

Navigating the Social Media Landscape

By Erin Blanding

Advisors: Dr. Victoria Szabo, Dr. Jasmine Cobb, and Brad Brinegar

Program II Graduation with Distinction Thesis

Duke University
Durham, North Carolina
2024

How does the TikTok algorithm know what you are thinking before you even search it up? How do influencers rise to popularity? What does it take to capture a digital audience's attention in a saturated online atmosphere? Given the trajectory of artificial intelligence and its proliferation online, will there be any way to distinguish what is “real” and what is “fake”?

Navigating the current social media landscape for creators and brands alike is a constantly evolving game of attempting to work with the algorithm instead of against it. TikTok’s “for you” feed revolutionized social media by prioritizing predictions of what users would *want* to see, rather than curating content they have already expressed an interest in. This has changed the way many popular social media platforms have organized their content. In combination with recommendations backed by unthinkable amounts of data, users are inundated with a never ending stream of addicting media that can have consequences socially and financially. This thesis delves into the relationship between content, data and data privacy concerns, artificial intelligence, and digital strategy as it relates to both individuals and companies in an ever changing, deeply interconnected digital environment.

Introduction

TikTok is one of the most popular social media applications of this day and age, with more than 150 million U.S. based users in 2023¹. Rather embarrassing to admit, I average about 3.5 hours each day on TikTok. The app has become both a formidable economic power and social force, generating over \$1 billion in consumer spend each quarter.² According to a Pew research study, 33% of U.S. adults reported that they use TikTok, a 12% increase since 2021.³ Isolation due to the COVID-19 pandemic led many of my peers and I to invest quite a lot of energy into the platform. By examining TikTok's policies within the broader context of data privacy concerns, I first explore the relationship between consumer data and digital marketing. Then, I investigate artificially generated content and the impact it has on a variety of audiences online. A discussion of current and future legislation related to social media follows, as well as speculation about the future of the digital sphere.

In 2020, Donald Trump attempted to ban TikTok due to the Chinese ownership of the app's parent company, ByteDance. Initial concerns centered around American data privacy in the event of the Chinese government demanding data collected through the

¹ Barkho, Gabriela. "In Its Quest to Recruit More Sellers, Tiktok Shop Is Targeting Some Etsy Merchants." Modern Retail, February 26, 2024. <https://www.modernretail.co/technology/in-its-quest-to-recruit-more-sellers-tiktok-shop-is-targeting-some-etsy-merchants/>.

² "State of Mobile Report." data.ai, 2023.

³ Gottfried, Jeffrey. "Americans' Social Media Use." Pew Research Center: Internet, Science & Tech, January 31, 2024.

<https://www.pewresearch.org/internet/2024/01/31/americans-social-media-use/#:~:text=among U.S. teens.-,TikTok sees growth since 2021,the past couple of years.>

app.⁴ Much of this privacy issue has been occluded by blatant racism and xenophobia.⁵ TikTok is not allowed on any official US government devices, a precaution also taken by Australia, Belgium, Canada, Denmark, the Netherlands, New Zealand, Norway, Taiwan, and the UK. Afghanistan, India, Nepal, and Somalia have each banned TikTok altogether.⁶ TikTok is also banned in China.⁷ Previous attempts to ban the app in the U.S. have been unsuccessful, and more recent attempts are discussed in depth later in this paper.

In 2008, reading the privacy policies a person encountered in a year would require 76 work days.⁸ This number has undoubtedly grown exponentially given our growing dependence on phones and computers within the last 15 years. Through an examination of TikTok's privacy policies, terms of service, community guidelines and other documents, I will illustrate a variety of concerns centering around app transparency, content recommendation systems, and user privacy. Much of this evidence is paraphrased from the aforementioned policies and is far from comprehensive. Most of the company's policies are extremely vague and hard to interpret, with countless grammatical errors that undermine TikTok's credibility. This is

⁴ Allyn, Bobby. "Trump Signs Executive Order That Will Effectively Ban Use of TikTok in the U.S." NPR, August 7, 2020. <https://www.npr.org/2020/08/06/900019185/trump-signs-executive-order-that-will-effectively-ban-use-of-tiktok-in-the-u-s>.

⁵ Soo, Zen. "Singaporeans Bemoan U.S. Senator's 'ignorant' Grilling of TikTok CEO." AP News, February 2, 2024. <https://apnews.com/article/tiktok-shou-chew-singapore-cotton-af72f8d53686f8bb378aec1193cdee6c>.

⁶ Chan, Kelvin. "Here Are the Countries That Have Bans on TikTok." AP News, April 4, 2023. <https://apnews.com/article/tiktok-ban-privacy-cybersecurity-bytedance-china-2dce297f0aed056efe53309bbcd44a04>.

⁷ "TikTok Ban: China Attacks 'Bandit Logic' of House Vote." n.d. Wwww.bbc.com. Accessed April 17, 2024. <https://www.bbc.com/news/world-us-canada-68564531#>.

⁸ Madrigal, Alexis C. "Reading the Privacy Policies You Encounter in a Year Would Take 76 Work Days." The Atlantic, March 1, 2012. <https://www.theatlantic.com/technology/archive/2012/03/reading-the-privacy-policies-you-encounter-in-a-year-would-take-76-work-days/253851/>.

by no means legal advice, rather an examination of countless contradictions I noticed within their policies as a user of the application myself.

New developments in Artificial Intelligence (AI) tools have resulted in the proliferation of AI generated images and voice all over social media. The widespread impact of AI generated video has yet to be seen. Once Sora, OpenAI's new text-to-video AI tool is released to the public, it will likely change much of TikTok's content drastically. Following the contextualization of how many AI tools are developed, I outline the ways in which online inhabitants and experts alike attempt to resist AI infiltration. The final sections examine AI's impact on the social media landscape within the context of TikTok and beyond, as well as relevant examples of data privacy legislation in the U.S. and abroad.

What Is Special About TikTok?

TikTok's "for you feed" (FYF) sets the platform apart from other popular social media applications by prioritizing discovery as opposed to chronology. Platforms like Instagram open to your home page, where users mainly see posts from accounts they have already followed. TikTok however opens to its FYF, where users are met with a never ending stream of content based on in app activity. While the app is mainly video based, slideshows of photos are also common. It is rather unusual to come across any content without sound, whether it's original audio from a video, voice overs with background music, or a dance tutorial with a song in the background. YouTube shorts and Instagram Reels now compete with TikTok's FYF. While TikTok's terms of service state the platform is only for domestic and private use, its community guidelines boast

being a welcoming space to the global community.⁹ This discrepancy is a great example of the app's many conflicting messages.

Every interaction on the platform informs the app's algorithm, a complex recommendation system that decides what content should be presented to users. Through likes, shares, or comments, the platform personalizes the FYF by constantly adapting to pre-set metrics. These factors rank and prioritize content while also ensuring a variety of content types. For example, watching a long video from the beginning to end is a strong indicator of interest, as is following new accounts, exploring hashtags, or adding a video to your favorites. Factors like language preferences, country settings, and device types play a role in the FYF as well, but are not as influential as the aforementioned metrics. Expressions of disinterest, like marking “not interested” on a video or hiding videos from a particular creator, also factor into future content displays.¹⁰ My peers and I have had countless discussions about how it feels like the TikTok algorithm knows what is going on in our lives before we do. My TikTok feed has predicted things in my personal life and shown me content that is extremely niche, rare, and unique to my experiences.

By using the app, individuals are not only consenting to information being utilized to tailor their own feeds, but to also train the machine learning models and algorithms themselves. This allows the app to test beta features on particular audiences, customize search results and advertising, and adapt specific spam or malware detection

⁹ “Terms of Service.” TikTok. Accessed January 10, 2024.

<https://www.tiktok.com/legal/page/us/terms-of-service/en>.

“Community Guidelines.” TikTok. Accessed January 25, 2024.

<https://www.tiktok.com/community-guidelines/en/>.

¹⁰ “How Tiktok Recommends Videos #Foryou | Tiktok Newsroom.” TikTok Newsroom. Accessed April 3, 2024. <https://newsroom.tiktok.com/en-us/how-tiktok-recommends-videos-for-you>.

capabilities.¹¹ Features like auto scroll or toggles that allow you to speed up videos make it easy to spend hours absorbing content. Naturally, any attempt to reverse engineer or replicate any app source code or algorithms is strictly prohibited by TikTok, which is especially relevant in later discussion about the potential sale of the platform.¹²

TikTok regulates content and attempts to provide users with a wide variety of material. The platform claims its FYF is content neutral, without the subject of the video taken into account.¹³ TikTok inspects and tests algorithm code to ensure recommendations are indicated by user behavior.¹⁴ Ensuring diversified content seemingly contradicts claims of content neutrality, since categorizing content to diversify the FYF must factor in components of the content whether explicitly or implicitly. Content that is allowed to be posted on the platform but may be questionable for certain audiences, namely children, is ineligible for the FYF. This is specific to content that belongs in the following four categories: behavioral health, sensitive and mature themes, integrity and authenticity related to misinformation and artificially generated content, and finally, regulated goods.¹⁵

Content that is not backed by the algorithm can also be harder to find in search.¹⁶ The algorithm makes or breaks the performance metrics of content shared on the app, greatly limiting the reach of FYF ineligible posts. “Shadowbans” refer to periods of time in which a creator’s audience has trouble finding their content, even if the videos do not

¹¹ “Terms of Service.” TikTok. Accessed January 10, 2024.

<https://www.tiktok.com/legal/page/us/terms-of-service/en>.

¹² “Terms of Service.” TikTok. Accessed January 10, 2024.

<https://www.tiktok.com/legal/page/us/terms-of-service/en>.

¹³ “About Project Texas.” TikTok, March 21, 2023. <https://usds.tiktok.com/usds-about/>.

¹⁴ “About Project Texas.” TikTok, March 21, 2023. <https://usds.tiktok.com/usds-about/>.

¹⁵ “Community Guidelines.” TikTok. Accessed January 25, 2024.

<https://www.tiktok.com/community-guidelines/en/>.

¹⁶ “Community Guidelines.” TikTok. Accessed January 25, 2024.

<https://www.tiktok.com/community-guidelines/en/>.

specifically violate any policies.¹⁷ The multitude of factors that impact a video's performance make it difficult to identify or measure a shadowban's effects, but it has been likened to wage theft by the platform.¹⁸ Content creation and monetization on the platform are discussed more in depth in the digital marketing section of this paper.

