throughout the planning, design, and evaluation processes of GenAI image research tools and artifacts (Hemment et al., 2023; Inie et al., 2023; Piskopani et al., 2023; Sætra, 2023; Vimpari et al., 2023). As suggested by Roosa Wingström and Lundman (2024), collaborative research efforts to develop co-creative AI should aim to be "transparent and trustworthy in science, while also being "playful and surprising in the arts". The underlying design choices of GenAI models should be made visible to impacted communities and stakeholders, who are often excluded from understanding and engaging in critical technological design decisions (Hemment et al., 2023) to mutually identify implications and risks with GenAI development processes and usages (Piskopani et al., 2023). In turn, GenAI model developers and providers need to open themselves up to discussions and debates with creatives that allow them a platform to share their side of worries, excitements, and strategies when confronted with AI realities while discussing uniquely human approaches to creativity outside of statistical and algorithmic means (Inie et al., 2023).

Dialogues with artists should also delve into philosophical notions of art, ethics, and political economy. This will help GenAI model developers think beyond typical design and development elements and into areas requiring criticality and reflection beyond immediate market and institutional factors, as researchers are often neutrally disconnected from the political and social dimensions of AI (Hemment et al., 2023). As mentioned in Vimpari et al. (2023), academic and industry AI researchers should also collaborate more with human-computer interaction (HCI) researchers that would be able to bring about careful reflection on how to "balance scientific curiosity and financial incentives with the potential implications of their research on its professional users" instead of focusing only on automation capabilities when it could hinder opportunities for meaningful work and fulfilling artistic needs (Vimpari et al., 2023). Cross-disciplinary interactions, as suggested by

P3 during our interviews, will also help enlighten AI researchers on how GenAI image techniques can be utilized and examined outside of theoretical fields in computer science and into practical applications for various domains, given machine learning's versatility and broad range of applicable uses.

In addition, the development, adoption, and integration of GenAI tools into creative workflows should be done with thorough critique, critical assessment, or testing before deployment into creative industries and creative work. As mentioned by P7 from our interviews, GenAI researchers and developers may benefit from focusing on developing tools that provide intermediate outputs or tasks rather than fully generated outputs and images which will allow opportunities for artists to better work co-creatively with GenAI. This is so that artists and creatives can still maintain a large portion of creative control and agency over their work process and creative execution. Additionally, GenAI tools should look into helping artists with tasks that can help with inspiration, ideas, artefact development, productivity, skill development, teaching, social interactions (e.g., communication with stakeholders) and enhancements to one's personal life (e.g., assisting with tasks in personal life to give more time for creative endeavours) (Santo et al., 2023). For GenAI tools to become meaningful and ideally personalized to the needs and work processes of creatives, GenAI developers and practitioners should make the tools accessible, explainable, and usable for co-creation, while actively working with creatives to inform them of their features and limitations (Inie et al., 2023).

Chapter 6

Threats to Validity

In Chapter 6, I recognize the threats to the validity of my research and discuss potential limitations arising from my research design and findings. Given the time constraints of the Master's research, I discuss various aspects of the participant sampling and analysis process of the interview data as part of my limitations, which could be further improved as future work.

6.1 Internal Validity

The recruitment process and the small sample size and diversity of the participants are potential threats to the internal validity of my findings. As mentioned in Section 3.3, I selectively recruited only computer science graduate students from one university in Japan, which does not generalize all the viewpoints on the issue of students at other institutions in the country. During recruitment, I also mentioned that interviews will be in English. This limits my sample to only those who feel comfortable enough to engage in an English conversation (except P4 who requested for a Japanese interview), therefore excluding students non-English speaking students at the university. In addition, I was only able to interview one female participant. This not only reflects a general lack of gender diversity in the AI field in Japan, but also how these findings stem primarily from the point of view of male Japanese students at the university and in the AI community at large. Moreover, there are also experts and industry professionals in other domains who can provide different perspectives on how GenAI image technologies can impact creative professionals and other creative industries in

Japan. These could include those in advertising and video games. Further insights into this topic could be provided by interviewing individual creative professionals and other groups. This will help gather more diverse opinions on other types of social and ethical implications which may arise from the use of GenAI image technologies in their own respective fields.

Another threat to my findings is the analysis of the data. Given that I was the only person involved in the manual analysis of the interview data, it can be perceived as subjective. It would have been more ideal if there were several people reviewing the data and coming to a consensus on the coding of the interviews by engaging in discussions throughout the process to ensure more objectivity to the thematic analysis. Therefore, it would be worthwhile to reanalyze the data using this approach if this study were to be repeated or extended in the future.

However, because the work in this thesis is the first of its kind to explore the intersection between the ethical and social awareness of CS graduate students on GenAI image tools as prospective GenAI researchers and its implications for creative work, I believe that my research is an essential first step in uncovering the often overlooked impacts GenAI technologies can have toward culture, pedagogy, and labour and serves as foundation for future work in this area.

6.2 External Validity

Because the CS graduate students interviewed were not native English speakers, there were instances where students found it challenging to express some of their opinions and thoughts in English. There is a chance of misunderstanding and miscommunication during the interview process given linguistic challenges. Therefore, the analysis could only be based on what was said to the best of my ability in English. I am also not fluent in Japanese and it was not possible to have Jun Kuribayashi assist in all potential Japanese interviews given his own time commitments and availability during my 2-month stay in Tokyo for data collection. Therefore, given that English is the most likely common language between Japanese students, international students at the university, and myself, English was the best language of choice to conduct the interviews.

6.3 Construct Validity

The construct validity of my research can be attributed to my positionality as a researcher. Given that the analytical approach on the issues discussed in the interviews is shaped by my academic and professional background as a software engineering student working in science and technology studies (STS), as well as my cultural upbringing in Canada, it is important to note that the interview data were analyzed under such lenses. Emerged themes during analysis may differ if someone of different academic and cultural background were to analyse the same data collected. However, given that Professor Ema was able to look at the results of my data analysis, I believe that she was able to ensure that it matches a Japanese understanding of my findings.

Chapter 7

Conclusion and Future Work

In Chapter 7, the final chapter of this thesis, I present a summary of the thesis and how its main findings can help future AI researchers in Japan better understand the impacts of GenAI image tools in creative work. I also suggest future areas of work and areas for further exploration on the topic of this thesis to expand its scope.

7.1 Conclusion

State-of-the-art GenAI image tools are sweeping the world by storm due to their ability to generate photorealistic and high-quality artistic work with ease. In particular, its ability to generate anime and manga-styled images have garnered significant interest towards its integration into Japan's existing creative workflows. However, various concerns about its potential to disrupt creative industries and the social and ethical implications stemming from its development and its current usages have suggested the need for future guidelines and regulations in the country. With such potential prospects in mind, current and future GenAI researchers in Japan will play a pivotal role in helping shape such policies and regulations as future experts and developers of such technologies.

Therefore, my study aims to investigate what prospective GenAI researchers in Japan (i.e., computer science graduate students studying in Japan) see as the technical, social, ethical and cultural aspects of GenAI image tools for creative work. Given their future role as designers, developers, and experts of GenAI image technologies, any areas of oversight on its impacts towards Japan's

creative industries may prevent equitable and sustainable uses of such technologies for artists and creative professionals.

In this study, I interviewed 9 CS graduate students studying at a university in Tokyo and conducted 3 interviews with experts on the legal, social, and cultural impacts of using GenAI image tools for creative work. In my interviews with CS graduate students, I asked them on their opinions regarding the technical benefits, risks, and limitations of using GenAI image tools for creative work, along with the social and ethical aspects seen from their perspective regarding such usages. From these conversations, various aspects about AI research culture emerged when discussing the resulting social and ethical implications observed from GenAI image tools. In my interviews with Taichi Kakinuma, Arts Workers Japan, and Professor Hartzheim, I discussed the legal, social, and cultural implications from using GenAI image tools for creative professionals working in Japan's creative industries, respectively.

My findings suggest that CS graduate students in Japan generally perceive GenAI image technologies optimistically as a tool that can enhance productivity and foster creativity. In contrast, Japanese artists, creative professionals and creative industries fear its potential to replace fulfilling work and its ability to jeopardize existing work cultures and pedagogy at the workplace, such as vocational knowledge and skills learned through practice and mentoring within Japan's creative industries.

From these results, it becomes clear that it is critical for GenAI researchers to develop an understanding and awareness on how GenAI image technologies can disrupt various aspects of culture and labour in creative work. Although this technology may have democratized art by lowering barriers that are necessary to produce artistic images and photos, it is clear that it was not created democratically, as the technology surprised the general public and, most critically, blindsided many artists and creatives. Many artists felt disrespected, commodified, and, most importantly, marginalized from having their work used as training data without their knowledge or consent. However, it is not accurate to say that those who create such technologies do not care about the social and ethical impacts of AI. It was evident from my interviews with the students that prospective GenAI researchers generally demonstrate social and ethical awareness on such issues, but neglect to think about the long-term applications and non-technical implications of their work because they feel

unequipped to approach its socially oriented concerns and aspects.

