

Generated tools: A Defamiliarizing Approach to Creating ML Art

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Abstract

In recent years there has been an increase in the adoption of machine learning (ML) systems that can generate novel images. This increased use may reveal the beginning of a familiarity in which the implications of these emerging technologies are naturalised or made increasingly invisible. Thus, practices which can disrupt familiarity may allow us to create experiences of heightened awareness in which we can consider our engagement with this emerging technology. In this paper, I discuss the outcomes of working with a Generative Adversarial Network (GAN), using a dataset created from the hand tools section of a popular Australian hardware store. Through this creative practice, I investigate how artists can use ML as mechanisms for creating artworks that disrupt, investigate and defamiliarize the known.

Keywords

Generative Adversarial Networks, Machine Learning, Creative Artificial Intelligence, Tools, Generative Art.

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Introduction

As digital technologies are increasingly embedded into the everyday and the ways we construct and interact within our world perception, it has been noted that they also become increasingly familiar, invisible, or subconscious.¹ While often perceived as a 'tool'—an extension of the human hand designed to fulfil a certain function—our relation to technology is increasingly being understood as a symbiosis of interdependence.² Furthermore, the co-evolutionary relationship between tools and humans has also been noted—highlighting the influence these 'tools' have in shaping us, as we shape them.³ As we continue to see, use, and adopt these tools, they become increasingly familiar and every day. However, with this increased familiarity may come a decrease in active or conscious visibility resulting in the loss of regular inciting provocation to question how we relate, interact, and construct our perception of the world with these technologies. Thus, techniques of making the familiar unfamiliar may be a strategy for creating experiences of heightened perception of or critical engagement with technology.

Generated tools (2021) is a practice-based research project in which I worked with a GAN to create an installation that features tools as subject matter. In this, I am exploring how we can use ML conceptually to create defamiliarizing experiences which may allow us to critically reflect upon and re-engage with concepts, worldviews and ideas which have been naturalised. ML that can generate images is compelling technology—sparking new ways of making and creative possibilities. However, it also has the potential to be a reaffirming conservative force, as it is informed by the training dataset and may familiarize and perpetuate the visuals, ideas and assumptions hosted within.⁴ While this reliance upon the dataset may pose a risk if we engage uncritically—this also presents the opportunity for artists to disrupt, explore and denaturalise the known. Thus, through the documentation and discussion of work created with a GAN, this paper presents the concept of defamiliarization as one approach for understanding the potential impact or possibilities of working with ML to generate art.

Tools, Technology, and Familiarity

There has been much critical reflection on the relationship between humans and tools—both in how tools present an invisible familiarity, as well as in the

mutual influence we exert. Martin Heidegger explained tools as "ready-to-hand", meaning as long as they function correctly or to our expectations, they remain concealed from view, or not in our conscious presence.⁵ However, while tools typically fade into the realm of the unconscious everyday, they also reveal a co-evolutionary relationship between tools and humans. While we typically narrativize our relation to tools as being a one-way influence, contemporary philosophical approaches recognise that it is more of a symbiosis. To solve an issue or to respond to our environment, we create new tools, which in turn change how we act and lead to the discovery of new problems or use cases for tools as this cycle repeats itself.⁶

Similar lines of thought have also been applied to technology. It has been suggested that technology is an extension of ourselves with which we cohabit a shared ecosystem. Through this cohabitation, we are able to coextend our skills, capabilities, and properties, changing how we act in ways we perceive as beneficial, and in turn leading to the development and adoption of new technologies.⁷

However, as this cycle of development and adoption continues, this cohabitation becomes increasingly familiar or subconscious.⁸ While technological innovation feels novel at first, over time with increased adoption and use, repeated interaction results in a comfortable familiarity that doesn't necessarily encourage reflection or critical engagement.

In the past 5 years, there has been increased adoption of ML systems that can generate novel images. While there is a large amount of general 'hype' and awareness, the development of systems like DALLÉ-2, Stable Diffusion and Mid Journey, which all have user-friendly demos and applications hosted online, alongside apps like WOMBO Dream and TikTok's green screen AI filter, may reveal the beginning of familiarity, or a future of familiarity with ML systems.