The “content neutral” eligibility model allows TikTok to balance censorship with protecting key demographics from inappropriate content. These content moderation efforts contradict the app's statement that they have no obligation to screen or review content posted to the platform, especially considering that platforms can shield themselves legally through good faith efforts to regulate harmful information.¹⁹ The abstract nature of these rules allow the company to do with user data as they please, which will be examined in depth in the following data collection section.

Data Collection

Basic information, like language preference or country, is augmented by information from other publicly available sources.²⁰ TikTok, similar to many other applications and websites, utilize both session and persistent cookies.²¹ Their privacy policy becomes extremely vague beyond this point. For context, by using the app, users consent to the entirety of TikTok's privacy policy. This also grants the company

¹⁷ Fowler, Geoffrey A. “Shadowbanning Is Real: How Social Media Decides Who to Silence - The Washington Post.” The Washington Post, December 27, 2022.

<https://www.washingtonpost.com/technology/2022/12/27/shadowban/>.

¹⁸ Doctorow, Cory. “The ‘enshittification’ of TikTok.” Wired, January 23, 2023.

<https://www.wired.com/story/tiktok-platforms-cory-doctorow/>.

¹⁹ “Terms of Service.” TikTok. Accessed January 10, 2024.

<https://www.tiktok.com/legal/page/us/terms-of-service/en>.

²⁰ “Privacy Policy.” TikTok. Accessed January 16, 2024.

<https://www.tiktok.com/legal/page/us/privacy-policy/en>.

²¹ “Privacy Policy.” TikTok. Accessed January 16, 2024.

<https://www.tiktok.com/legal/page/us/privacy-policy/en>.

permission to gather information about you from “certain affiliated entities.” In addition to any activity on platforms owned by these partners, activity on other websites, apps, or in stores can be documented. The names of these partners are not explicitly disclosed within the policy, however TikTok is not responsible for the privacy practices of said partners. Once this data is aggregated and de-identified, it is surprisingly no longer subject to their privacy policy.²²

De-identified data is still *your* data, as is exemplified by the 2008 Harvard “Tastes, Ties, and Time” debacle of 2006. A research team formed by Jason Kaufman, a Berkman Center for Internet & Society research fellow, collected data from about 1,700 facebook profiles from Harvard's class of 2009 without their knowledge or consent over the course of four years. The dataset included each student's “gender, home state, major, political views, network of friends, and romantic tastes”, as well as race and ethnicity. Although shared publicly as data from an “anonymous” university, privacy scholar Michael Zimmer at the University of Wisconsin at Milwaukee identified Harvard undergraduates as the data subjects. Profile data was accessed by student research assistants, meaning these profiles were only visible to Harvard’s Facebook network in particular. A spokesman from Harvard’s institutional review board justified the mistake by noting federal human subject regulations were developed prior to the internet age.²³ This dataset is likely much smaller than the one’s TikTok sells to advertisers, de-identification is only one piece of the privacy puzzle.

²² “Privacy Policy.” TikTok. Accessed January 16, 2024.
<https://www.tiktok.com/legal/page/us/privacy-policy/en>.

²³ Perry, Marc. “Harvard Researchers Accused of Breaching Students’ Privacy.” The Chronicle of Higher Education, July 10, 2011.
<https://www.chronicle.com/article/harvard-researchers-accused-of-breaching-students-privacy/>.

Any content created on TikTok is theirs to use in ads or promos. They have no obligation to share any potential benefits with the creator whatsoever. This privilege is extended to any of the app's third party partners, granting full rights to "use, modify, adapt, reproduce, make derivative works of, publish and/or transmit, and/or distribute [...] User Content in any format and on any platform". Users waive any right to inspect or approve potential marketing or promotional materials, and without attribution. In addition, the app is not required to pay royalties to any third parties with intellectual property in your content, such as record labels, music publishers, or any other copyright owners.²⁴

As is standard in the industry, TikTok's terms of service are a legally binding contract. Overall, the document was extremely vague and full of jargon. For those under 18, consent is required from a parent or guardian, in addition to the minor.²⁵ How can a child reasonably enter a legally binding contract with parental guidance that is not confirmed at all? Can anyone but lawyers with extra free time truly consent to an agreement so difficult to understand? The company's community guidelines, in contrast, are simple and informative, with helpful definitions.²⁶ However, much of this information was hidden under "more information" dropdowns. Regardless, since the app is available to anyone in the US, policies should be clear to a variety of audiences, given just how easy it is to access and use apps in general. This recommendation is not unique to TikTok and should be implemented for all social media platforms.

²⁴ "Terms of Service." TikTok. Accessed January 10, 2024.

<https://www.tiktok.com/legal/page/us/terms-of-service/en>.

²⁵ "Terms of Service." TikTok. Accessed January 10, 2024.

<https://www.tiktok.com/legal/page/us/terms-of-service/en>.

²⁶ "Community Guidelines." TikTok. Accessed January 25, 2024.

<https://www.tiktok.com/community-guidelines/en/>.

User data is utilized to provide promotional materials from TikTok or any “affiliates and trusted third parties.” Again, no additional information about who these affiliates or third parties may be is provided here. This data is sold or shared with third parties for advertising purposes except where restricted by law in California, Colorado, Connecticut, Utah and Virginia.²⁷ TikTok users have the right to request personal information the company has collected from them, including how it is categorized, the commercial purpose for the information, and categories of third parties the information is shared with, down to each specific piece of personal information collected.²⁸ I requested my TikTok data to further investigate the execution of said policies. A day after submitting the in-app request, I downloaded eleven folders of text documents with the following labels: activity, ads and data, app settings, comments, direct messages, income+ wallet transactions, poi review, posts, profile, tiktok live, and TikTok shopping.

Upon first review, I was shocked how empty many of the documents were. Of thirty-five documents across folders, thirteen had no data. Much of what was provided could be easily found within the app, such as my saved videos and sounds, or who I am currently following. Within the ads and data folder specifically, “ad interest categories” was completely blank. The following is a screenshot of unique entries collected by the app from browser windows that opened within the app.

²⁷ “Privacy Policy.” TikTok. Accessed January 16, 2024. <https://www.tiktok.com/legal/page/us/privacy-policy/en>.

²⁸ “Privacy Policy.” TikTok. Accessed January 16, 2024. <https://www.tiktok.com/legal/page/us/privacy-policy/en>.

Date: 2023-11-28 05:00:21
Source: Abercrombie & Fitch - iProspect
Event: Pageview

Date: 2023-11-28 03:41:24
Source: Sephora_SR_US_GenZBoosting-2023_Social-TikTok_NA_USD_LVMH
Event: Pageview

Date: 2023-11-28 03:41:14
Source: Sephora_SR_US_GenZBoosting-2023_Social-TikTok_NA_USD_LVMH
Event: ViewContent

Date: 2023-11-26 22:19:46
Source: Ulta Beauty
Event: ViewContent

Date: 2023-11-26 22:19:39
Source: Ulta Beauty
Event: Pageview

Date: 2023-11-07 04:22:54
Source: Sephora_SR_US_GenZBoosting-2023_Social-TikTok_NA_USD_LVMH
Event: CompletePayment

Date: 2023-11-07 04:16:06
Source: Sephora_SR_US_GenZBoosting-2023_Social-TikTok_NA_USD_LVMH
Event: AddToCart

Date: 2023-08-08 17:43:41
Source: Savage X Fenty
Event: Pageview

Date: 2023-08-08 17:43:41
Source: Savage X Fenty
Event: Browse

Date: 2023-07-18 16:59:21
Source: Tapestry - Coach - Coachtopia
Event: Pageview

Surprisingly, this data only encompasses 2023, and I have not purchased anything from Sephora in years. The sheer lack of information within these folders leads me to believe that a majority of the data TikTok collects is from outside sources. This would allow them to collect whatever they would like without any liability for how or why the information was acquired. I am not convinced that my FYF seems to know more about me than I know about myself from only the information provided in these folders.

Project Texas is TikTok's billion dollar data security initiative to increase transparency and accountability, launched in early 2021 in response to the potential

U.S. ban.²⁹ It is unclear which of these policies are already in effect and which will be implemented in the future. The app claims to have created a stand-alone United States version of TikTok isolated within Oracle U.S. cloud servers in Austin, Texas. However, the standalone app can communicate with the global TikTok service in “controlled and monitored ways”.³⁰ In addition, TikTok created an “entirely independent business entity tasked with managing all business functions that require access to user data identified by the U.S. government as needing additional protection and safeguarding the systems that deliver content on the app in the U.S. to ensure that it is free from foreign manipulation”. This unit is called TikTok U.S. Data Security (USDS). The company states “no data goes in or out of the U.S. TikTok platform without going through gateways that will be controlled by an American-based trusted technology provider (the TTP) and monitored by both the TTP and USDS.” Furthermore, employees of the USDS are vetted with requirements “more typical of the defense industry than a social media or entertainment platform,” and the subsidiary is overseen by an independent board of directors with strong backgrounds in U.S. national security.³¹

The app collects keystroke patterns or rhythms, and biometric identifiers like faceprints or voiceprints from user content. Current versions of the app do not collect precise or approximate GPS location information from US users, unless a user has an older version of the app that permits them to do so. This data may be transmitted to international “servers or data centers [...] for storage and/or processing.”³²

²⁹ “About Project Texas.” TikTok, March 21, 2023. <https://usds.tiktok.com/usds-about/>.

³⁰ “About Project Texas.” TikTok, March 21, 2023. <https://usds.tiktok.com/usds-about/>.

³¹ “About Project Texas.” TikTok, March 21, 2023. <https://usds.tiktok.com/usds-about/>.

³² “Privacy Policy.” TikTok. Accessed January 16, 2024. <https://www.tiktok.com/legal/page/us/privacy-policy/en>.

Recent reporting from the Wall Street Journal claims that managers have instructed Project Texas employees to share information such as user email, birthdate, or IP address with coworkers in other parts of the company, including ByteDance employees, outside of official channels. ByteDance maintains the TikTok algorithm, and is updated so frequently that Project Texas employees are unable to examine each line of code as TikTok claims. Much of the data privacy work employees have done has been on ByteDance provided devices and tools, as there have been extreme delays in the distribution of new equipment. Oracle does not monitor data shared by employees through TikTok's internal messaging tools. Employees report that while U.S. data was initially only allowed to be shared in aggregate and not permitted to be downloaded, managers have begun to make exceptions to these policies. Ultimately, employees claim ByteDance managers "continue to request U.S. data". In addition, several ByteDance executives have transferred from its Beijing headquarters to top roles at TikTok in the U.S.³³ While TikTok's policies are not particularly unique, its connection to China is.