As a result, I encourage Canadian and Japanese AI researchers, students and professionals alike, to reflect on the findings of my research and consider whether their own values and beliefs resonate with those emerged from the students and whether they would have similar oversights to the social and ethical implications that would emerge from integrating GenAI image tools to creative work. In particular, I would like to emphasize how integrating such tools without thoughtful consideration of how GenAI image tools can impede one's vocational development can jeopardize the well-being of artists and creative professionals in their career development, but also their sense of artistry, privacy, and dignity. My findings in Japan provide both Canada and Japan an invaluable lesson in considering whether and how current GenAI image tools should be integrated into creative workflows. I hope to empower AI researchers and developers, in Canada, Japan, and across the globe, to involve multiple stakeholders in the planning, design, and evaluation phases of GenAI image research through engaged participatory AI design. This will ensure that the needs and concerns of impacted communities are what drive the development of GenAI systems, rather than letting GenAI systems dictate the experiences of those impacted. In addition, these results help identify gaps and the need to further discuss aspects of labour and vocational development in the computer science and software engineering curriculum.

7.2 Future Work

My study takes a first step towards discussing the often overlooked and interconnected aspects of culture, pedagogy, and labour in Japan's creative industries that can be jeopardized with the integration of GenAI image tools. Although the focus of my study is on Japan, I plan to expand the study to include students and experts from other countries and regions in the world where GenAI image technologies may impact their own creative professionals and creative industries in differing ways. A comparative analysis between various cultures and regions on such issues could help develop a more comprehensive understanding of the situation on a global scale. In addition, an investigation into how existing CS curriculum around the world covers social and ethical aspects of GenAI technologies, how they are taught, and what aspects in CS curricula could be further

improved to account for such aspects in its teachings.

Regardless, there is substantial potential to further explore the implications of GenAI image tools and other creative GenAI tools on society. Given that GenAI is at a relatively early stage of mainstream development and adoption, it is invaluable to explore how they operate in society and the various impacts that can be attributed to their design and implementation. By leveraging an early approach to investigate these issues, aspects of equity and sustainability can be proactively incorporated into future GenAI technologies and research.

Appendix A

Interview Guide for CS Graduate Student Interviews

(1) What is your experience with AI in your research?

(2) What was your first reaction to generative AI?

(3) How are generative AI technologies being discussed or used in your lab or research environment?

(4) Have you used or heard of text-to-image generative AI systems?

(5) What would you say are the technical advantages or limitations with text-to-image generative AI systems?

(6) What is your opinion towards using large amounts of images from the internet to train text-to-image systems?

(7) What non-technical considerations do you think are needed when researching, developing, and training text-to image systems?

(8) Do you consider the usage of text-to-image generative AI as a form of creativity?

(9) Do you think there are benefits or risks with using text-to-image generative AI systems as a creative tool in general?

(10) What non-technical considerations do you think are needed when using text-to-image systems?

(11) How have you seen generative AI and/or text-to-image generative AI being discussed in Japan?

(12) What do you think are the use cases, benefits, or risks specific to Japan when using text-to-image generative AI as a creative tool?

(13) How do you think text-to-image generative AI should be used in research and industry in Japan?

(14) Do you think Japanese professional artists should use text-to-image systems for their work?

(15) Do you think Japanese hobby artists should use text-to-image systems?

(16) Should Japanese hobby artists use text-to-image systems differently or the same way as professional artists?

(17) What kind of impact do you think text-to-image systems will have on Japanese society and Japanese creative professionals?

(18) What do you think is the future for text-to-image generative AI as a creative tool in Japan?

(19) What challenges do you think Japanese researchers and users will face in the future when it comes to text-to-image generative AI?

(20) Is there anything that has not been discussed that you would like to talk about?

Appendix B

Thematic Maps of Student Interviews

Continued on the following page.