Defamiliarization and visual indeterminacy

If familiarity reduces technology to the subconscious, thus dampening opportunities to be aware of how we relate to and are shaped by it, unfamiliarity becomes a potential strategy for sparking conscious engagement. Coined by Viktor Shklovsky in 1917, defamiliarization is understood as a tactic for creating heightened awareness or perception by halting our automatic assumptions about a subject, allowing us to view it again

for the first time.^{9, 10, 11} The goal of such a practice is not to reveal a more objective truth about a subject, but rather to create a heightened perception of how we construct, understand, and relate to the subject.¹² Defamiliarization has also been identified as a common tactic employed by digital artists to create experiences of critical distance between audiences and technology, to temporarily make the familiar unfamiliar for heightened perception to be achieved.¹³

The ways that artists enact this varies broadly, as it is understood that all art forms can generate a defamiliarizing effect.¹⁴ However, one emerging approach related to ML is visual indeterminacy. It has been noted that GANs typically create uncanny, strange, or visually indeterminate images.¹⁵ Visual indeterminacy, as well as ambiguity and uncertainty, has also been recognized as useful tools for prompting multiple interpretations or disrupting an artefact's socially encoded properties.^{16, 17} Furthermore, artists may be able to engage the differences between our logic and the chosen system's logic to create defamiliarizing effects. For example, when working with image-based ML, we understand images as representations of objects, scenes, and worldly concepts, while a system like a GAN is attempting to map the underlying structural logic of the dataset at a pixel level. Engaging the system's ability to recreate patterns within the dataset, we can generate coherent and recognisable forms. However, by navigating their latent spaces, we can push them to create semi-coherent, or visually indeterminate forms. Thus, working with ML to generate art may present opportunities to denaturalise our understandings through visual indeterminacy or strangeness, via this difference in structural logic.

Installation description

The installation consists of a tool wall which houses three instances of working with a StyleGAN2 trained using a dataset of images of hand tools sourced from the Bunnings Warehouse website (an iconic Australian hardware store).¹⁸ The first instance shows 3D printed tools, modelled and printed using the generated images by the GAN as reference. The second instance shows 2D "latent space walk" videos projected on the tool wall, created by incrementally sampling the latent vector space generated by the GAN. The final instance shows doctored Bunnings Warehouse product catalogues, featuring images of tools generated by the GAN. Audience members are encouraged to engage with the

work by flipping through the product catalogues, as well as being able to pick up, play with and rearrange the 3D printed objects on the tool wall.



Figure 1. Image of Tool Wall Installation featuring 3D prints and 2D project latent space walk videos.

3D Printed tools

While images created by ML systems are becoming increasingly familiar, we most commonly encounter them in digital spaces, as images or animations. Thus, one goal of the work was to translate the generated images into 3D objects to observe whether this could be a method of creating defamiliarizing experiences. The 3D printed tools were created by first generating a series of images using a StyleGAN2 trained on a dataset of images of hand tools sourced from the Bunnings Warehouse website. While the GAN is trained using these images of hand tools, how these tools exist and function in conceptual space is not captured. Thus, when it generates images of tools it does so with no consideration of functionality—creating tools that have no clear associated uses. Simultaneously, we can expect the generated images to be aesthetically tool-like as the GAN is attempting to replicate the original dataset and

find its underlying structural logic. Thus, the work explores whether the 'uselessness' of the GAN-produced artefacts is an effective tactic of defamiliarization.

Margaret Boden discusses 'useless' artefacts as having the ability to playfully challenge expectation, while bringing the typical affordance of similar items to the foreground.¹⁹ Tools are useful—but most of the time they are not being used—hung upon tool boards like artworks, neatly organised in boxes like collectables, or haphazardly thrown in draws like junk. They often also hold semantic and sentimental value - tools are given as gifts, passed down through families and lent between friends and communities. If tools remain concealed from perception so long as they function correctly, how does encountering inherently useless tools bring these hidden 'uses' to the foreground?²⁰



Figure 2. GAN generated image of a tool.

The generated images were then curated and used as references to model and texture 3D tools in Autodesk Maya and Mudbox. Reference images were selected through a process of working through the generated images and selecting a broad range of shapes, tool-like iconography and sizes that existed within the possibility space. The goal when modelling and texturing the tools was to follow the reference images closely, while also recognizing the inherent role of interpretation when translating from 2D to 3D. These models were then 3D printed using a variety of grey, black, and aluminium filament. The results are visually and texturally strange, tool-like artefacts. As they were modelled using the StyleGAN2 curated images as reference, they have a visually indeterminate quality—with familiar elements (e.g. handles, pointy ends, and bits and pieces of recognizable tools) combined or blurred in unfamiliar ways. Further, since they are 3D printed, the tools have unique ridges, divots and holes which create an unfamiliar hand feel. The light-weight material of the filament creates a unique engagement with the tools which we typically associate with rubbery, metal, and heavy sensations.



Figure 3. 3D print of GAN generated image of a tool.