Digital Marketing

TikTok is a powerful search tool for Gen Z, about 1 in 10 reporting they are more likely to use TikTok than Google for search.³⁴ Capitalizing on the FYF's unique

³³ Wells, Georgia. "TikTok Struggles to Protect U.S. Data from Its China Parent." The Wall Street Journal, January 30, 2024.

<https://www.wsj.com/tech/tiktok-pledged-to-protect-u-s-data-1-5-billion-later-its-still-struggling-cbccf203>.

³⁴ "Using TikTok as a Search Engine | Adobe Express." Adobe Express. Accessed March 4, 2024. <https://www.adobe.com/express/learn/blog/using-tiktok-as-a-search-engine>.

opportunities for discovery, almost every other video on many feeds around the country now feature in-app product links. In recruitment campaigns targeted to sellers on online marketplaces like Etsy, TikTok cites internal research that shows TikTok plays a role in purchase decisions for 83% of users.³⁵

Benefit Cosmetics has sold 87,000 product units since joining TikTok Shop beta in March 2023.³⁶ Over 30% of people believe that live shopping helps them make informed purchase decisions.³⁷ U.S. livestreams have driven around 40% of in app sales for Benefit since November 2023, each live episode centered around particular themes. Boosting content within the app's algorithm using engagement techniques, Benefit livestreams garner an audience ranging from a couple thousand to tens of thousands. In combination with their affiliate content creator network of around 2,000 individuals, the brand is confident they could easily triple or quadruple sales in 2024 on TikTok Shop.³⁸

According to Bloomberg, TikTok aims to grow its U.S. E-commerce business to as much as \$17.5 billion in 2024.³⁹ Influencer advertising represents about 47.9% of performance marketing, commerce content, and affiliate marketing, with one in four small businesses having used TikTok influencers for promotions.⁴⁰ 66% of brands report

³⁵ Barkho, Gabriela. "In Its Quest to Recruit More Sellers, Tiktok Shop Is Targeting Some Etsy Merchants." Modern Retail, February 26, 2024. <https://www.modernretail.co/technology/in-its-quest-to-recruit-more-sellers-tiktok-shop-is-targeting-some-etsy-merchants/>.

³⁶ Sandler, Emma. "Benefit Cosmetics Eyes Triple-Digit Sales Growth on TikTok Shop." Glossy, January 5, 2024. <https://www.glossy.co/beauty/benefits-cosmetics-eyes-triple-digit-sales-growth-on-tiktok-shop/>.

³⁷ Titus, Rahul, John Harding-Easson, and Ansley Williams. "2024 Influencer Trends You Should Care About." Ogilvy, November 15, 2023.

³⁸ Sandler, Emma. "Benefit Cosmetics Eyes Triple-Digit Sales Growth on TikTok Shop." Glossy, January 5, 2024. <https://www.glossy.co/beauty/benefits-cosmetics-eyes-triple-digit-sales-growth-on-tiktok-shop/>.

³⁹ Sandler, Emma. "Benefit Cosmetics Eyes Triple-Digit Sales Growth on TikTok Shop." Glossy, January 5, 2024. <https://www.glossy.co/beauty/benefits-cosmetics-eyes-triple-digit-sales-growth-on-tiktok-shop/>.

⁴⁰ Sullivan, Laurie. "Search Gets Buried in Hints of Commerce Ad Budget Increases." Search Gets Buried In Hints Of Commerce Ad Budget Increases, January 26, 2024.

that creator-led content has a greater return on investment when compared to more traditional ads.⁴¹ Overall global advertising spend is projected to reach \$1 trillion this year for the first time, however, 36% or less of these investments actually reach their intended audiences.⁴²

Live streams can be so lucrative in part due to virtual items, categorized as coins, gifts, roses, or diamonds.⁴³ Selena Gomez and Chloe Bailey are two celebrities that were shocked to discover virtual items can be converted into real money while live streaming to fans.⁴⁴ Adults can buy coins and gifts, send them to other users, or receive them. Users under 18 can only participate in the livestream gifting process with parent/guardian consent. Eligibility to receive perks hinges on factors like content quality or number of followers, for example.⁴⁵

Coins are how users purchase virtual gifts and expire when/if the user's account is terminated. This form of virtual tender is restricted to TikTok, and coins cannot be directly transferred to other users.⁴⁶ 70 coins cost \$.74 at the time of writing.⁴⁷ TikTok reserves the right to manage or modify coins without any responsibility to the user, even

<https://www.mediapost.com/publications/article/393008/search-gets-buried-in-hints-of-commerce-ad-budget.html>.

Sullivan, Laurie. "TikTok: The Gen Z Search Engine." TikTok: The Gen Z Search Engine, January 16, 2024. <https://www.mediapost.com/publications/article/392663/tiktok-the-gen-z-search-engine.html>.

⁴¹ Titus, Rahul, John Harding-Easson, and Ansley Williams. "2024 Influencer Trends You Should Care About." Ogilvy, November 15, 2023.

⁴² "ANA Programmatic Media Supply Chain Transparency Study." Association of National Advertisers, December 5, 2023.

⁴³ "Virtual Items Policy." TikTok, October 2022. <https://www.tiktok.com/legal/page/row/virtual-items/en>.

⁴⁴ u/blancoaryan. "Selena Gomez Reaction on Her TikTok Live When She Found out Gifts That Her Fans Were Sending Cost Real Money. (She Ended the Live Stream Afterwards)." Reddit, 2023.

https://www.reddit.com/r/MadeMeSmile/comments/10atkij/selena_gomez_reaction_on_her_tiktok_live_when_she/.

@thechloexhallerroom. TikTok, March 7, 2024.

https://www.tiktok.com/@thechloexhallerroom/video/7343525684305759534?_r=1&_t=8kVfTK5LfkK.

⁴⁵ "Virtual Items Policy." TikTok, October 2022. <https://www.tiktok.com/legal/page/row/virtual-items/en>.

⁴⁶ "Virtual Items Policy." TikTok, October 2022. <https://www.tiktok.com/legal/page/row/virtual-items/en>.

⁴⁷ "TikTok Coins: Buy and Recharge Coins to Send Gifts | TikTok." n.d. www.tiktok.com.

<https://www.tiktok.com/coin>.

in the event coins are terminated from the platform completely. Gifts are encouraged to be used as tokens of appreciation for user content uploaded or streamed by another user through the “Give Gift” button found under relevant material. These transactions are public to everyone and include the giver’s name and user ID, as well as any details included with the gift.⁴⁸

Once given, gifts are converted into diamonds, a form of virtual item that cannot be purchased. Diamonds serve as a measurement of popularity for associated content, mediated by an ambiguous conversion rate determined by the platform. Creators must request to withdraw these funds from TikTok, who is under no obligation to fulfill requests within any specific period of time. The app reserves the right to cancel diamonds at any time without paying out funds creators may have accrued but have yet to convert.⁴⁹

Kajabi is an online platform for entrepreneurs to build, market, and sell digital products. In late 2023, the company conducted a survey of online creator businesses across 5 global markets. Of 2,026 screened creators currently monetizing content, half make six figures or more. The influencer industry is estimated to reach \$480 billion by 2027, with more than 50 million creators attempting to make a living online. Revenue from brand deals comprised 66% of creator income in 2022. The explosion of influencer marketing has not benefited creators equally, as less than 97% of influencers make less than \$100k each year. Platforms and marketers reap the largest rewards from the creator economy, leading to creators diversifying revenue streams to avoid an over

⁴⁸ “Virtual Items Policy.” TikTok, October 2022. <https://www.tiktok.com/legal/page/row/virtual-items/en>.

⁴⁹ “Virtual Items Policy.” TikTok, October 2022. <https://www.tiktok.com/legal/page/row/virtual-items/en>.

dependence on any one specific app.⁵⁰ While algorithms are excellent tools for discovery and audience building, chasing virality is not a sustainable method of converting influence to sales. Relying on an app to engage with an audience is not a viable long term strategy. In the event that the creator gets banned, the app gets banned, or their content is no longer favorable to finicky algorithms, the one size fits all influencer approach is outdated.

Chasing views is gradually being replaced by creator-owned digital products, like online courses, memberships, or community building opportunities. Platform payouts can then be supplemented with additional revenue streams, physical products, coaching, and consulting as additional examples. Creators making less than \$100k per year average two revenue streams, whereas creators making over \$100k average five or more. Creators making over \$150k a year report about seven revenue streams.⁵¹

TikTok's Creator Fund was an early strategy to support creators on the app, offering about \$0.20–\$0.40 per 1,000 views.⁵² This rate was not substantial for creators, resulting in a new creativity program projecting 20x larger payouts. The beta program specifically targets high quality videos over a minute in length from US adult creators with over 10k followers and at least 100k views within the last month. Videos can be up to 10 minutes within the app or 30 minutes online, and should be interspersed with

⁵⁰ "The State of Creators '24 Report." Kajabi. Accessed March 2, 2024.

https://creatortrends.kajabi.com/?utm_campaign=Newsletters&utm_medium=email&_hsmi=292819027&_hsenc=p2ANqtz-84yXevNDL1O7s0rip92fECKv-0a1hCLSI9Bzp_m4-bbRLF8HCHCYVTUI-XyGkUQ4XPUI DHs2VZLBC-7vcPFGaQ-b0DIA&utm_content=292820757&utm_source=hs_email.

⁵¹ "The State of Creators '24 Report." Kajabi. Accessed March 2, 2024.

https://creatortrends.kajabi.com/?utm_campaign=Newsletters&utm_medium=email&_hsmi=292819027&_hsenc=p2ANqtz-84yXevNDL1O7s0rip92fECKv-0a1hCLSI9Bzp_m4-bbRLF8HCHCYVTUI-XyGkUQ4XPUI DHs2VZLBC-7vcPFGaQ-b0DIA&utm_content=292820757&utm_source=hs_email.