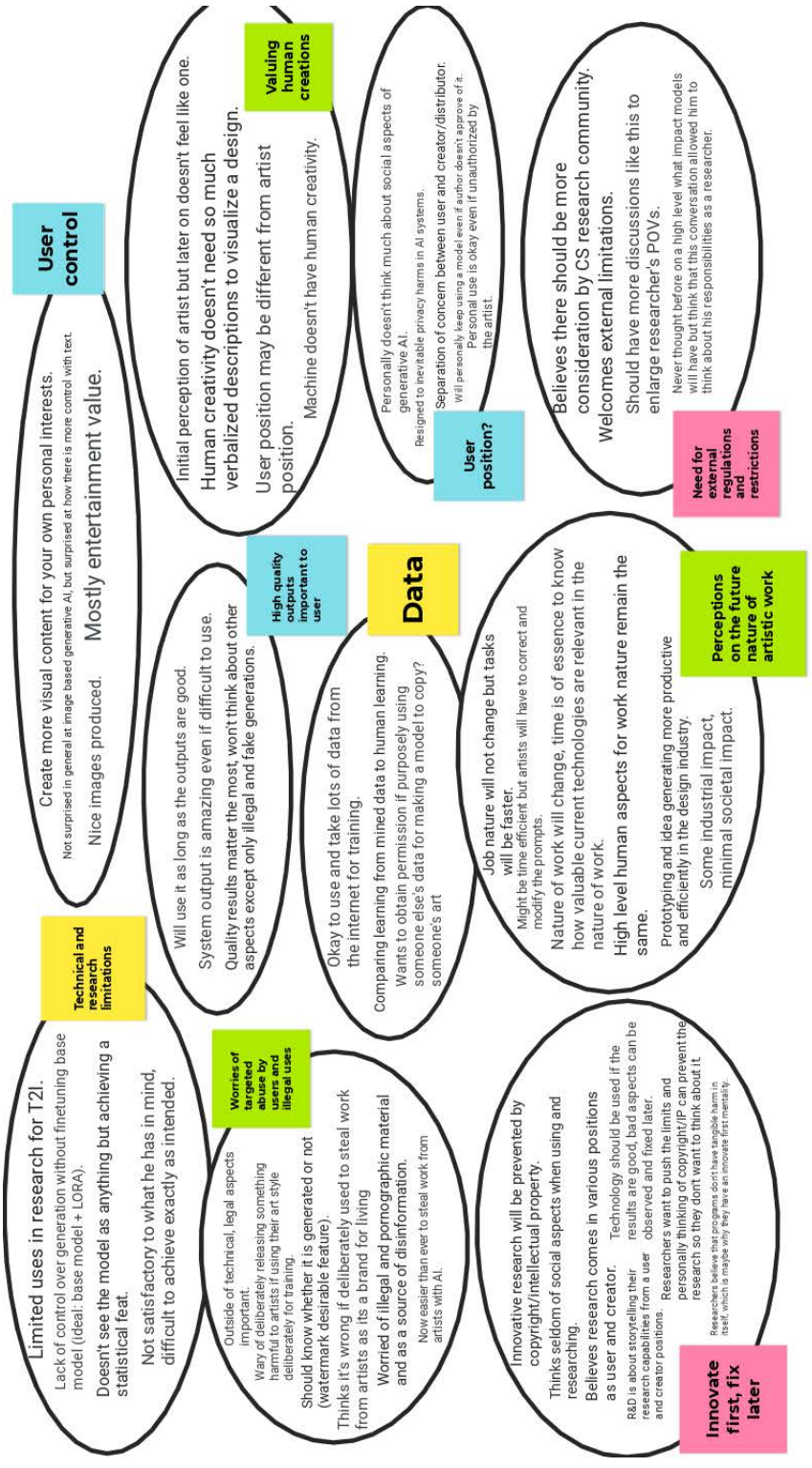

Figure B.1: Thematic map showing the topics discussed by P1

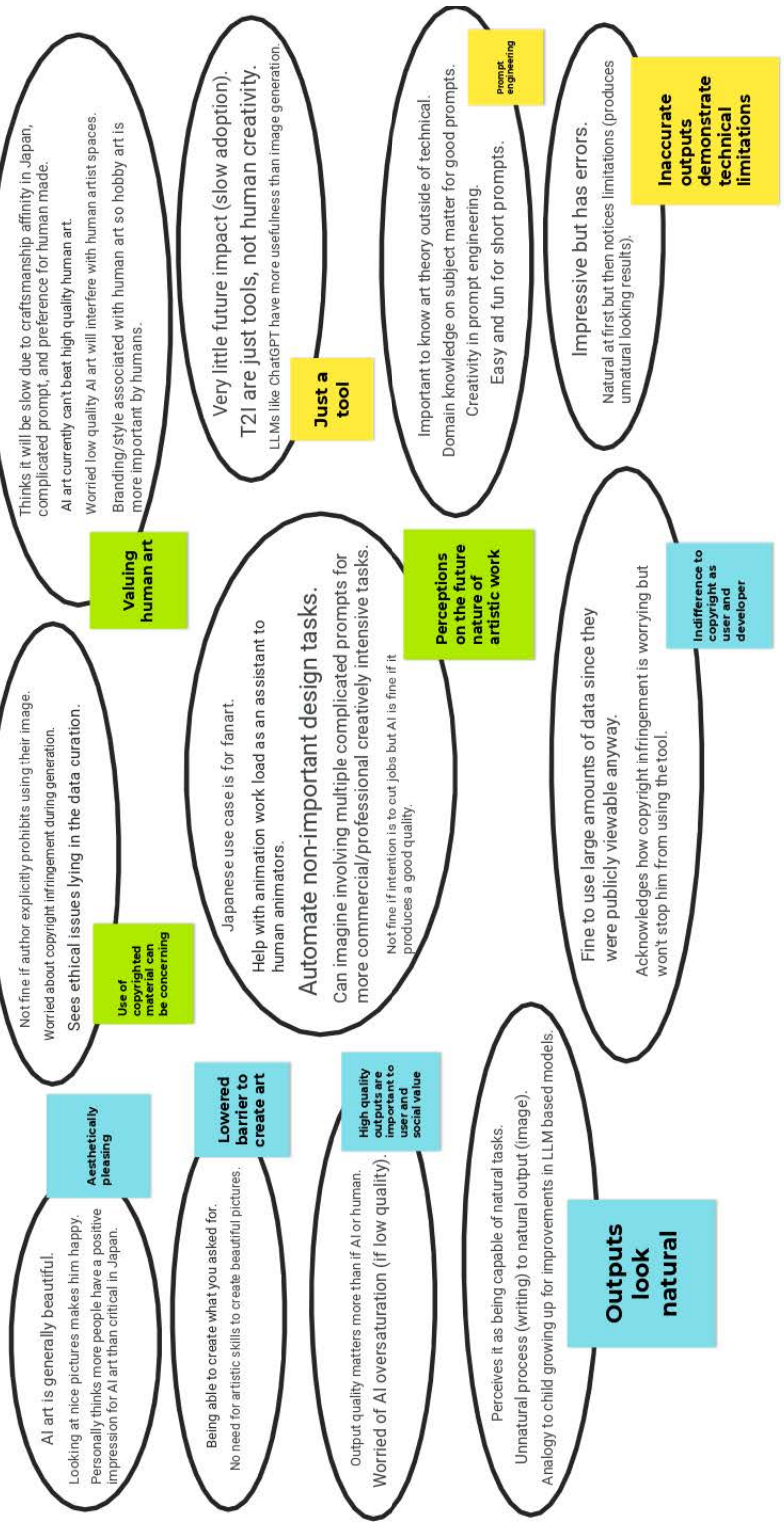

Figure B.2: Thematic map showing the topics discussed by P2

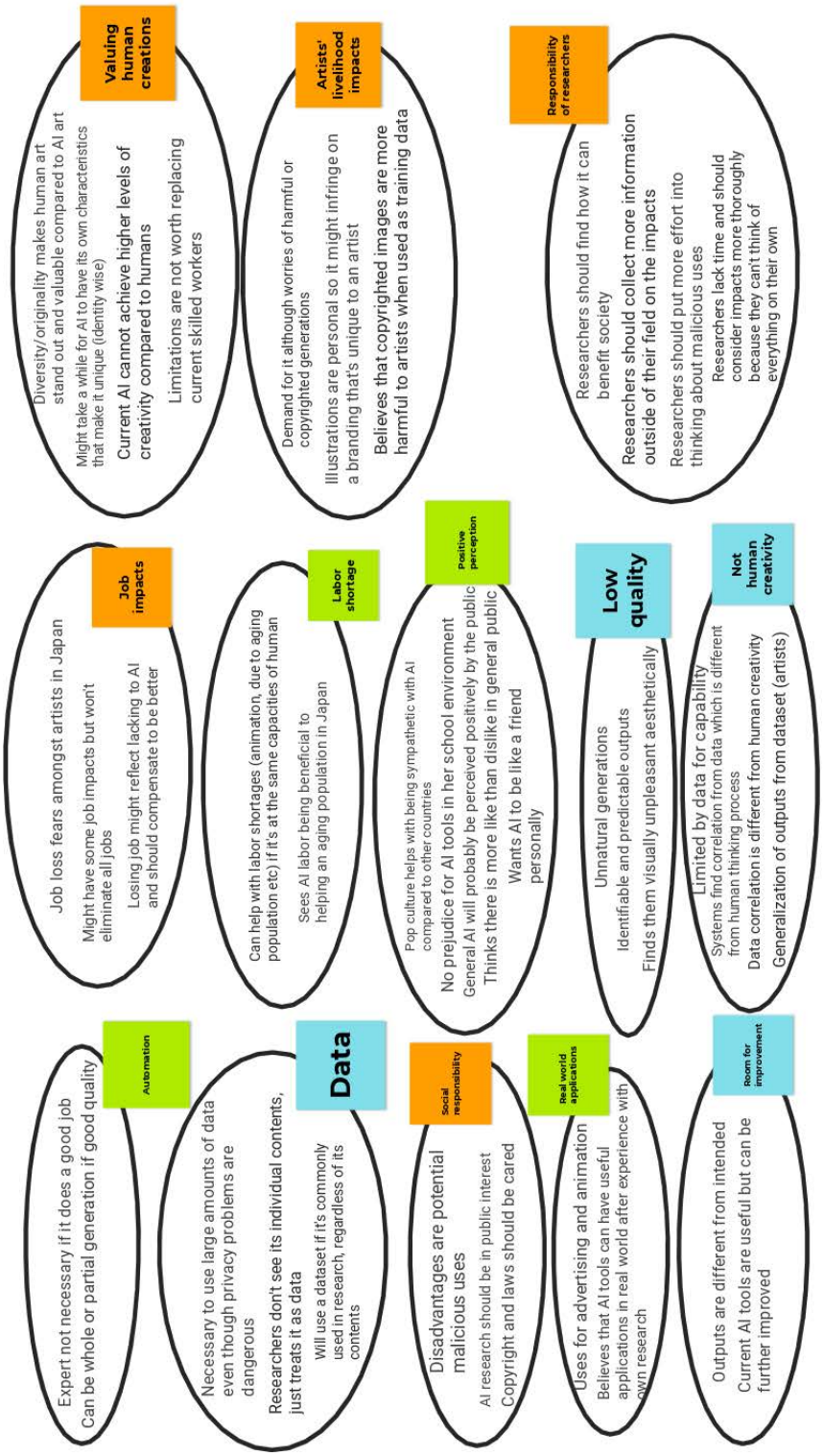

Figure B.3: Thematic map showing the topics discussed by P3

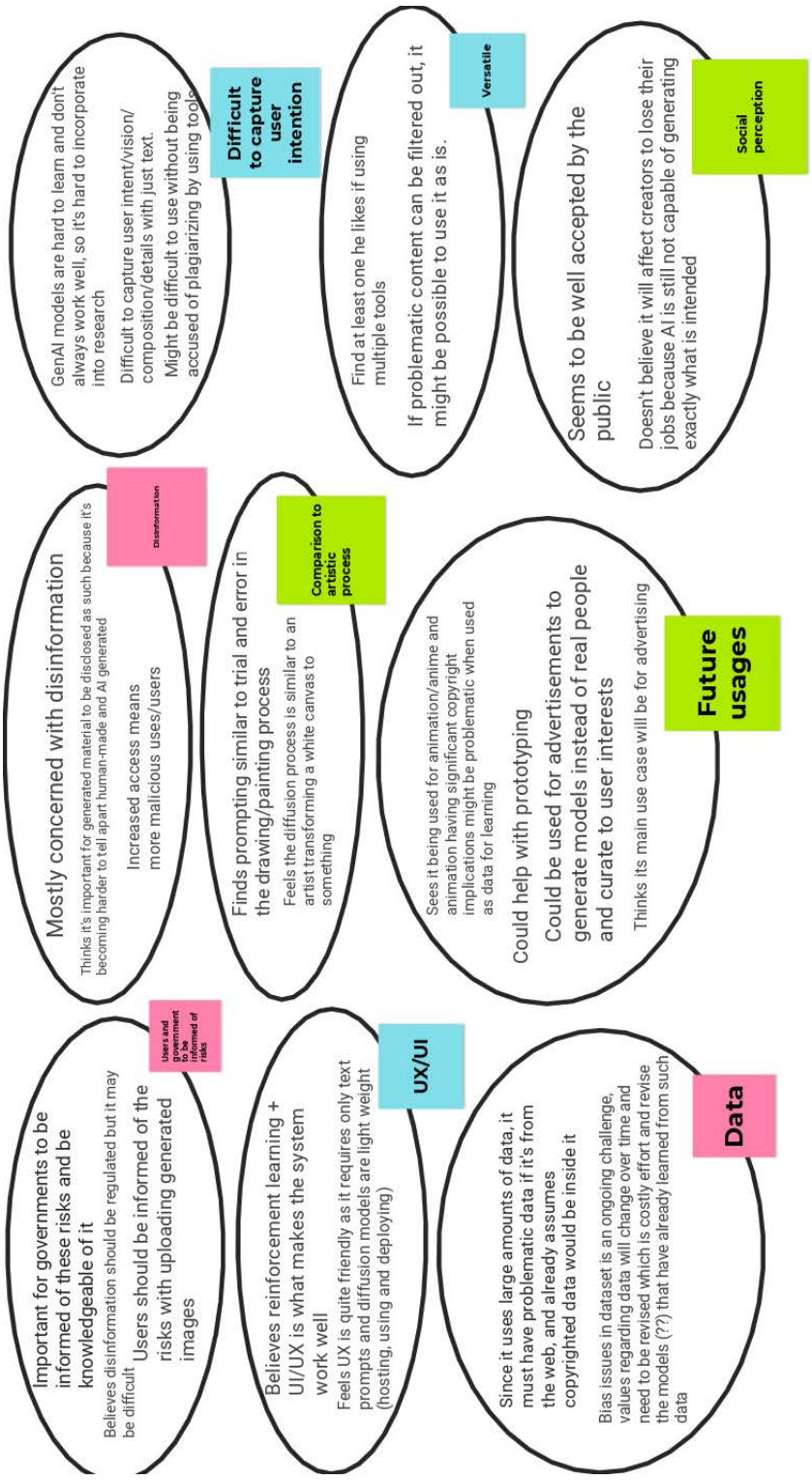

Figure B.4: Thematic map showing the topics discussed by P4

Figure B.5: Thematic map showing the topics discussed by P5

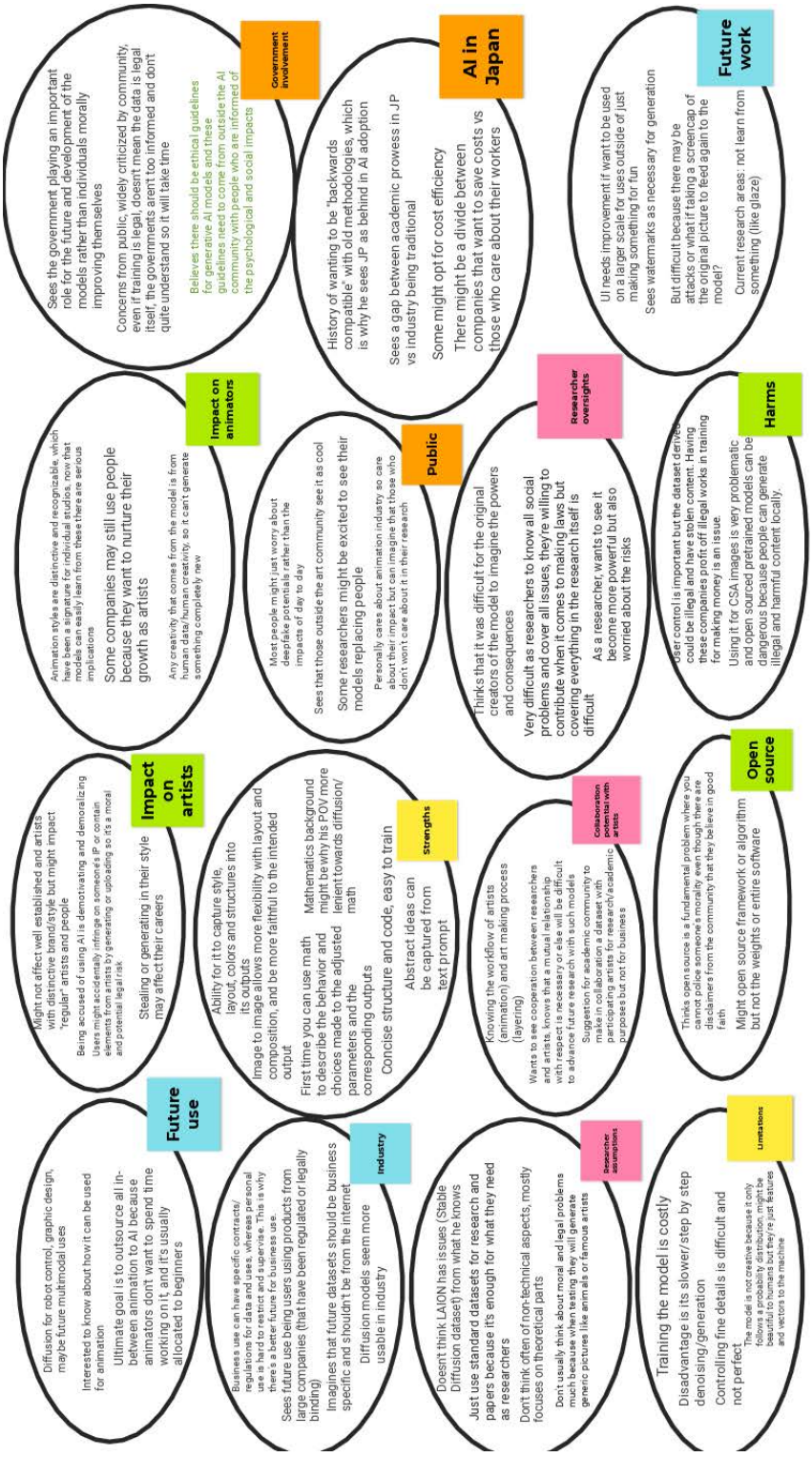

Figure B.6: Thematic map showing the topics discussed by P6

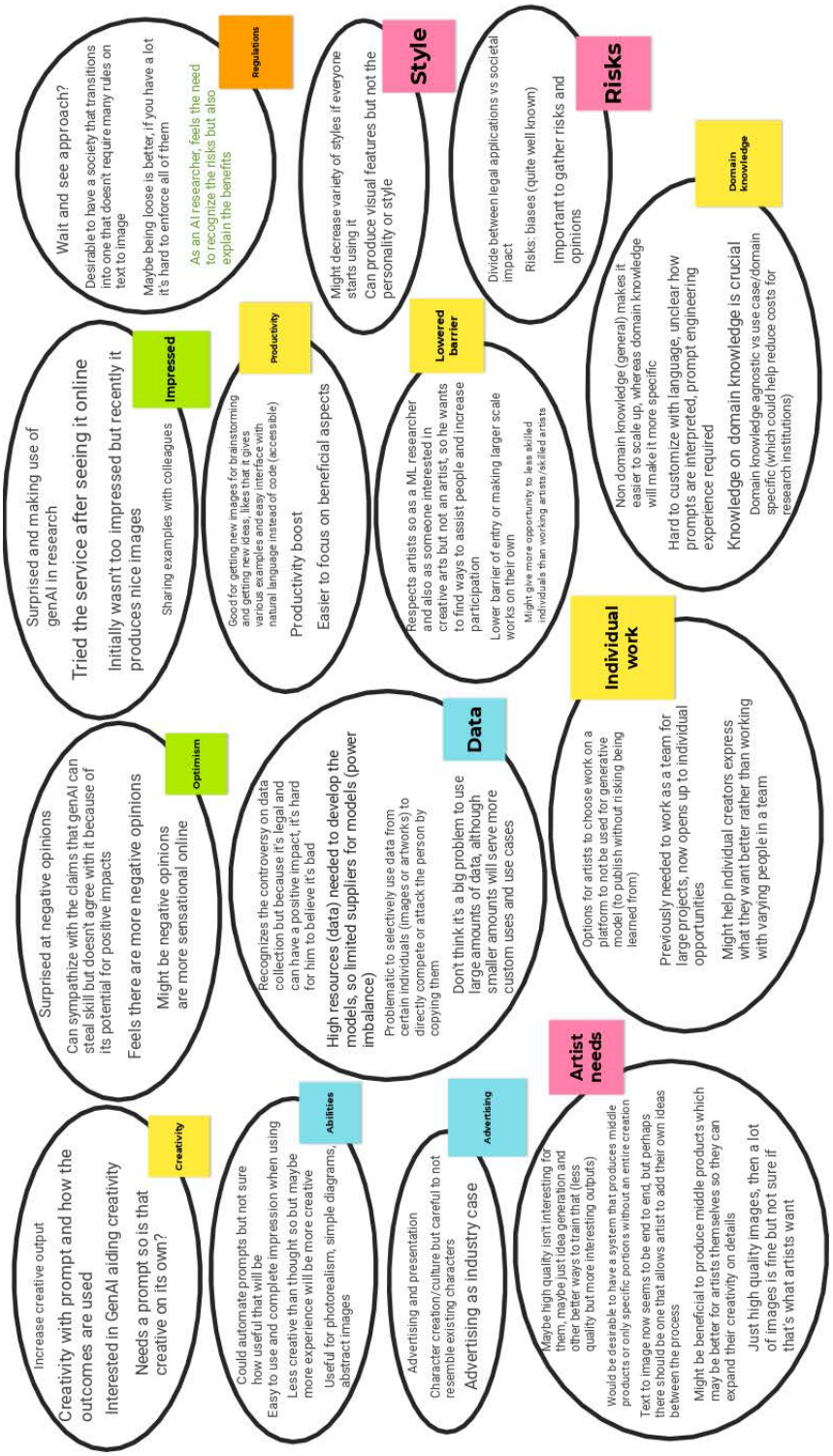

Figure B.7: Thematic map showing the topics discussed by P7

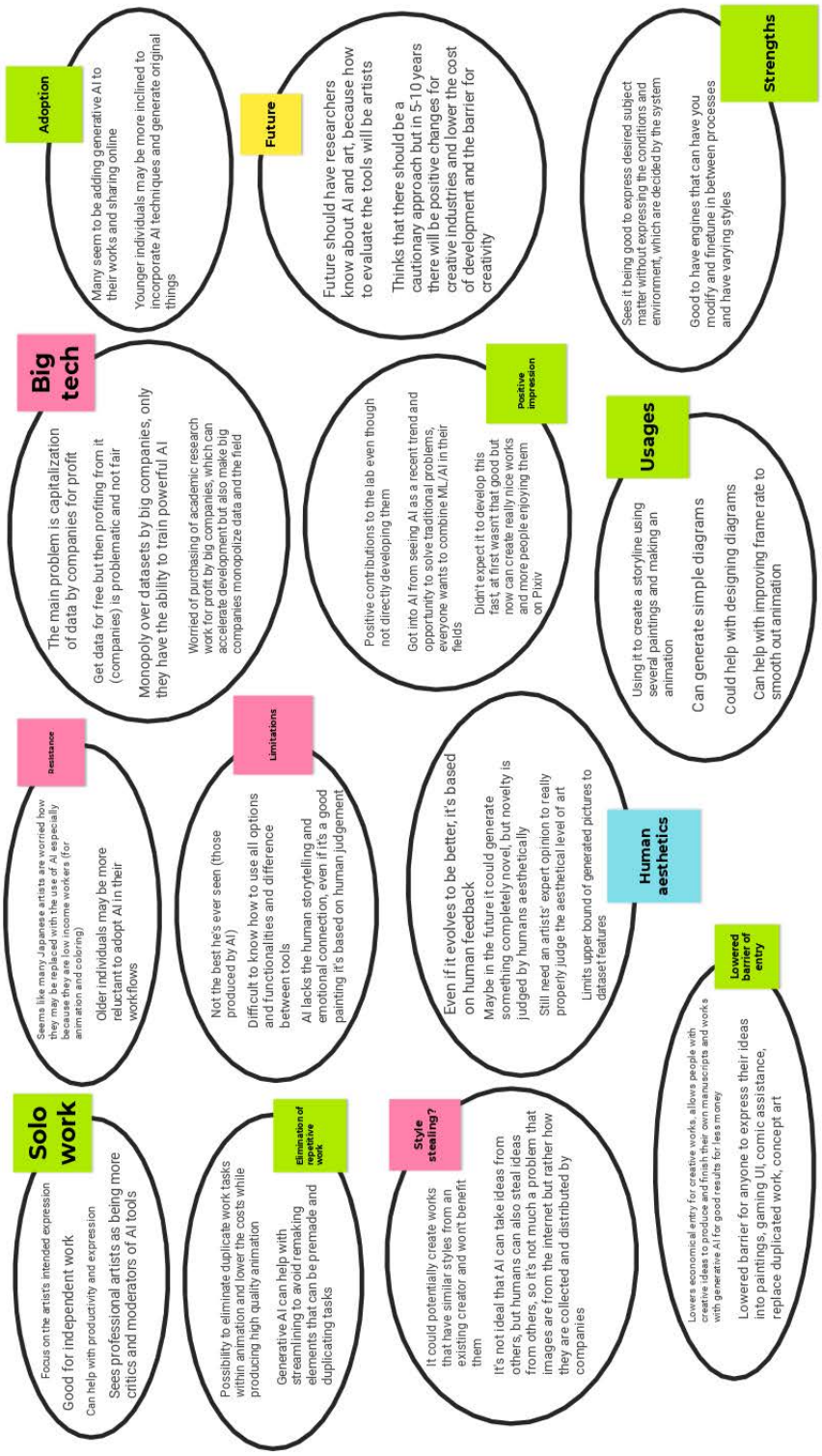

Figure B.8: Thematic map showing the topics discussed by P8

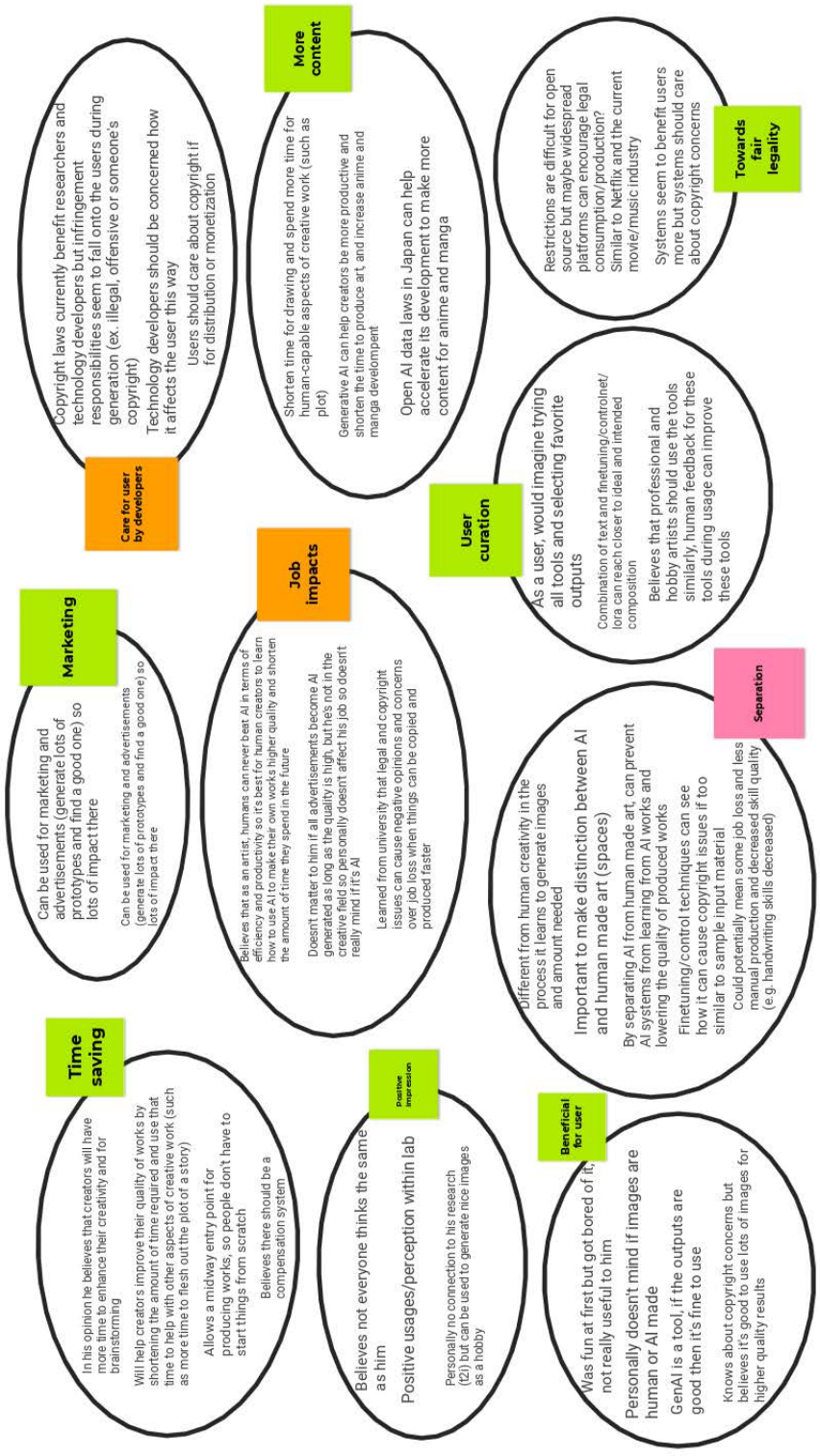

