The Benefits and Drawbacks of AI Generated Images
(Technical Paper)

How Accessibility in Computer Interfaces Affect Society
(STS Paper)

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Joseph Moretto
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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

ADVISORS

Daniel Graham, Computer Science

Bryn E. Seabrook, PhD, Department of Engineering and Society

How Accessibility in Computer Interfaces Affect Society

Introduction

Accessibility at its core is allowing all to use or participate in a service, product, activity, or anything that can be made accessible, so that no one is excluded. Accessibility can both make a product easier to use or it can allow for people that could not participate to partake. The benefits of accessibility can range from making products more accessible to a wider audience or making it so those with disabilities can use the product in the first place (Mortensen, n.d). Additionally, accessibility can benefit a larger audience than whom it's originally targeting. What does accessibility mean in computers?

Accessibility in computers can be in the form of tools which allow for more efficient and easier usage of what the tools specialize in. The interface is also a form of accessibility in computers which allows for certain people to use computers and others to more easily use computers and increases their efficiency (Niggl, 2021). While accessibility is overwhelmingly positive, it does have some downsides. The ability to perform cyber-attacks is also made more accessible with more people being targets. Being easier to access may cause users to put less effort in learning the system. The proposed technical research paper will cover AI generated images and their benefits and downfalls. This research is motivated by the emergence of open-source AI generation software that is accessible to the public. This research also ties into the proposed STS paper as it highlights the benefits and possible drawbacks of accessibility in relation to a specific technology.

The STS research paper will examine the interconnected STS frameworks of technological determinism and social construction. Technological determinism is the idea that

technology drives changes in society (Smith, 1994). Social determinism is the opposite in which society determines the development of technologies. A critique of technological determinism and social determinism is the existence of each other as opposites, such that one of these frameworks is more prominent than the other. This paper will handle the critique technological determinism and social determinism with the idea of despite being opposites, both can occur simultaneously and feed into each other. Technological advancement changes society and in turn society then changes the technology to better suit the needs of the current culture (Smith, 1994). The framework of wicked problems will also be used in the technical report to describe some of the problems with AI image generation. Wicked problems are problems that are very hard or even impossible to solve because of either the scope of the problems, conflicting goals, or a lack of a clear definition to work on (Seager, Selinger , & Wiek, A, 2011).

Technical Topic

Stable diffusion is the latest open-source image generation AI using machine learning. The main difference in concerns to general users is the overall quality and accessibility of the platform. While previous iterations of available image generation would have very poor quality in the average of its generated images, current technologies can lead to very high-quality generated images on average (Mostaque, 2022).

The platform is open source allowing for modifications and development by everyone. Stable diffusion is relatively easy to install and use compared to previous iterations. Stable diffusion may require some troubleshooting and guide consulting to work, but the installation is simple enough to not require an expert to install and operate. The image generation UI is relatively simple, with all that is required on base level is a user prompt and a push of a button to

get started. While still there being depth in the tuning of parameters to modify the results for more experienced users (Edwards, 2022).

While the base machine algorithm is what makes these results possible, the model that is used by the algorithm is very important to the style and quality of the images generated. A model in this case is a machine learning model that is trained on data to recognize patterns and construct results based on the patterns. A basic example of this would be to train a model on facial expressions and then using that model a machine learning algorithm would be able to identify the type of facial expression on new data.

In this case the models are trained on various images and then can generate images based on those images (Edwards, 2022). Training on artists' works brings up the issues of possible plagiarism, does the model and algorithm copy from the images or does it recognize patterns from images and construct new images from those patterns. While technically the answer is the latter, it is not so simple.

The definitions of plagiarism in images are not numerically defined. If a model learns from fifty thousand images and uses the patterns derived from several hundred images in response to a specific prompt to generate a part of an image, is that plagiarism? This is a wicked problem because the definitions are not concrete on this topic, making it difficult to determine what counts as plagiarism (Sandberg 2022).

"Plagiarism is presenting someone else's work or ideas as your own, with or without their consent, by incorporating it into your work without full acknowledgement" (Plagiarism. University of Oxford, n.d). With art, many works are inspired from other works. An artist may be inspired from a piece of work that overall changes their style and future works. Artists also

may copy a style or create a piece of work based on another artist to pay respect to them while crediting them, which is typically not considered plagiarism (Nishiyama, 2022).

Sometimes for an artist inspiration may be subconscious and may be drawn from many different works as the human mind can only imagine or derive from what it's already seen. With humans it is near impossible to determine the inner workings of an artist's mind to see what exactly developed their style. With AI image generation, it is a different story in terms of source. Set images are used to train the models that the AI uses to have pattern recognition. While the source is defined, how much is exactly derived and how it learned is not known because Stable diffusion uses deep neural networks in their training (Hardesty, n.d).