⁵² Davey, Lizzie. "How Much Does TikTok Pay Creators? The Numbers Revealed." How Much Does TikTok Pay Creators? The Numbers Revealed, January 30, 2024.

<https://www.descript.com/blog/article/how-much-does-tiktok-pay#:~:text=lot%20of%20experimenting,-,How%20much%20money%20can%20you%20earn%20through%20the%20creator%20fund,%240.40%20for%20every%201%2C000%20views>.

additional short form content. This program also provides a detailed creator dashboard with video performance analytics. Users are encouraged to use TikTok to edit this content, and videos are “subject to the same recommendation strategies as other TikTok videos”. Rewards are based on the average gross revenue per 1,000 qualified views, which can fluctuate due to factors like engagement, authenticity, or region according to the platform.⁵³ Outside of this program, creators have no right to receive any income from content on the services, especially if it has already been monetized on another platform.⁵⁴

YouTube has more established and efficient monetization capabilities- if creators making over \$100k were not able to access YouTube payouts, almost half of them would potentially lose over \$50k. 40% of successful creators surpassed the \$100k mark in under two years, with the most lucrative content categories being beauty, fitness, and gaming. Overall, the most profitable niches are business, marketing, finance, and real estate. Again, follower count is only one piece of the everchanging social media puzzle, as a large majority of creators making respectable incomes online have less than a million followers.⁵⁵

Parasocial relationships between users and their favorite creators create an appealing advertising ecosystem for influencers and brands alike. Authenticity and community are key, and individuals are typically willing to engage with promotional

⁵³ “Creativity Program Beta.” TikTok Creator Portal, October 13, 2023.

<https://www.tiktok.com/creators/creator-portal/en-us/getting-paid-to-create/creativity-program-beta/>.

⁵⁴ “Terms of Service.” TikTok. Accessed January 10, 2024.

<https://www.tiktok.com/legal/page/us/terms-of-service/en>.

⁵⁵ “The State of Creators ’24 Report.” Kajabi. Accessed March 2, 2024.

https://creatortrends.kajabi.com/?utm_campaign=Newsletters&utm_medium=email&_hsmi=292819027&_hsenc=p2ANqtz-84yXevNDL1O7s0rip92fECKv-0a1hCLSI9Bzp_m4-bbRLF8HCHCYVTUI-XyGkUQ4XPUI DHs2VZLBC-7vcPFGaQ-b0DIA&utm_content=292820757&utm_source=hs_email.

materials if they are getting something out of it.⁵⁶ However, “de-influencing” has become a popular topic as of late, with creators emphasizing that many products end up in landfills in a few short months. Another popular de-influencing strategy is reminding audiences that they probably already own a version of what is being advertised to them.⁵⁷

TikTok’s community guidelines require creators promoting goods or services in return for “something of value” must disclose this with the platform’s branded content tool or through captions on videos. This includes paid partnerships and brand endorsements.⁵⁸ However, it is still hard to discern organic content from paid promotions. The following definitions are provided to clarify:

Material relationship refers to a relationship that may have a significant impact on the credibility of any representation or endorsement and that would not be reasonably expected. This may include personal, family, employment, and financial relationships.

Disclosures are clear statements that explain your relationship to a third party. Relationships include receiving financial compensation from, having a relative who works for, and being an employee of that third party.

⁵⁶ “The State of Creators ’24 Report.” Kajabi. Accessed March 2, 2024.
https://creatortrends.kajabi.com/?utm_campaign=Newsletters&utm_medium=email&_hsmi=292819027&_hsenc=p2ANqtz-84yXevNDL1O7s0rip92fECKv-0a1hCLSI9Bzp_m4-bbRLF8HCHCYVTUI-XyGkUQ4XPUiDHs2VZLBC-7vcPFGaQ-b0DIA&utm_content=292820757&utm_source=hs_email.

⁵⁷ depressiondotgov. 2023. “TikTok .” Www.tiktok.com. November 21, 2023.
https://www.tiktok.com/@depressiondotgov/video/7303937264441167150?_r=1&_t=8lh4EsKHuFq.

⁵⁸ “Community Guidelines.” TikTok. Accessed January 25, 2024.
<https://www.tiktok.com/community-guidelines/en/>.

Something of value may refer to cash payments, free products, store credit, discounts, and special access to products, services, or events.”⁵⁹

Although TikTok shop ads or more “commercial” type posts can be easier to spot, User Generated Content (UGC) is where the lines between paid and organic product affiliation become blurred. UGC can come in the form of unboxing videos or reviews, and is specifically created by individuals, rather than the brand itself.⁶⁰

If creators may benefit from future transactions through affiliate or referral commission links, or if they share research on products, services, or industries in which they have a commercial connection, this must be divulged.⁶¹ Adoption of these policies is varied, so the app now has a feature to report undisclosed brand content. Terms of service prohibit the use of the platform “to advertise or perform any commercial solicitation”, but almost every other video on my feed is an ad. In an effort to maintain some semblance of integrity, trading, writing, or soliciting fake reviews is not allowed on the platform.⁶²

Children are extremely vulnerable to deceptive marketing tactics since they are still developing critical thinking and impulse control skills. In 2023, children 4-18 spent 112 minutes a day on TikTok, making it the most popular app for this age group. TikTok has generated the most ad revenue from users 13-17, a grand total of \$2 billion.

Estimates show that 35% of the app's 2022 ad revenue overall came from users under

⁵⁹ “Community Guidelines.” TikTok. Accessed January 25, 2024.

<https://www.tiktok.com/community-guidelines/en/>.

⁶⁰ Duke, Dylan. “Why User-Generated Content Is Winning.” Forbes, February 20, 2024.

<https://www.forbes.com/sites/forbesbusinesscouncil/2023/03/13/why-user-generated-content-is-winning/?sh=3eef68a6e94>.

⁶¹ “Community Guidelines.” TikTok. Accessed January 25, 2024.

<https://www.tiktok.com/community-guidelines/en/>.

⁶² “Terms of Service.” TikTok. Accessed January 10, 2024.

<https://www.tiktok.com/legal/page/us/terms-of-service/en>.

18. Although kids may be aware that they are being advertised to, ads combined with personalized content or connections with trusted communities are difficult to resist.⁶³

TikTok's children's privacy policy broadly claims to protect children from exploitative content that could potentially put them in "psychological, physical, or developmental harm". Users under 16 do not have access to direct messages and they must be 18+ to go live or send gifts. "Kids mode" limits the amount of data collected from US children, while still allowing them to explore content on the app. Children are able to create videos and save them to their phone, but content is not saved by TikTok or visible to others. In addition, children cannot publicly share personal information, and TikTok does not sell or share any information collected from them to third parties for advertising purposes. However, as is true with all accounts, TikTok may transmit information from children to international data centers for storage, processing, and/or other purposes not explicitly listed. Shockingly, the children's privacy policy also includes resources for those who may have "sexual feelings towards a young person".⁶⁴

The Federal Trade Commission (FTC) has proposed several changes to outdated laws regarding Children's online safety. Platforms used by children under 13 would need to obtain parental consent to share information about them with third parties, separate from the service itself, and verifiable. However, if this disclosure is "integral" to the service, it may not be required. Persistent identifiers, such as cookies, would be prohibited in regards to push notifications to kids. Utilizing online contact information to encourage children to use the service more would also be prohibited. In regards to

⁶³ Ortutay, Barbara, and Haleluya Hadero. "Social Media Companies Made \$11 Billion in US Ad Revenue from Minors, Harvard Study Finds." AP News, December 27, 2023. <https://apnews.com/article/tiktok-meta-instagram-revenue-teens-harvard-cc9bf875d6f7259ba2aee8805ccdaf3d>.

⁶⁴ "Children's Privacy Policy." TikTok. Accessed March 6, 2024. <https://www.tiktok.com/legal/page/global/privacy-policy-for-younger-users/en>.

education technology, these services would no longer be allowed to use children's information for commercial purposes, among other proposed restrictions. These changes would prohibit services from retaining collected information indefinitely or for secondary purposes, in addition to requiring a "written, public data retention policy for children's personal information."⁶⁵

The FTC recently updated its guidelines surrounding endorsements and testimonials for the first time since 2009. These changes clarify what is considered an endorsement, who is considered an endorser, what constitutes clear and conspicuous disclosures, who is liable in the event of a deceptive endorsement and consumer review best practices. Failing to follow these guidelines could result in fines or penalties for influencers, brands, and marketers in order to ensure consumers know when they are being advertised to.⁶⁶

Social media platforms initially prioritize users to build a strong base and get them hooked. Once users and their friends have established communities, platforms pivot to focusing on the needs of advertisers and businesses who want to capitalize on these audiences. After both users and sellers are dependent on these networks, platforms struggle to find an ideal balance of showing users videos they have demonstrated an interest in with showing content the company has vested interest in. While artificially increasing engagement or otherwise attempting to circumnavigate the app's recommendation system is not allowed for users, TikTok has been accused of inflating metrics to procure partnerships with influencers and brands. These commercial

⁶⁵ Ortutay, Barbara. "FTC Proposes Strengthening Children's Online Privacy Rules to Address Tracking, Push Notifications." AP News, December 20, 2023. <https://apnews.com/article/ftc-children-social-media-games-coppa-352ba63293832ee930f0c137aac735de>

⁶⁶ "Disclosures 101 for Social Media Influencers." Washington, DC: Federal Trade Commission, November 2019.

incentives have led to an overall decline in the quality of content presented by the algorithm. Not only are users inundated with ads, videos without TikTok Shop products attached are deprioritized by the platform and harder to discover. Journalist Cory Doctorow describes this process as “enshittification”.⁶⁷

Many users double as creators, since any American with a phone can create a viral TikTok. Recording in public is commonplace, meaning users can be both consumers of content and the content itself. While TikTok distinguishes users from creators in their policies, a more integrated approach would be more appropriate considering the context in which people actually use the app.⁶⁸

TikTok is a hub for video, photo, shopping, and more in order to prevent users from leaving the app, with the goal of never ending consumption. Algorithms function behind the scenes, adapting to our behavior and anticipating our interests, creating an endless stream of content. This creates echo chambers that make assumptions about what possibilities or limitations exist for users. Dopamine hits from notifications allow developers, marketers, and advertisers to absorb us in virtual worlds where we lose track of ourselves and time. Social media is the digital commodification of our desire for connection. Feeds lack built-in pauses that would allow users to reflect on what they are seeing or how long they have spent scrolling. Rather than positioning social platforms to enhance in-person interactions, the platform becomes the source of interaction in itself.⁶⁹