Figure B.9: Thematic map showing the topics discussed by P9

References

Ando, K. (2024, April). The japan coast guard has stopped distributing leaflets using ai illustrations due to reactions on social media (title translated from japanese). *BuzzFeed Japan*. Retrieved from https://www.buzzfeed.com/jp/kenjiando/jcg-koho-illust

AnimeChain LLC, & Active Gaming Media Inc. (2024). *Proposed blockchain model by animechain for genai image systems (translated into english by automaton media).* Retrieved from https://automaton-media.com/en/wp-content/uploads/2024/01/20240115-25474-002.png

Anno, T. (2023). *Pages from takahiro anno's self-published manga using images generated by stable diffusion.* Retrieved from https://automaton-media.com/en/wp-content/uploads/2023/09/20230926-21837-oo1.jpg

Aoi, L. (2022a, September). Ai image generator "mimic" renews its anti-fraud policies after receiving criticism. *AUTOMATON WEST*. Retrieved from https://automaton-media.com/en/nongaming-news/20220916-15751/

Aoi, L. (2022b, October). Japanese porn site sees large influx of ai-generated art and mandates them to be labeled as such. *AUTOMATON WEST*. Retrieved from https://automaton-media.com/en/nongaming-news/20221016-16222/

Aoi, L. (2022c, September). New ai image generating service in japan stirs debate. artists decry their work being used for ai art generation. *AUTOMATON WEST*. Retrieved from https://automaton-media.com/en/nongaming-news/20220831-15350/

Aoi, L. (2022d, October). Pixiv announces its policies on ai art to differentiate between regular posts and ai-generated works. *AUTOMATON WEST*. Retrieved from https://automaton

-media.com/en/nongaming-news/20221021-16314/.