Through the combination of recognizable tool-like elements in unfamiliar ways with the 3D printed materiality, the familiar functions and feelings that are tied to how we perceive, construct and experience tools subconsciously are no longer present—opening the space for new interpretations and speculation. As audiences would approach the strange tools, typically their first reaction was to generate a new use case for the tool. In short, this element of the work combines visual indeterminate 'useless' tools supplied by the GAN with subversive, textural 3D prints to create a speculative experience for audiences, engaging difference in structural logics, visual indeterminacy and unfamiliar materiality as tactics of defamiliarization.

2D latent space walk videos

The projected 2D latent space walk videos were created using the possibility space generated by the StyleGAN2 trained on the dataset of hand tools. Latent space walk videos involve the sampling and incremental changing of points in the latent vector space which can then be used to create animations. As the system was trained on a dataset of hand tools, the resulting animations present fluid tools that merge and shape into one another. While we typically conceptualise tools in a worldly context—with clear boundaries, defined shape language and affordances that are affirmed via learnt aesthetics (e.g., handles, spouts)—the GAN's distribution renders a more fluid visualisation.

Thus, the work is interested in whether the visual indeterminacy created by the GAN is an effective strategy of defamiliarization. As visual indeterminacy is understood as a tactic to engage audiences with the active nature of seeing and meaning making, it may engender defamiliarizing experiences.^{21, 22} Furthermore, visually indeterminate art prolongs perception through the combination of "apparently detailed and vivid images resist identification."²³ The generated latent

space walk videos thus present strange tools trained using a highly recognisable visual dataset, which now resist specific identification via the GAN's involvement. Whether this resistance of identification invokes the active nature of seeing, or creates experiences of heightened perception is unclear—does coming into the contact with the work go beyond strange? Do these splodgy, blurry tools engender an active awareness or reflection on the symbiotic nature of tools and technology?

Product catalogue

Accompanying the tool wall are doctored product catalogues which have been inserted with images of tools generated by the GAN. Using Photoshop, the original composition of the catalogue was closely followed as the GAN generated tools were added based on their perceived visual similarities. The goal was to create a catalogue that could be believably passed off as real at first glance.

The resulting catalogue is a mixture of the original text, lifestyle images, prices, and generated tools. This presentation results in a double-take effect. Unlike the 3D printed tools which are outwardly alien or strange by design, in this presentation, they almost look like real tools inside of a real catalogue at a cursory glance. The context the product catalogue provides—the text, price tags, product descriptions, branding and lifestyle images—almost act as visual vouchers for authenticity of these generated tools.

Returning to defamiliarization, Shklovsky positions the purpose of art as to “make forms difficult, to increase the difficulty and length of perception because the process of perception is an aesthetic end in itself and must be prolonged.”²⁴ Thus, the work engages surprise, understood as violation of expectation²⁵, and appropriation as potential strategies of defamiliarization. By appropriating the catalogue and inserting familiar, yet strange tool-like artefacts, the doubletake causes an increase in perception, calling us to look a little closer and make sense of the nonsensical tools.

In this, the work explores whether the surprise and absurdity of the nonsensical catalogue provides space to investigate the socially coded meanings present in the subject matter that are familiar and normalised. For example, does the messaging and imagery surrounding Father's Day become less natural or familiar through the introduction of the generated tools?



Figure 4. Doctored Bunnings product catalogue featuring GAN generated images of tools.

Conclusion

As the practice of generating images using ML becomes increasingly familiar, we need to be aware and considerate of the ways it may naturalise or reinforce worldviews, categories, and ideas via this engagement. However, just as ML has the ability to be conservative, to narrow in on the dataset and to perpetuate the ideas within—so too can artists employ it to disrupt, investigate and defamiliarize the known.

Through the documentation and analysis of my work, *Generated Tools (2021)*, this paper presents an experimental approach to generating art with ML to create defamiliarizing experiences. As a part of this discussion, I have explored how artists can engage with visual indeterminacy and the structural logics of ML systems, as a method for disrupting the assumed, and reapproaching the known with fresh perspective.

Furthermore, through the analysis of the 3D prints, projected latent space walk videos and doctored product catalogues, I have investigated how the presentation of ML generated images can create, alter, and deepen the defamiliarization experience.

In this I am interested in how we can ‘make strange’ in ways that matter. As ML presents unique opportunities for defamiliarization—how can artists defamiliarize in ways which persist beyond the initial encounter? How

can we blur, splodge and surprise with ML in ways that recover both the subjects of datasets and technologies themselves from the automatism of perception and use?

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