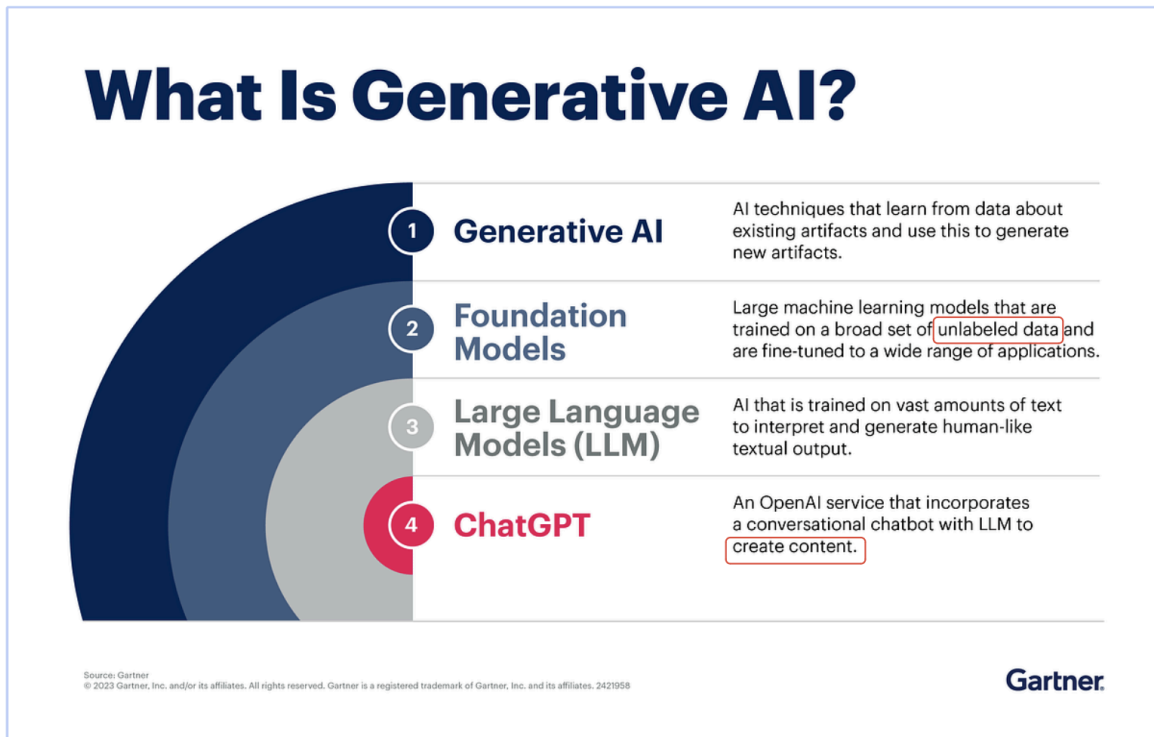
⁶⁷ Doctorow, Cory. “The ‘enshittification’ of TikTok.” *Wired*, January 23, 2023. <https://www.wired.com/story/tiktok-platforms-cory-doctorow/>.

⁶⁸ “Community Guidelines.” TikTok. Accessed January 25, 2024. <https://www.tiktok.com/community-guidelines/en/>.

“Terms of Service.” TikTok. Accessed January 10, 2024. <https://www.tiktok.com/legal/page/us/terms-of-service/en>.

⁶⁹ Soderman, Braxton. *Against flow: Video games and the flowing subject*. Cambridge, MA: MIT Press, 2021.

Artificial Intelligence and Social Media



Google Developer Groups

70

Before diving into the impact of Artificial Intelligence (AI) on social media, this section begins with context for how these tools have been developed. Vast amounts of data collected from online activity is the backbone of Artificial Intelligence development. While AI can be a powerful productivity tool the methods companies use to source vast amounts of training data are questionable at best. AI can be a rather misleading buzzword these days, and the following section examines its proliferation online in the form of text-to-image, text-to-voice, and text-to-video tools.

⁷⁰ Kumar, Uday. n.d. Review of Wild to Wise - Taming Generative AI in a Responsible Ecosystem. Presented at Duke Product Management Lecture. Accessed March 24, 2024.

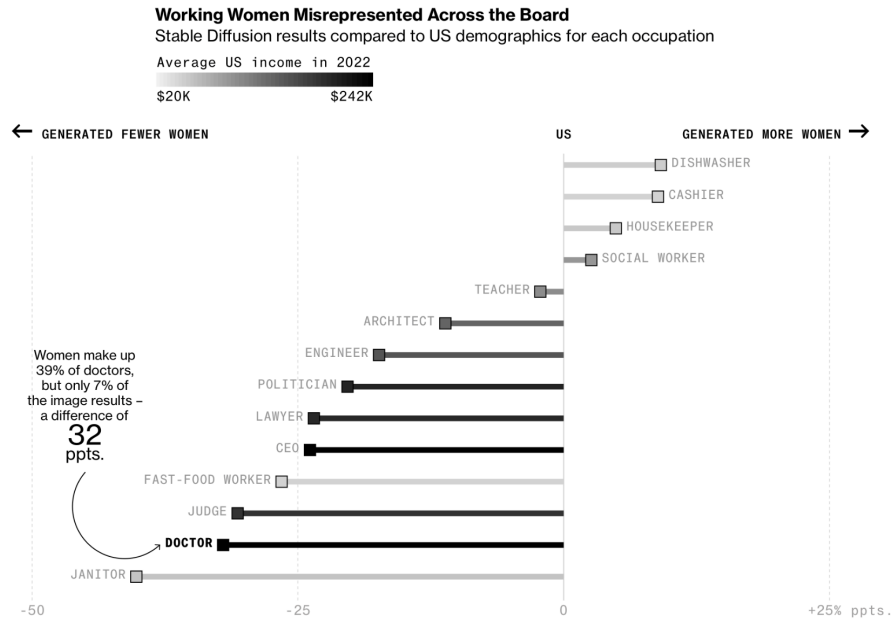
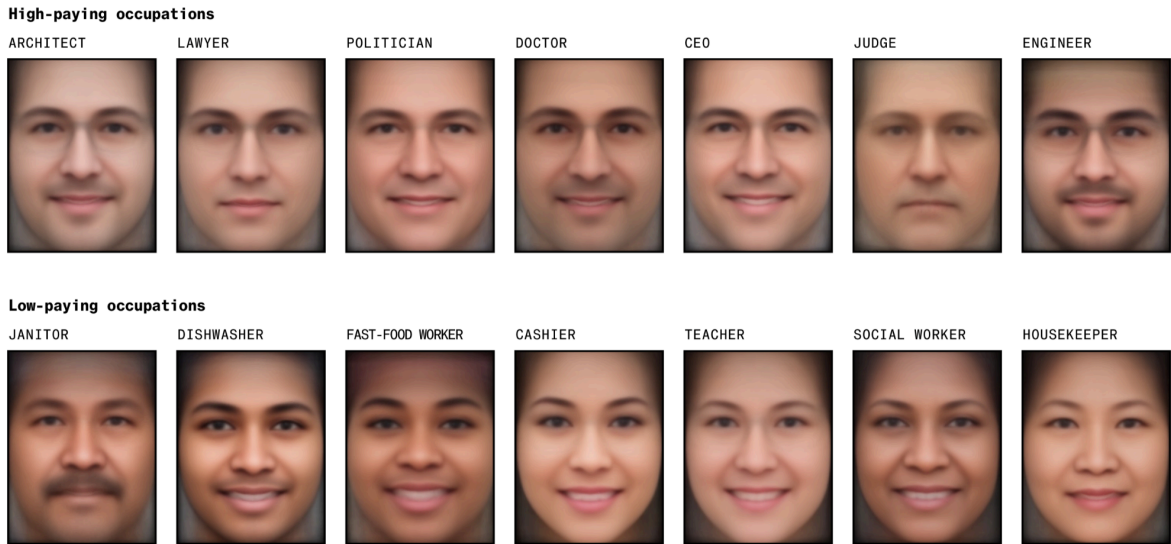
AI tools are only as good as their training data and configurations. Many of the metaphors associated with AI are intended to provide a basis for understanding the technology using concepts a person may already be familiar with. The title “artificial intelligence” is an anthropomorphism likening technology to human cognitive processes. Mathematics professor Roger Penrose at the University of Oxford warns against the perception that AI can replicate the inner workings of the human mind flawlessly. He argues that “true intelligence requires consciousness”, which cannot be simulated by algorithms.⁷¹ The conflation of meaning versus intended meaning has led AI to be popularly misrepresented as more than just software created by humans for humans. “Intelligence” builds undue trust in tools that commonly “hallucinate” in their responses. “Hallucination” describes the process in which AI’s underlying language models create nonsensical or inaccurate outputs due to the incorrect perception of non-existent patterns or objects. Input bias or biases in training data can undergird these misinterpretations, among a variety of other potential factors.⁷² These biases can lead to a multitude of issues for different communities when gone unchecked.

Bloomberg used Stable Diffusion text-to-image AI technology to examine outputs specifically related to careers and crime. As shown in the image below, images generated for high paying jobs typically featured people with lighter skin tones, and darker skin tones for jobs like “fast food worker” or “social worker”. The following graph showcases that women are overrepresented when Stability AI is prompted with low

⁷¹ Weatherbed, Jess. “How to Keep Your Art out of AI Generators.” The Verge, February 7, 2024. <https://www.theverge.com/24063327/ai-art-protect-images-copyright-generators>.

⁷² “What Are Ai Hallucinations?” IBM. Accessed April 3, 2024. <https://www.ibm.com/topics/ai-hallucinations>.

paying jobs and underrepresented in higher paying jobs when compared to data on gender representation across industries.⁷³



74

⁷³ Bloomberg.com. n.d. “Humans Are Biased. Generative AI Is Even Worse.” Accessed April 20, 2024. https://www.bloomberg.com/graphics/2023-generative-ai-bias/?itid=lk_inline_enhanced-template&embedded-checkout=true.

⁷⁴ Bloomberg.com. n.d. “Humans Are Biased. Generative AI Is Even Worse.” Accessed April 20, 2024. https://www.bloomberg.com/graphics/2023-generative-ai-bias/?itid=lk_inline_enhanced-template&embedded-checkout=true.