Baio, A. (2023, November). Invasive diffusion: How one unwilling illustrator found herself turned into an ai model. *Waxy.org*. Retrieved from https://waxy.org/2022/11/invasive-diffusion-how-one-unwilling-illustrator-found-herself-turned-into-an-ai-model/

Baseel, C. (2023a, May). Ai-generated swimsuit/lingerie model makes debut in japan's weekly playboy magazine. *SoraNews24*. Retrieved from https://soranews24.com/2023/05/30/ai-generated-swimsuit-lingerie-model-makes-debut-in-japans-weekly-playboy-magazine%E3%80%90photos%E3%80%91/

Baseel, C. (2023b, June). Japan's "just-born" ai-generated swimsuit/lingerie model's career/existence is officially over. *SoraNews24*. Retrieved from https://soranews24.com/2023/06/09/japans-just-born-ai-generated-swimsuit-lingerie-models-career-existence-is-officially-over/

Baseel, C. (2024, June). Evangelion singer cancels appearance at anime orchestra concert over use of ai-generated artwork. *SoraNews24*. Retrieved from https://soranews24.com/2024/06/20/evangelion-singer-cancels-appearance-at-anime-orchestra-concert-over-use-of-ai-generated-artwork/

Betker, J., Goh, G., Jing, L., Brooks, T., Wang, J., Li, L., ... Ramesh, A. (2023). *Improving image generation with better captions.* Retrieved from https://cdn.openai.com/papers/dall-e-3.pdf

Bianchi, F., Kalluri, P., Durmus, E., Ladhak, F., Cheng, M., Nozza, D., ... Caliskan, A. (2023). Easily accessible text-to-image generation amplifies demographic stereotypes at large scale. In *Proceedings of the 2023 acm conference on fairness, accountability, and transparency* (p. 1493–1504). New York, NY, USA: Association for Computing Machinery. Retrieved from https://doi.org/10.1145/3593013.3594095 doi: 10.1145/3593013.3594095

Billett, S. (2002). Toward a workplace pedagogy: Guidance, participation, and engagement. *Adult education quarterly*, *53*(1), 27–43. doi: 10.1177/07417130223720

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. Retrieved from https://www.tandfonline.com/doi/

abs/10.1191/1478088706qp063oa doi: 10.1191/1478088706qp063oa

Bromann, S. (2010). Vocational education and training in japan — recent trends. In P. Haghirian (Ed.), *Innovation and change in japanese management* (pp. 100–118). London: Palgrave Macmillan UK. Retrieved from https://doi.org/10.1057/9780230250536_6 doi: 10.1057/9780230250536_6

Bunz, M. (2019). The calculation of meaning: on the misunderstanding of new artificial intelligence as culture. *Culture, Theory and Critique*, *60*(3-4), 264–278. Retrieved from https://doi.org/10.1080/14735784.2019.1667255 doi: 10.1080/14735784.2019.1667255

Byford, S. (2023, April). Welcome to line, japan's everything app. *Rest of World*. Retrieved from https://restofworld.org/2023/bento-app-line/

Celsys, Inc. (2022, December). Clip studio paint will no longer implement an image generator function. *CLIP STUDIO PAINT News*. Retrieved from https://www.clipstudio.net/en/news/202212/02_01/

Clarke, L. (2022, November). When ai can make art – what does it mean for creativity? *The Guardian*. Retrieved from https://www.theguardian.com/technology/2022/nov/12/when-ai-can-make-art-what-does-it-mean-for-creativity-dall-e-midjourney

Court Listener. (2024). *Andersen v. stability ai ltd., 3:23-cv-00201*. Retrieved from https://www.courtlistener.com/docket/66732129/andersen-v-stability-ai-ltd/

Crawford, A., & Smith, T. (2023, June). Illegal trade in ai child sex abuse images exposed. *BBC News*. Retrieved from https://www.bbc.com/news/uk-65932372

Deck, A. (2022, October). Ai-generated art sparks furious backlash from japan's anime community. *Rest of World*. Retrieved from https://restofworld.org/2022/ai-backlash-anime-artists/

Deck, A. (2023a, February). Anime artists are panicking over netflix's ai experiment. *Rest of World*. Retrieved from https://restofworld.org/2023/netflix-anime-ai-artists/

Deck, A. (2023b, June). Japan's new ai rules favor copycats over artists, experts say. *Rest*

of World. Retrieved from https://restofworld.org/2023/japans-new-ai-rules-favor-copycats-over-artists/

Deck, A. (2023c, February). This japanese manga artist-turned-politician is taking on ai art. *Rest of World*. Retrieved from https://restofworld.org/2023/generative-ai-japanese-politicians-manga/

Dhariwal, P., & Nichol, A. (2021). Diffusion models beat gans on image synthesis. In M. Ranzato, A. Beygelzimer, Y. Dauphin, P. Liang, & J. W. Vaughan (Eds.), *Advances in neural information processing systems* (Vol. 34, pp. 8780–8794). Curran Associates, Inc. Retrieved from https://proceedings.neurips.cc/paper_files/paper/2021/file/49ad23d1ec9fa4bd8d77d02681df5cfa-Paper.pdf

Erez, M., & Nouri, R. (2010). Creativity: The influence of cultural, social, and work contexts. *Management and Organization Review*, *6*(3), 351–370. doi: 10.1111/j.1740-8784.2010.00191.x

Forsythe, D. E. (1993a). The construction of work in artificial intelligence. *Science, Technology, & Human Values*, *18*(4), 460-479. Retrieved from https://doi.org/10.1177/016224399301800404 doi: 10.1177/016224399301800404

Forsythe, D. E. (1993b). Engineering knowledge: The construction of knowledge in artificial intelligence. *Social Studies of Science*, *23*(3), 445-477. Retrieved from https://doi.org/10.1177/030631279302300302 doi: 10.1177/030631279302300302

Fukuyama, M. (2018). Society 5.0: Aiming for a new human-centered society. *Japan Spotlight*, *27*(5), 47–50.

Gal, R., Alaluf, Y., Atzmon, Y., Patashnik, O., Bermano, A. H., Chechik, G., & Cohen-Or, D. (2022). *An image is worth one word: Personalizing text-to-image generation using textual inversion.* Retrieved from https://arxiv.org/abs/2208.01618

Ghinoi, S., & Omori, M. (2023). Expert knowledge and social innovation: analysing policy debates in japan. *Journal of Social Entrepreneurship*, *0*(0), 1–20. Retrieved from https://doi.org/10.1080/19420676.2023.2178485 doi: 10.1080/19420676.2023.2178485

Ghosh, A., & Fossas, G. (2022). *Can there be art without an artist?* Retrieved from https://arxiv.org/abs/2209.07667

Gill, S. L. (2020). Qualitative sampling methods. *Journal of Human Lactation*, *36*(4), 579-581. Retrieved from https://doi.org/10.1177/0890334420949218 (PMID: 32813616) doi: 10.1177/0890334420949218

Government of Japan. (2021). *Sixth science, technology, and innovation basic plan.* Retrieved from https://www8.cao.go.jp/cstp/english/sti_basic_plan.pdf

Government of Japan. (2024, February). The hiroshima ai process: Leading the global challenge to shape inclusive governance for generative ai. *Kizuna: Linking Japan and the World*. Retrieved from https://www.japan.go.jp/kizuna/2024/02/hiroshima_ai_process.html

Ha, A. Y. J., Passananti, J., Bhaskar, R., Shan, S., Southen, R., Zheng, H., & Zhao, B. Y. (2024). *Organic or diffused: Can we distinguish human art from ai-generated images?* Retrieved from https://arxiv.org/abs/2402.03214

Harada, H. (2023, May). Japan arts workers' survey reveals harm from generative ai, calls for copyright action. *The Mainichi*. Retrieved from https://mainichi.jp/english/articles/20230516/p2a/00m/0et/014000c

Heikkilä, M. (2022, September). This artist is dominating ai-generated art. and he's not happy about it. *MIT Technology Review*. Retrieved from https://www.technologyreview.com/2022/09/16/1059598/this-artist-is-dominating-ai-generated-art-and-hes-not-happy-about-it/

Hemment, D., Currie, M., Bennett, S., Elwes, J., Ridler, A., Sinders, C., ... Warner, H. (2023). Ai in the public eye: Investigating public ai literacy through ai art. In *Proceedings of the 2023 acm conference on fairness, accountability, and transparency* (p. 931–942). New York, NY, USA: Association for Computing Machinery. Retrieved from https://doi.org/10.1145/3593013.3594052 doi: 10.1145/3593013.3594052

Ho, K. K. (2024, January). Database of 16,000 artists used to train midjourney ai, including 6-year-old child, garners criticism. *ARTnews.com*. Retrieved from https://www.artnews.com/art-news/news/midjourney-ai-artists-database-1234691955/

Ho, S. C. Y., Ema, A., & Tajmel, T. (2024). The impacts of text-to-image generative ai on creative professionals according to prospective generative ai researchers: Insights from

japan. In *Proceedings of the aaai symposium series* (Vol. 3, pp. 459–463). Retrieved from https://ojs.aaai.org/index.php/AAAI-SS/article/view/31256 doi: 10.1609/aaaiss.v3i1.31256