Neural networks are algorithms that are designed to mimic the learning process and pattern recognition of the human brain. Neural networks are created using virtual interconnected nodes with weights that emulate how neurons in the brain work (Hardesty, n.d). With deep neural networks it can be difficult to impossible to determine what "inspiration" the AI gathered and in what quantities. The overall deliverable of the technical project is a report that examines the benefits of the image generation technology and the ethical concerns involving plagiarism.

STS Topic:

Computers have not always been very accessible. The first computers were only available to few highly technical organizations because of their immense size, cost, and involved maintenance. Because of the barrier to entry, computers were rare. Since greater part of society did not have access to computers, accessible user interfaces were not too much of a priority as only trained users were using computers. As computers developed, they became easier to use, being able to take in keyboard input and having displays to show information (Timeline of

Computer History, n.d). As a wider range of people were using computers the need for better interfaces was necessary as it was complex and unwieldy to use computers in the late 70's compared to today (Timeline of Computer History). The needs of society then went to influence the development of computers, with better user interfaces being made to better accommodate newer users (What really makes software user friendly, n.d).

While not limited to, accessibility is widely used for people with disabilities. There are many technologies and techniques that are used for people with disabilities ranging from modified or alternate input devices to software assistance (Burgstahler, n.d). For those with lower levels of dexterity there are modified keyboards with different layouts and spacing between keys to allow for easier usage. Alternative input devices have been designed for people that are unable to use keyboards. One such device is the "sip and puff" which is a device and software that cycles through options on the display and the user can choose the specific option that is highlighted by puffing air into the device (Bird, 2021). Other interfacing options include face pointing, foot pedals, simple switches, and more. Eye tracking software can be used to select and click on parts of the interface. There are also text magnifications with those with poor eyesight. People with blindness utilize text to speech and speech to text among other software to interface with computers. Captions are used for people with auditory disabilities (Bird, 2021).

The creation and advancements of these technologies have primarily been for the purpose of helping those with disabilities, however some of these technologies and techniques are used by society as a whole. The curb cut effect is where actions taken to benefit those with disabilities end up benefiting a larger group of people (Mortensen, n.d). The term curb cut effect originated from adding depression into curbs at pedestrian crossing to allow for easier movement for people with mobility disabilities. The curb cuts ended up benefiting everyone as it is easier than

stepping over a curb for everyone and made it much easier for any wheeled device to cross, such as suitcases and bikes. Captions were originally created for people with auditory impairments, but found wider usage for people in loud environments, learning to read, and watching videos in foreign languages (Mortensen n.d). Text to speech helps users learn to pronounce words and is an alternative to reading. Speech to text is used as a tool for easier typing. The curb cut effect has applied to computer science, with many advancements being made for a group of people going on to benefit a wider audience of users (Bird, 2021).

For the most part, accessibility is a force for good, but if a product or service can be misused, accessibility widens the audience of potential bad actors. An example of this lies in cybersecurity with the increasing accessibility and access to tools. Tools in the field of cybersecurity allow for many tasks to be accomplished more efficiently, but also much more easily. Being able to take advantage of the vulnerability of a service and creating a payload would require a specific skill set that only those with a certain amount of experience could accomplish (Thomas, 2022).

Using tools however, the barrier to entry is much lower. Using a cybersecurity tool such as Metasploit allows for a user to look up and select a payload for existing vulnerabilities then it applies it for the user. The accessibility of tools is a wicked problem as while the tools are used by those in cybersecurity, they are also used by bad actors. While accessibility increases the overall audience, which means an increase in bad actors, it also increases the number of good actors within the cybersecurity world. Without those tools it would be more difficult for both parties and there would be less of both. There is not a clear-cut solution to this problem as actions to access to bad actors may curb beneficial accessibility to good actors (McDowell, 2021).

Research Methodology

More research will be conducted to answer: How Accessibility in Computer Interfaces Affects Society? Sources involving the development of accessibility in computers, current accessibility methods, and accessibility of cybersecurity tools will be gathered. The curb cut effects of certain innovations in computers will be researched to answer the STS question. The development of accessibility in computers will show that societal factors have influenced the development of technological through social determinism. The changes in society from those innovations will show technological determinism. Research into cybersecurity tools and certain types of hacking will show that accessibility can be a wicked problem when applied a product, service, or activity that can be misused.

Conclusion

The STS research paper will demonstrate the interconnected effects of accessibility on computers and society. The goal to increase the understanding of and importance of accessibility in computer. The curb cut effect through multiple technologies will be demonstrated and show how they accessibility benefit a wider variety of people than initially intended. The technical report will explain and go into detail the recent advancements of AI image generation. It will tie into the STS topic as the technology is accessible to the general public. The possible drawbacks of this technology will be explored such as possible plagiarism and creating slanderous images. The project will attempt to define these problems if possible and propose solutions based on those definitions.

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