Almost 90% of content on the internet will be AI generated in the next few years.⁷⁵ With 1 in 10 consumers relying on ChatGPT to search for information, and 1 in 20 going as far as asking it for personal finance advice, this presents a variety of challenges in terms of misinformation and representation.⁷⁶ When used in facial recognition technology, for example, this technology has already resulted in a number of wrongful arrests.⁷⁷

An unlabeled QR code printed onto a tiny slip of paper I found stacked in Duke's Bryan Center led to a site titled "Stop AI Extinction" with a headline asking "if you knew that an Asteroid Would Strike Earth within the Next 5 years, that Would destroy the Human Race, What Would You Do about it Now?" Supplemented with grainy images of robots forcing a human to work an assembly line, the site claims the threat posed by AI exceeds that of pandemics or nuclear war.⁷⁸ This sentiment is shared among several of the most prominent AI developers, warning that AI may pose an existential threat to humanity.⁷⁹ Since the development of AI tools has not slowed down, technology that can prevent images from being absorbed into training data is now necessary.

A guide from *The Verge* informs visual artists on best practices to combat digital corporate theft in regards to text-to-image AI tools. Some AI companies have request

⁷⁵ Bloomberg.com. n.d. "Humans Are Biased. Generative AI Is Even Worse." Accessed April 20, 2024. https://www.bloomberg.com/graphics/2023-generative-ai-bias/?itid=ik_inline_enhanced-template&embedded-checkout=true.

⁷⁶ Sullivan, Laurie. "TikTok: The Gen Z Search Engine." TikTok: The Gen Z Search Engine, January 16, 2024. <https://www.mediapost.com/publications/article/392663/tiktok-the-gen-z-search-engine.html>.

⁷⁷ Bloomberg.com. n.d. "Humans Are Biased. Generative AI Is Even Worse." Accessed April 20, 2024. https://www.bloomberg.com/graphics/2023-generative-ai-bias/?itid=ik_inline_enhanced-template&embedded-checkout=true.

⁷⁸ ** Stop AI Extinction **. Accessed March 4, 2024. <http://ai.ccaway.net/>.

⁷⁹ Roose, Kevin. A.I. Poses 'Risk of Extinction,' Industry Leaders Warn. New York: New York Times Company, 2023. <https://login.proxy.lib.duke.edu/login?url=https://www.proquest.com/blogs-podcasts-websites/i-poses-risk-extinction-industry-leaders-warn/docview/2820276400/se-2>.

forms to remove works from training data, which sometimes requires separate forms for each particular image. This tedious process ensures the work will not be included in *future* training datasets, and it is hard to regulate implementation. Current AI models have already been trained, but do not retain sources. Also, if images are available elsewhere online, they are still likely to be collected. The article encourages artists to investigate where they host their work, as many services license images to third parties. To remove works from either Midjourney or Stability AI's Stable Diffusion, artists must email the companies directly, and there is no formalized process. Blocking the "GPTBot" web crawler or using Off-facebook activity to see what services are selling data to Meta are other strategies for protecting images online.⁸⁰ Social media sites profit from the digital networks we develop and maintain on their platforms. Sharing creative work should not come at the cost of losing all rights to your intellectual property.

Glaze is a free tool developed at the University of Chicago that changes image pixels to confuse AI, yet these alterations are not extremely noticeable to the human eye. Nightshade, developed by the University of Chicago team as well, distorts how AI analyzes an image as an attempt to "poison" outputs. Poisoning a large language model requires quite a large magnitude of deceptive images. Therefore, the effectiveness of such tools vary depending on the context, and are flimsy defenses against surveillance online. Some platforms do not allow users to opt out of contributing to the company's training data if they use the platform at all, Adobe Stock and Meta as two examples. Anything uploaded to Facebook, Instagram or Threads will be included in training datasets. Existing users may not have kept up with updates to privacy policies, meaning

⁸⁰ Weatherbed, Jess. "How to Keep Your Art out of AI Generators." The Verge, February 7, 2024. <https://www.theverge.com/24063327/ai-art-protect-images-copyright-generators>.

they continue to use the app without awareness that their content is used for AI development . Meta has a process to request the correction or deletion of personal information in training data, but only if they received the information from third parties.⁸¹ Opt-in processes could be an equitable and ethical alternative to the “options” described earlier.

What if sites protected users from tech giants looking to profit off their work? Medium is a platform that does not allow content on the site to be used to train AI models. Another site, Kin.Art, uses visual and metadata scrambling techniques that are not detectable to the human eye, so “any labels the AI model reads will not accurately reflect the content.” Rather than allowing users to manually apply privacy mechanisms to individual works, Kin.Art is an entire portfolio site that automatically protects content hosted. The site is currently free to use, but a 5% service fee will be applied to commissions made through the platform in the future.⁸²

More than 40% of consumers are apprehensive about the use of AI in social media interactions, according to The Sprout Social Index.⁸³ Text-to-image AI tools are rather commonplace now, and it's important to examine nefarious use cases. In early 2024, deepfake pornographic images of Taylor Swift proliferated X, one image gaining 47 million views on the platform before removal. Fans mass reported images and X eventually blocked searches for Taylor Swift.⁸⁴ These particular images were not widely

⁸¹ Weatherbed, Jess. “How to Keep Your Art out of AI Generators.” The Verge, February 7, 2024. <https://www.theverge.com/24063327/ai-art-protect-images-copyright-generators>.

⁸² Weatherbed, Jess. “How to Keep Your Art out of AI Generators.” The Verge, February 7, 2024. <https://www.theverge.com/24063327/ai-art-protect-images-copyright-generators>.

⁸³ “2024 Content Benchmarks Report.” Sprout Social, 2024.

⁸⁴ “Inside the Taylor Swift Deepfake Scandal: ‘It’s Men Telling a Powerful Woman to Get Back in Her Box.’” The Guardian, January 31, 2024. <https://www.theguardian.com/technology/2024/jan/31/inside-the-taylor-swift-deepfake-scandal-its-men-telling-a-powerful-woman-to-get-back-in-her-box>.

shared on the platform for more than a day, but a 2019 study found that 96% of online deepfake video content was nonconsensual pornography.⁸⁵

Celebrities have teams dedicated to supporting them when these sorts of attacks take place, but regular individuals cannot afford such luxuries. A reddit user u/deepfakes created a forum with the same name in 2017 to share technology capable of face swapping female celebrities into pornographic videos. The most common nationalities and professions targeted are British actresses, South Korean musicians, and American actresses. 8 of the 10 top porn websites studied host deepfake pornography, and in 2019 9 sites were dedicated to deepfake porn specifically. DeepNude is an app allowing users to remove clothes from pictures of women and replace them with synthetically generated naked body parts. The model was only trained on women, and it only took 30 seconds to generate an image. DeepNude was overwhelmed with requests in the 24 hour period following journalist Samantha Cole's coverage of the platform, receiving over 545,000 visits and 95,464 active users in this period. The creators of the app took the official site down claiming "the world is not ready for DeepNude". The technology has been reproduced and distributed via other digital avenues, some platforms offering images for \$1/photo or \$20/month for unlimited access. The owners sold the app to an anonymous buyer for \$30,000. The UK's new online safety act makes sharing of nonconsensual deepfake pornographic material illegal, but the US has no such protections.⁸⁶ Widespread uptake of text-to-image AI

⁸⁵ "Inside the Taylor Swift Deepfake Scandal: 'It's Men Telling a Powerful Woman to Get Back in Her Box.'" The Guardian, January 31, 2024. <https://www.theguardian.com/technology/2024/jan/31/inside-the-taylor-swift-deepfake-scandal-its-men-telling-a-powerful-woman-to-get-back-in-her-box>.

Adjer, Henry, Giorgio Patrini, Francesco Cavalli, and Laurence Cullen. "The State of Deepfakes: Landscape, Threats, and Impact." Deeptrace, September 2019.

⁸⁶ Adjer, Henry, Giorgio Patrini, Francesco Cavalli, and Laurence Cullen. "The State of Deepfakes: Landscape, Threats, and Impact." Deeptrace, September 2019.

tools could be detrimental as time progresses, especially considering how fast content goes viral online.

TikTok’s “content neutral” algorithm does not allow “nudity, including uncovered genitals and buttocks, as well as nipples and areolas of women and girls.”⁸⁷ I’ve come across several bots linking to porn in their bios or suggestive livestreams, indicating that there are strategies to avoid TikTok’s safety precautions. The app uses an opt-in model for sensitive media, meaning questionable videos feature a warning label text along the lines of “people have reported this video is disturbing. View?” Unfortunately, many of the examples provided in the company’s policy of prohibited content are centered around women’s bodies in particular.⁸⁸

45% of Americans report being equally excited and concerned about the influx of AI in daily life.⁸⁹ We may not be able to tell the difference between what is “real” or “fake” as AI technology progresses.⁹⁰ TikTok’s privacy policy requires that synthetic or manipulated media be disclosed clearly. Inaccurate, misleading, or false content that may “cause significant harm to individuals or society” or synthetic media containing “the likeness of any real private figure” is strictly prohibited, especially in content used as endorsements.⁹¹

⁸⁷ “Community Guidelines.” TikTok. Accessed January 25, 2024.
<https://www.tiktok.com/community-guidelines/en/>.

⁸⁸ “Community Guidelines.” TikTok. Accessed January 25, 2024.
<https://www.tiktok.com/community-guidelines/en/>.

⁸⁹ Rainie, Lee, Cary Funk, Monica Anderson, and Alec Tyson. “AI and Human Enhancement: Americans’ Openness Is Tempered by a Range of Concerns.” Pew Research Center: Internet, Science & Tech, March 17, 2022.
<https://www.pewresearch.org/internet/2022/03/17/ai-and-human-enhancement-americans-openness-is-tempered-by-a-range-of-concerns/>.

⁹⁰ University of Waterloo. “Can you tell AI-generated people from real ones?.” ScienceDaily.
www.sciencedaily.com/releases/2024/03/240306003456.htm (accessed March 4, 2024).

⁹¹ “Privacy Policy.” TikTok. Accessed January 16, 2024.
<https://www.tiktok.com/legal/page/us/privacy-policy/en>.