Holland, O., Sugiura, N., & Jozuka, E. (2023, March). This is japan's first ai-generated manga comic. but is it art? *CNN Style*. Retrieved from https://www.cnn.com/style/article/japan-first-ai-generated-manga-art-intl-hnk/index.html

Hu, E. J., Shen, Y., Wallis, P., Allen-Zhu, Z., Li, Y., Wang, S., ... Chen, W. (2021). *Lora: Low-rank adaptation of large language models.* Retrieved from https://arxiv.org/abs/2106.09685

Inie, N., Falk, J., & Tanimoto, S. (2023). Designing participatory ai: Creative professionals' worries and expectations about generative ai. In *Extended abstracts of the 2023 chi conference on human factors in computing systems.* New York, NY, USA: Association for Computing Machinery. Retrieved from https://doi.org/10.1145/3544549.3585657 doi: 10.1145/3544549.3585657

Ito En, Ltd. (2023, August). Sales of the ai-generated package "oi ocha catechin green tea" series will begin on monday, september 4th. the "catepo mileage campaign" will also start on the same day (title translated from japanese). *ITO EN Corporate Information Site*. Retrieved from https://www.itoen.co.jp/news/article/55683/

Japan Coast Guard. (2024, March). *Japan coast guard leaflet on water safety using ai-generated art.* Retrieved from https://x.com/JCG_koho/status/1773208645037084832

Jeffcutt, P. (2004). Knowledge relationships and transactions in a cultural economy: Analysing the creative industries ecosystem. *Media International Australia*, *112*(1), 67-82. Retrieved from https://doi.org/10.1177/1329878X0411200107 doi: 10.1177/1329878X0411200107

Jiang, H. H., Brown, L., Cheng, J., Khan, M., Gupta, A., Workman, D., ... Gebru, T. (2023). Ai art and its impact on artists. In *Proceedings of the 2023 aaai/acm conference on ai, ethics, and society* (p. 363–374). New York, NY, USA: Association for Computing Machinery. Retrieved from https://doi.org/10.1145/3600211.3604681 doi:

10.1145/3600211.3604681

Jiménez, J. (2024, September). Worried about meta using your instagram to train its a.i.? here's what to know. *The New York Times*. Retrieved from https://www.nytimes.com/article/meta-ai-scraping-policy.html

Kaiba Co., Ltd. (2023, July). A first in the country! sakai city, fukui prefecture, is accepting ai art submissions from the public! the winning works will be used as "sakai city hometown tax return gifts"! this is the first initiative in which an image generation ai is officially adopted by a local government. this will be a stepping stone for ai creators (title translated from japanese). *PR TIMES*. Retrieved from https://prtimes.jp/main/html/rd/p/000000015.000105910.html

Kaneko, K. (2023, June). Organization founded to create guidelines for use of ai image generators. *The Japan Times*. Retrieved from https://www.japantimes.co.jp/news/2023/06/22/national/ai-image-guidelines-organization/

Kawamura, Y. (2024, Feb). "talking cola" developed with generative ai: Coca-cola's change in marketing strategy behind the development (title translated from japanese). *Nikkei XTrend*. Retrieved from https://xtrend.nikkei.com/atcl/contents/casestudy/00012/01398/

Knight, W. (2022, September). The joy and dread of ai image generators without limits. *WIRED*. Retrieved from https://www.wired.com/story/the-joy-and-dread-of-ai-image-generators-without-limits/

Ko, H.-K., Park, G., Jeon, H., Jo, J., Kim, J., & Seo, J. (2023, March). Large-scale text-to-image generation models for visual artists' creative works. In *Proceedings of the 28th international conference on intelligent user interfaces*. ACM. Retrieved from http://dx.doi.org/10.1145/3581641.3584078 doi: 10.1145/3581641.3584078

Kobayashi, Y. (2023, June). Ai illustration sales service "petapi" apologises for lack of consideration for creators amid criticism (title translated from japanese). *KAI-YOU*. Retrieved from https://kai-you.net/article/86934

Konjyaku Kimono Grand Market. (2023, April). *Konjyaku kimono grand market event poster using ai-generated art*. Retrieved from https://x.com/konjyaku_kimono/status/

1647968046802440192

Level-5 Inc. (2023). *Cropped sections of images created with stable diffusion utilized as background assets in a level-5 game.* Retrieved from https://automaton-media.com/en/wp-content/uploads/2023/12/20231213-24326-005.jpeg

Metz, R., & Ford, B. (2024, April). Adobe's 'ethical' firefly ai was trained on midjourney images. *Bloomberg*. Retrieved from https://www.bloomberg.com/news/articles/2024-04-12/adobe-s-ai-firefly-used-ai-generated-images-from-rivals-for-training

Morisawa, R. (2023, September). Majority of anime industry professionals want the use of ai to be legally regulated. *AUTOMATON WEST*. Retrieved from https://automaton-media.com/en/news/20230914-21651/

Natalie Music Editorial Department. (2023a, June). Blue encount releases new music video using image generation ai (title translated from japanese). *Natalie Music*. Retrieved from https://natalie.mu/music/news/527591

Natalie Music Editorial Department. (2023b, June). Yuzu's new song jacket was created using image generation ai (title translated from japanese). *Natalie Music*. Retrieved from https://natalie.mu/music/news/527566

Netflix, Inc. (2023). *Background process for netflix's "the dog & the boy" using a variation of stable diffusion developed by rinna co., ltd.* Retrieved from https://www.incgmedia.com/images/easyblog_articles/2644/b2ap3_large_netflix_ai.jpg

NHK WORLD-JAPAN. (2023a, November). Ai-generated episode of legendary black jack manga series unveiled. *NHK WORLD-JAPAN News*. Retrieved from https://www3.nhk.or.jp/nhkworld/en/news/backstories/2861/

NHK WORLD-JAPAN. (2023b, June). Ai manga project aims to continue astro boy creator's work. *NHK WORLD-JAPAN News*. Retrieved from https://www3.nhk.or.jp/nhkworld/en/news/backstories/2521/

Oppenlaender, J. (2022). The creativity of text-to-image generation. In *Proceedings of the 25th international academic mindtrek conference* (p. 192–202). New York, NY, USA: Association for Computing Machinery. Retrieved from https://doi.org/10.1145/

3569219.3569352 doi: 10.1145/3569219.3569352

Osaki, T. (2023, March). Machine magic or art menace? japan's first ai manga. *TechXplore*. Retrieved from https://techxplore.com/news/2023-03-machine-magic-art-menace-japan.html

Pal, S., & Lazzaroni, R. M. (2024, October). Ai's missing link: The gender gap in the talent pool. *Interface*. Retrieved from https://www.stiftung-nv.de/publications/ai-gender-gap

Piskopani, A. M., Chamberlain, A., & Ten Holter, C. (2023). Responsible ai and the arts: The ethical and legal implications of ai in the arts and creative industries. In *Proceedings of the first international symposium on trustworthy autonomous systems.* New York, NY, USA: Association for Computing Machinery. Retrieved from https://doi.org/10.1145/3597512.3597528 doi: 10.1145/3597512.3597528

Podell, D., English, Z., Lacey, K., Blattmann, A., Dockhorn, T., Müller, J., ... Rombach, R. (2023). *Sdxl: Improving latent diffusion models for high-resolution image synthesis.* Retrieved from https://arxiv.org/abs/2307.01952

Ramesh, A., Dhariwal, P., Nichol, A., Chu, C., & Chen, M. (2022). *Hierarchical text-conditional image generation with clip latents.* Retrieved from https://arxiv.org/abs/2204.06125

Rombach, R., Blattmann, A., Lorenz, D., Esser, P., & Ommer, B. (2022). High-resolution image synthesis with latent diffusion models. In *Proceedings of the ieee/cvf conference on computer vision and pattern recognition* (pp. 10684–10695).

Roosa Wingström, J. H., & Lundman, R. (2024). Redefining creativity in the era of ai? perspectives of computer scientists and new media artists. *Creativity Research Journal*, *36*(2), 177–193. Retrieved from https://doi.org/10.1080/10400419.2022.2107850 doi: 10.1080/10400419.2022.2107850

Ruiz, N., Li, Y., Jampani, V., Pritch, Y., Rubinstein, M., & Aberman, K. (2023). Dreambooth: Fine tuning text-to-image diffusion models for subject-driven generation. In *2023 ieee/cvf conference on computer vision and pattern recognition (cvpr)* (p. 22500-22510). doi: 10.1109/CVPR52729.2023.02155

Santo, L. E., Santos, A. C., & Inácio, M. L. (2023). Focusing on artists' needs: Using a cultural probe for artist-centred creative software development. In *Proceedings of the 14th international conference on computational creativity (iccc'23).*

Santos, R. (2022, November). Can ai-generated art replace creative humans? *VICE*. Retrieved from https://www.vice.com/en/article/epzkwm/artificial-intelligence-art-creatives-ai

Sauer, A., Boesel, F., Dockhorn, T., Blattmann, A., Esser, P., & Rombach, R. (2024). *Fast high-resolution image synthesis with latent adversarial diffusion distillation.* Retrieved from https://arxiv.org/abs/2403.12015