Allowed: Synthetic media showing a public figure in certain contexts, including artistic and educational content, such as a video showing a celebrity doing a popular TikTok dance, and a historical figure featured in a history lesson.⁹²

“Likeness” encompasses image generated synthetic media, but voice regulations are much more unclear. Text-to-voice models have led to the widespread sharing of AI generated music on TikTok, ranging from covers of pop songs in Toad’s voice or mimicking Drake and the Weeknd’s voices without their permission.⁹³ The following section is an examination of text-to-voice AI implementation online.

Universal Music Group (UMG) removed the AI generated song “Heart On My Sleeve” by “Drake” and “The Weeknd” from TikTok, as well as Spotify and YouTube. While this song was not used for commercial purposes, the label was able to make a copyright claim due to its inclusion of a protected producer tag.⁹⁴ After UMG’s previous licensing agreement with TikTok ended January 31st, 2024, the label removed all songs by artists like Taylor Swift and Olivia Rodrigo, citing concerns around “adequate compensation for artists and songwriters, protections against AI-generated music, and online safety on the platform to protect artists from ‘hate speech, bigotry, bullying and harassment.’”⁹⁵ Content previously featuring UMG owned songs were muted, and the

⁹² “Privacy Policy.” TikTok. Accessed January 16, 2024.
<https://www.tiktok.com/legal/page/us/privacy-policy/en>.

⁹³ Polito, Brianne, and Matthew Savare. “The No Fakes Act and the Right of Publicity in the Age of Generative AI.” Association of National Advertisers, December 15, 2023.

⁹⁴ Polito, Brianne, and Matthew Savare. “The No Fakes Act and the Right of Publicity in the Age of Generative AI.” Association of National Advertisers, December 15, 2023.
<https://www.ana.net/miccontent/show/id/ii-2023-12-fake-act-ai>.

⁹⁵ Weatherbed, Jess. 2024. “TikTok Loses Taylor Swift, Drake, and Other Major Universal Music Artists.” The Verge. February 1, 2024.
<https://www.theverge.com/2024/2/1/24057839/umg-pulls-tiktok-music-ai-contract-dispute>.

music had to be replaced with other sounds. Users took this in stride, adding copyright free sounds to videos that do not align with the original context of the video. TikTok is a great platform for music discovery, which established UMG artists signed do not need. The vacuum for popular sounds has been filled by smaller artists and creators that appreciate the increased opportunity for exposure.

The aforementioned use of text-to-voice AI seems rather harmless, however, this technology can be used by scammers to impersonate others. Euler Hermes, a French insurance company, reported a UK client lost \$243,000 in March 2019 due to scammers synthetically impersonating their CEO's voice. While sound and video have historically been reliable records of events, this is no longer the case.⁹⁶ TikTok's community guidelines prohibit impersonation, creating fake personas or misrepresenting affiliations with people or entities to mislead audiences.⁹⁷

To combat misinformation, TikTok uses independent fact-checking partners, such as Lead Stories and PolitiFact, to support integrity and authenticity on the platform. These partners review and assess content "across more than 60 markets". Violations can result in the removal of the content or FYF ineligibility. In the event that it is unclear whether or not content violates the platform's misinformation policies, viewers are notified that the content may be misinformation. Any content posing a public safety risk or inducing panic is strictly prohibited, for example, posting footage of a historical attack as if it were currently happening. This applies to content that is "real, fictional, digitally

⁹⁶ Adjer, Henry, Giorgio Patrini, Francesco Cavalli, and Laurence Cullen. "The State of Deepfakes: Landscape, Threats, and Impact." Deeptrace, September 2019.

⁹⁷ "Community Guidelines." TikTok. Accessed January 25, 2024.
<https://www.tiktok.com/community-guidelines/en/>.

created, and shown in fine art or objects”, meaning that the type of content and the context it is presented in are both taken into account.⁹⁸

Sora is OpenAI’s new text-to-video model that can create visually complex videos up to a minute long. Videos can feature multiple characters and details specific to certain subjects or backgrounds in multiple scenes with a persistent visual style. In addition, the technology can extend existing videos or fill in missing frames. The model currently has limitations in regard to visually representing cause and effect or simulating the physics of certain events. OpenAI has granted select visual artists, designers, and filmmakers early access to the technology, and is working with experts in bias, policy, and education for testing and feedback before public release. Any video generated by Sora will include C2PA metadata, which can be used to investigate if content was generated with AI. In addition, the model does not accept text inputs related to “extreme violence, sexual content, hateful imagery, celebrity likeness, or the IP of others.”⁹⁹ However, this technology is built off of Dall-E and GPT models, with data scraped from the entire internet. This technology is not currently available to the public.¹⁰⁰ Current TikTok videos are typically real footage, which can be edited or augmented with filters. However, the platform will likely be flooded with AI generated videos once Sora is taken up by the masses.

⁹⁸ “Community Guidelines.” TikTok. Accessed January 25, 2024. <https://www.tiktok.com/community-guidelines/en/>.

⁹⁹ “Creating Video from Text.” Sora. Accessed April 3, 2024. <https://openai.com/sora>.

¹⁰⁰ “Creating Video from Text.” Sora. Accessed April 3, 2024. <https://openai.com/sora>.

Data Security Legislation

On March 6th, 2024 around 8PM, I received the following push notification from TikTok:

“Stop a TikTok shutdown: Congress is planning a total ban of TikTok. Speak up now-before your government strips 170 million Americans of their Constitutional right to free expression. This will damage millions of businesses, destroy the livelihoods of countless creators across the country, and deny artists an audience. Let Congress know what TikTok means to you and tell them to vote NO.”

TikTok was prepared to organize users against a ban this time around, spending millions in advertisements featuring nuns or veterans, for example.¹⁰¹ Beneath the message was a field to enter my zipcode and identify my representative, with a red button reading “Call Now”. The House Energy and Commerce Committee unanimously approved a bill that would give TikTok’s parent company ByteDance 165 days to sell TikTok if enacted. If TikTok is not sold by that date, app store operators would no longer be able to make the app available for users to download. In addition, TikTok traffic or content would be restricted from any “internet hosting services”. New Jersey representative Frank Pallone likened this data security effort to regulating US airwaves due to national security concerns. The bill could also enact similar restrictions for other apps from companies of foreign adversaries. Subsequent bills will aim to limit US companies from selling American data to foreign adversaries. The US government,

¹⁰¹ Maheshwari, Sapna. "TikTok Turns to Nuns, Veterans and Ranchers in Marketing Blitz." New York Times, Apr 05, 2024, Late Edition (East Coast), <https://login.proxy.lib.duke.edu/login?url=https://www.proquest.com/newspapers/tiktok-turns-nuns-veteran-s-ranchers-marketing/docview/3033715795/se-2> (accessed April 20, 2024).

including law enforcement agencies, have already purchased large amounts of personal data from commercial data brokers, and are capable of using commercial spyware to breach individual phones.¹⁰²

Steven Mnuchin, former Treasury Secretary under Donald Trump, is forming an investor group to purchase TikTok.¹⁰³ TikTok is nothing without its algorithm, though its unclear at this point if it would be included in the sale. The American Civil Liberties Union (ACLU) opposes the ban, arguing that it would be an infringement of the American constitutional right to free speech and expression.¹⁰⁴ Many people use TikTok as a news source, and the bill could be seen as an attempt to prevent the proliferation of propaganda from the Chinese government in the upcoming election. However, a forced sale would not prevent other types of election propaganda sure to overrun the app soon, especially considering the propaganda already present. Regardless of who purchases TikTok, any algorithm in the hands of domestic or international bad actors could shift this situation from precarious to catastrophic.

China aside, TikTok being hosted on the cloud is a privacy concern within itself. Though popular, cloud based technology can present a variety of unique data privacy challenges. As an example, Wzye, a smart home camera company, had to notify 13,000 customers of a security breach momentarily allowing some users to see inside of other users homes in February. According to the company, over 1,500 people tapped to view video of someone else's home. Although over 99% of the company's customers overall

¹⁰² Fung, Brian. 2024. "Congress Explores New Bill to Force a Sale or Ban of TikTok in America | CNN Business." CNN. March 7, 2024.

<https://www.cnn.com/2024/03/07/tech/congress-bill-bans-tiktok-america/index.html>.

¹⁰³ "Former Treasury Secretary Mnuchin Aims to Buy TikTok with Investor Group." PBS, March 14, 2024. <https://www.pbs.org/newshour/economy/former-treasury-secretary-mnuchin-aims-to-buy-tiktok-with-invest-or-group>.

¹⁰⁴ "Tell Congress: No Tiktok Ban." American Civil Liberties Union. Accessed April 3, 2024. <https://action.aclu.org/send-message/tell-congress-no-tiktok-ban>.

were not affected. Wyze claims a recently integrated “third-party caching client library” incorrectly connected certain device and user IDs. A 23-year-old girl shared on Reddit that she was getting ready for work during the breach, which made her feed disgusted and violated. The company is scrambling to add additional verification measures, however, their reputation may be irreparably damaged.¹⁰⁵

There is no federal data privacy law in the United States. Regulations should limit how much data companies can collect about consumers, as well as how long they are able to hold onto this data. The longer our data is available, the more likely it is to be compromised by data brokers or scammers. Only 14 states have some form of data privacy legislation as of this year. The American Data Privacy and Protection Act (ADPPA) of 2022 did not pass.¹⁰⁶ However, the Maryland Online Data Privacy Act, modeled on the ADPPA passed both the House and Senate. Data minimization and civil rights protections aim to limit personal data collection and protect sensitive information.¹⁰⁷ State regulations are generally industry-friendly, making it difficult for consumers to hold tech companies accountable.¹⁰⁸

The European Union sets a great example for where federal US data policies could begin. The General Data Protection Regulation is built upon the right to privacy in

¹⁰⁵ Hawkins, Andrew J. 2024. “Wyze Says Camera Breach Let 13,000 Customers Briefly See into Other People’s Homes.” The Verge. February 19, 2024.
<https://www.theverge.com/2024/2/19/24077233/wyze-security-camera-breach-13000-customers-events>.

¹⁰⁶ “Maryland Privacy Bills Pass House and Senate.” n.d. EPIC - Electronic Privacy Information Center. Accessed March 4, 2024.
<https://epic.org/maryland-privacy-bill-nears-passage-after-clearing-house-and-senate/>.

¹⁰⁷ “Maryland Privacy Bills Pass House and Senate.” n.d. EPIC - Electronic Privacy Information Center. Accessed March 4, 2024.
<https://epic.org/maryland-privacy-bill-nears-passage-after-clearing-house-and-senate/>.