Schuhmann, C., Beaumont, R., Vencu, R., Gordon, C., Wightman, R., Cherti, M., ... Jitsev, J. (2022). Laion-5b: An open large-scale dataset for training next generation image-text models. In S. Koyejo, S. Mohamed, A. Agarwal, D. Belgrave, K. Cho, & A. Oh (Eds.), *Advances in neural information processing systems* (Vol. 35, pp. 25278–25294). Curran Associates, Inc. Retrieved from https://proceedings.neurips.cc/paper_files/paper/2022/file/a1859debfb3b59d094f3504d5ebb6c25-Paper-Datasets_and_Benchmarks.pdf

Shaffi, S. (2023, January). 'it's the opposite of art': why illustrators are furious about ai. *The Guardian*. Retrieved from https://www.theguardian.com/artanddesign/2023/jan/23/its-the-opposite-of-art-why-illustrators-are-furious-about-ai

Shan, S., Cryan, J., Wenger, E., Zheng, H., Hanocka, R., & Zhao, B. Y. (2023, Aug). Glaze: Protecting artists from style mimicry by Text-to-Image models. In *32nd usenix security symposium (usenix security 23)* (pp. 2187–2204). Anaheim, CA: USENIX Association. Retrieved from https://www.usenix.org/conference/usenixsecurity23/presentation/shan

Shan, S., Ding, W., Passananti, J., Wu, S., Zheng, H., & Zhao, B. Y. (2024, May). Nightshade: Prompt-specific poisoning attacks on text-to-image generative models. In *2024 ieee symposium on security and privacy (sp)* (p. 807-825). Los Alamitos, CA, USA: IEEE Computer Society. Retrieved from https://doi.ieeecomputersociety.org/10.1109/

SP54263.2024.00207 doi: 10.1109/SP54263.2024.00207

Shi, J., Jain, R., Duan, R., & Ramani, K. (2023). *Understanding generative ai in art: An interview study with artists on g-ai from an hci perspective.* Retrieved from https://arxiv.org/abs/2310.13149

Shinchosha Publishing Co., Ltd. (2023, March). *Pages of "cyberpunk momotaro" manga using images generated by midjourney.* Retrieved from https://media.cnn.com/api/v1/images/stellar/prod/230309220022-01-japan-ai-manga-handout.jpg

Silberling, A. (2024, June). A social app for creatives, cara grew from 40k to 650k users in a week because artists are fed up with meta's ai policies. *TechCrunch*. Retrieved from https://techcrunch.com/2024/06/06/a-social-app-for-creatives-cara-grew-from-40k-to-650k-users-in-a-week-because-artists-are-fed-up-with-metas-ai-policies/

SnackTime Inc. (2024). *Image protected with watermarking using mist (left) vs. genai attempts to mimic an image that has been watermarked with mist (right).* Retrieved from https://automaton-media.com/en/wp-content/uploads/2024/01/20240119-25818-001-1.jpg

Stability AI Ltd. (2023, November). *"profile photo of a high school boy" (left: Dalle-3, center: Translated prompt+sdxl, right: Jsdxl).* Retrieved from https://images.squarespace-cdn.com/content/v1/646b4513dbebfb2c0adc2b52/bd646ee9-91dc-45a0-b329-ea88f8ba2a19/%E3%82%B9%E3%82%AF%E3%83%AA%E3%83%BC%E3%83%B3%E3%82%B7%E3%83%A7%E3%83%83%E3%83%88+2023-11-16+19.40.27.png

Stability AI Ltd. (2024, April). We have released a text-to-image model "japanese stable diffusion xl" that is available for commercial use and is specialized for japan (title translated from japanese). *Stability AI Japan*. Retrieved from https://ja.stability.ai/blog/japanese-stable-diffusion-xl

Sugimoto, H. (2024, April). Creators feel threatened by generative ai, but some say they'd like to use it if it's clean. what's the path to coexistence? (title translated from japanese). *Magmix*.

Retrieved from https://magmix.jp/post/224092

Sætra, H. S. (2023). Generative ai: Here to stay, but for good? *Technology in Society*, *75*, 102372. Retrieved from https://www.sciencedirect.com/science/article/pii/S0160791X2300177X doi: https://doi.org/10.1016/j.techsoc.2023.102372

Tatsuki, M. (2024, Jan). "ibis paint" releases new feature that shows "ai illustration examples" → withdrawn after just one day "due to user feedback" (title translated from japanese). *ITmedia NEWS*. Retrieved from https://www.itmedia.co.jp/news/articles/2401/10/news165.html

Tezuka Productions Co., Ltd. (2023). *Tezuka-like female character candidates generated with stable diffusion for the new manga installment of "black jack"*. Retrieved from https://www3.nhk.or.jp/nhkworld/en/news/backstories/2861/images/Y2vDs2fkC9OKgtivqAnxI8CRUeU3AEJslUD4PGog.jpeg

The Yomiuri Shimbun. (2023, Nov). Ai helps create new "black jack" manga episode for osamu tezuka's iconic maverick doctor. *The Japan News*. Retrieved from https://japannews.yomiuri.co.jp/culture/manga-anime/20231121-150901/

tks24. (2023, July). Ai illustration sales service "petapi" announces shutdown just one and a half months after launch (title translated from japanese). *INTERNET Watch*. Retrieved from https://internet.watch.impress.co.jp/docs/yajiuma/1516111.html

Toshi, K. (2023, June). Japan's digital future depends on women. *Nikkei Asia*. Retrieved from https://asia.nikkei.com/Spotlight/Datawatch/Japan-s-digital-future-depends-on-women

Townsend, V. (2023, December). Japanese game developer level-5 reveals how they use generative ai like stable diffusion. *AUTOMATON WEST*. Retrieved from https://automaton-media.com/en/news/20231213-24326/

Townsend, V. (2024, January). Japanese tool protects your artwork from ai learning. *AUTOMATON WEST*. Retrieved from https://automaton-media.com/en/news/20240119-25818/

Toyota Research Institute. (2023, Jun). Toyota research institute unveils new generative ai technique for vehicle design. *Toyota USA Newsroom*. Retrieved from https://pressroom.toyota.com/toyota-research-institute-unveils-new-generative-ai-technique-for-vehicle-design/

V, A. (2023a, August). Famous japanese illustrator accused of using ai generated art, proves claims false with evidence. *AUTOMATON WEST*. Retrieved from https://automaton-media.com/en/news/20230815-20729/

V, A. (2023b, July). How shueisha tried to ai-generate every man's dream girl and why she's gone. *AUTOMATON WEST*. Retrieved from https://automaton-media.com/en/nongaming-news/20230608-19386/

V, A. (2023c, April). Kimono event comes under criticism for ai-generated illustration. *AUTOMATON WEST*. Retrieved from https://automaton-media.com/en/nongaming-news/20230426-18637/

V, A. (2024, February). Could ai replace manga artist assistants? ai startup founder shows "16-page manga completed without drawing," sparking discussion about loss of human jobs. *AUTOMATON WEST*. Retrieved from https://automaton-media.com/en/news/20230926-21837/

Viber Media S.a.r.l. (2023, May). Rakuten viber launches official chatbot "viber ai chat" using generative ai (title translated from japanese). *Rakuten Group, Inc. News*. Retrieved from https://corp.rakuten.co.jp/news/update/2023/0519_01.html

Vimpari, V., Kultima, A., Hämäläinen, P., & Guckelsberger, C. (2023, September). "an adapt-or-die type of situation": Perception, adoption, and use of text-to-image-generation ai by game industry professionals. *Proceedings of the ACM on Human-Computer Interaction*, *7*(CHI PLAY), 131–164. Retrieved from http://dx.doi.org/10.1145/3611025 doi: 10.1145/3611025

Vincent, J. (2022, September). Anyone can use this ai art generator - that's the risk. *The Verge*. Retrieved from https://www.theverge.com/2022/9/15/23340673/ai-image-generation-stable-diffusion-explained-ethics-copyright-data

Waxy.org. (2022, November). *Artwork by hollie mengert (left) vs. images generated with a stable*

diffusion model fine-tuned to her style using dreambooth (right). Retrieved from https://waxy.org/wp-content/uploads/2022/10/comparison2.jpg

Wiggers, K. (2022, August). Deepfakes: Uncensored ai art model prompts ethics questions. *TechCrunch*. Retrieved from https://techcrunch.com/2022/08/24/deepfakes-for-all-uncensored-ai-art-model-prompts-ethics-questions/

Woodman, K. (2024, January). Initiative to integrate ai and blockchain technology into anime production causes mixed responses in japan. *AUTOMATON WEST*. Retrieved from https://automaton-media.com/en/news/20240115-25474/

Xiang, C. (2022, September). Ai is probably using your images and it's not easy to opt out. *VICE*. Retrieved from https://www.vice.com/en/article/3ad58k/ai-is-probably-using-your-images-and-its-not-easy-to-opt-out

Xiang, C., & Maiberg, E. (2022, September). Isis executions and non-consensual porn are powering ai art. *VICE*. Retrieved from https://www.vice.com/en/article/93ad75/isis-executions-and-non-consensual-porn-are-powering-ai-art

Zwass, V. (2024, March). expert system. *Encyclopedia Britannica*. Retrieved from https://www.britannica.com/technology/expert-system