¹⁰⁸ “The State of Privacy: How State ‘Privacy’ Laws Fail to Protect Privacy and What They Can Do Better.” n.d. EPIC - Electronic Privacy Information Center. Accessed April 4, 2024.
<https://epic.org/documents/the-state-of-privacy-report/#:~:text=Weak%2C%20industry%2Dfriendly%20laws%20allow.>

the European Union. Data subjects can seek compensation for any damages incurred from a company violating any of the following seven principles:

“lawfulness, fairness, and transparency; purpose limitation; data minimization; accuracy; storage limitation; integrity and confidentiality; and accountability.”

Data controllers must be able to demonstrate compliance with the GDPR. Measures such as two-factor authentication or end-to-end encryption are required to safeguard information from cyber attacks. In the event of a data breach, data subjects must be notified within 72 hours to avoid penalization. Heavy fines fortify these protections.¹⁰⁹

Data collection processes are required to protect personal data “by design and by default”. Information cannot be collected, stored, or sold unless companies are freely given specific, unambiguous consent from the data subject. Data needed to execute or prepare a contract where the data subject is a party, comply with a legal obligation, or save someone’s life can be collected. In addition, data needed to complete public interest tasks or other official functions is permitted. Any other uses must be constituted by a “legitimate interest” in the personal data. This requires documentation of the circumstances and documentation that data subjects were notified. Consent can be withdrawn at any time, and requests must be presented in “clear and plain language”. Children under 13 must have parental permission to give consent.¹¹⁰

Companies considered public authorities must appoint a Data Protection Officer. Public authorities monitor people systemically, regularly, and on a large scale. If the company requires special categories of data, such as criminal convictions, at a large

¹⁰⁹ “What Is GDPR, the EU’s New Data Protection Law?” GDPR.eu, September 14, 2023. <https://gdpr.eu/what-is-gdpr/>.

¹¹⁰ “What Is GDPR, the EU’s New Data Protection Law?” GDPR.eu, September 14, 2023. <https://gdpr.eu/what-is-gdpr/>.

scale, they must also have a DPO. The GDPR ensures data subjects have the following protections:

“the right to be informed; the right of access; the right to rectification; the right to erasure; the right to restrict processing; the right to data portability; the right to object; and rights in relation to automated decision making and profiling.”¹¹¹

Back to the U.S., the “right of publicity” can protect individual rights to a person’s name, image, likeness, or voice in regards to commercial usage. However, only 38 states recognize this right, even fewer providing protections post-mortem.¹¹² The “Nurture Originals, Foster Art and Keep Entertainment Safe Act” is an attempt by Senators Chris Coons, Marsha Blackburn, Amy Klobuchar, and Thom Tillis to federally protect voice and visual likeness from generative AI tools. Also known as the No Fakes Act, this could create a right of publicity for 70 years post mortem. In addition, the act would prohibit production and distribution of AI generated media too similar to the source if used without their consent. Violating this act could result in civil liability of \$5,000 per violation, among other prohibitive measures. This would not include “digital replicas that are: (i) used as part of a news, public affairs, or sports report, (ii) used in a documentary or historical work if the digital replica of the applicable individual is used as a depiction of that actual individual, (iii) used for purposes of comment, criticism, scholarship, satire, or parody, (iv) used in an advertisement or commercial announcement for the purposes in (i)-(iii) above, or (v) are de minimis or incidental.”¹¹³

¹¹¹ “What Is GDPR, the EU’s New Data Protection Law?” GDPR.eu, September 14, 2023. <https://gdpr.eu/what-is-gdpr/>.

¹¹² Polito, Brianne, and Matthew Savare. “The No Fakes Act and the Right of Publicity in the Age of Generative AI.” Association of National Advertisers, December 15, 2023. <https://www.ana.net/miccontent/show/id/ii-2023-12-fake-act-ai>.

¹¹³ Polito, Brianne, and Matthew Savare. “The No Fakes Act and the Right of Publicity in the Age of Generative AI.” Association of National Advertisers, December 15, 2023. <https://www.ana.net/miccontent/show/id/ii-2023-12-fake-act-ai>.

Circling back to the previous discussion about AI tools, ownership of AI generated works varies greatly depending on factors such as the service provided or the content produced. If an image's source material is not specifically quoted by the service, there is no need to cite it from an intellectual property standpoint. Only ideas copied explicitly are protected by copyright. Due to the human authorship requirement for copyright protections, AI generated works are not considered. AI generated content is either public domain or derivative work of training data. Designation as a derivative works depends upon the level of similarity with the original work and the creators ability to determine where training data for the tool originated, as well as who owns its components. ChatGPT, for example, controls an output more than the user of the tool, so OpenAI has more of a claim to these works than the ChatGPT user. Independent creation, in and of itself, can be protection from potential copyright infringement claims.¹¹⁴

Discussion

Platforms and AI companies must be regulated before applications and tools are released to the public. All Tech is Human (ATIH) is a non-profit organization I am a part of that seeks to connect individuals committed to developing a responsible tech ecosystem. Their ten principles emphasize the importance of technological co-creation, rather than current top down models that exclude non-technical stakeholders in the

¹¹⁴ McKendrick, Joe. "Who Ultimately Owns Content Generated by CHATGPT and Other AI Platforms?" Forbes, February 20, 2024. <https://www.forbes.com/sites/joemckendrick/2022/12/21/who-ultimately-owns-content-generated-by-chatgpt-and-other-ai-platforms/?sh=1a89962d5423>.

media landscape. Using a “grassroots-power model”, the organization activates its multidisciplinary network to proactively understand technology’s impact. Research developed about the digital age as it continues to unfold is key to creating educational resources for a variety of audiences.¹¹⁵

ATIH’s Improving Social Media report sets out a variety of standards for the many stakeholders involved in new technology. Platforms are encouraged to prioritize wellbeing over business. This may conflict with short term returns, but will promote long-term user bases. Social media companies must look to media literacy experts to fully understand the impact of content shared on platforms and beyond. Tech professionals are responsible for recognizing and addressing biases within their work through ongoing education efforts. This is integral to the job, not auxiliary. Policymakers must ensure regulations are backed by research, and consider incentives for tech that prioritizes the wellbeing of users. News also plays a critical role in the responsible ecosystem, since sensationalization can miseducate the public. By showcasing the complexity and influence of social media and other technologies, news can inform audiences without scaring them unnecessarily.¹¹⁶ The non-profits Business Case for AI Ethics seeks to hold executive teams responsible for any harms caused by their developments now or in the future. Executives must consider outcomes possible in a variety of contexts during the development of AI technologies. Workers must be empowered by ethical industry standards and protected from retaliation for voicing

¹¹⁵ “Improving Social Media: The People, Organizations and Ideas for a Better Tech Future | PDF | Social Media | Popular Culture & Media Studies.” n.d. Scribd. Accessed February 11, 2024. https://www.scribd.com/document/495069082/Improving-Social-Media-The-People-Organizations-and-Ideas-for-a-Better-Tech-Future?doc_id=495069082&download=true&order=627913468.

¹¹⁶ “Improving Social Media: The People, Organizations and Ideas for a Better Tech Future | PDF | Social Media | Popular Culture & Media Studies.” n.d. Scribd. Accessed February 11, 2024. https://www.scribd.com/document/495069082/Improving-Social-Media-The-People-Organizations-and-Ideas-for-a-Better-Tech-Future?doc_id=495069082&download=true&order=627913468.

concerns to create a culture of questioning. AI must be regulated from design, deployment, and beyond, in real time.¹¹⁷ These frameworks provide a starting point for developments that prioritize users rather than profit.

It is safe to say nothing on the internet is real, in terms of AI generated or edited content, or real in terms of authenticity as opposed to careful curation. AI should cite where its outputs come from, which would require ethical databases built off of user consent. Users should disclose when AI tools are being used in any capacity. Although I highly distrust Meta, Instagram now allows users to manage its access to your camera roll, as an alternative to being required to share it in its entirety. This extra precaution makes me feel somewhat safer using the platform, likely prolonging my use of it. Apple notified me recently that Notability has had access to my entire camera roll for the last 6 months, and asked if I wanted to limit this. I had no idea I was handing over so much data to a note taking app, and without this notification, I never would have limited its access.

Whether we like it or not, our data and attention is our part of the bargain for free services online. As involuntary prosumers on a broad scale, it is difficult to disentangle our identity from the multitude of data points collected about us. The way we perform on social media cannot be viewed as a siloed representation of us, rather as incomplete snapshots of our networks at any given time. Tech giants attempt to replace warm and fuzzy feelings from fulfilling relationships with constant dopamine hits that trick us into satisfaction with parasocial dynamics online, forcing us to observe life as it happens from our phones. It is practically impossible to use services in a way that does not also

¹¹⁷ Human, All Tech Is. 2021. "The Business Case for AI Ethics." All Tech Is Human. April 14, 2021. <https://alltechishuman.substack.com/p/the-business-case-for-ai-ethics>.

undermine your digital privacy, so do what you can when you can by opting to limit what you share when given the option.

People use TikTok as a search engine not because they want facts, but because they want to know who is using what. We want to see if we fit in with the qualities brands project onto their products to determine if they align with what we want to be associated with. Considering most products are fundamentally similar and price does not directly correlate with quality, good marketers understand people buy things because they are impulsive, want to be like their friends, lack real social connections, and seek objects to fill the gap. Attempting to trick people into purchases is an elementary, short term strategy. In 1673, René Descartes wrote that although "machines could do many things as well as, or perhaps even better than, men, they would infallibly fail in certain others, by which we would discover that they did not act by understanding or reason, but only by the disposition of their organs."¹¹⁸ You are not your data, and there is no way to commodify the human essence of imperfection. Even though I wrote this paper on TikTok selling our data to the government, that is where you will continue to find me in my free time.

¹¹⁸ Springer, Claudia. *Electronic eros: Bodies and desire in the postindustrial age*. Austin: University of Texas Press, 1996.

Acknowledgements

I would like to extend my gratitude to my advisors, Dr. Victoria Szabo, Dr. Jasmine Cobb, and Brad Brinegar, for their time and feedback. I would also like to thank Dr. Rachael Murphey, my family, friends, and my pet bunny Honeybun for supporting me during this time!