Navigating the Impact of Artificial Intelligence In Musical Social Media Platforms, A Case Study of Spotify and TikTok

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***Abstract*— This paper will address the gap in research on AI in musical social media and provide insight into issues faced. Although direct solutions will not be provided, this paper will unbiasedly examine the usage of Artificial Intelligence in 2 specific musical social media platforms which are Spotify and TikTok, consider and claim positive and negative impacts of AI usage in the platforms, as well as extend arguments from Daron Acemoglu's "Redesigning AI" [1] as well as some responses to his article.**

I. Introduction

Have you ever been lost? Not lost in an unknown place or lost without navigation, but rather stuck in the trance of a new song that you've discovered that you just can't seem to get enough of? Before crediting ourselves and taking deep pride in uncovering the song on our own and playing it to others with the excitement of saying "look at this amazing song I found", it is important to consider how we really stumbled upon that song. The music that we listen to should be a reflection of us and our personalities, but with the presence of Artificial Intelligence in music, does the music we listen to truly resemble us as individuals, or is it just an algorithmically generated recommendation that we've each given in to without realizing it?

For the purpose of this paper, it is necessary to determine what specifically defines a social media platform. According to the Oxford English Dictionary [2], social media platforms are "websites and applications which enable users to create and share content or to participate in social networking." Following this criteria, both Spotify [3], a "digital music, podcast, and video service that gives you access to millions of songs and other content from creators all over the world" and Tiktok [4], an "application that allows users to create, watch, and share 15-second videos shot on mobile devices or webcams" are both considered as social media.

II. The Use of AI in Spotify

A. Hyper Personalized Recommendations

Spotify has been using artificial intelligence for quite a while now and plays a big role in the application. It is a significant part of what makes Spotify the app that we know and love today. One of the most important things that Spotify uses AI for is its recommendation system. This can be broken down further into the following categories: daily and weekly mixes, playlist recommendations, radio stations, content curation, ad targeting, and audio analysis. According to Mike Kaput from the Marketing Artificial Intelligence Institute [5], Spotify leverages user data pulled from various aspects of application usage. Acquiring data ranges all the way from playlist creation to listening history. This can even include the tempo and key of songs to ensure a more accurate recommendation. Using this large set of data, the AI algorithmically predicts what the user might want to listen to next. This accounts for the creation of mixes, playlist recommendation, radio recommendation, content curation and audio analysis. For ad targeting, Spotify uses the same process as all other websites and applications with specific ad targeting which consists of using customer data to segment audiences by factors such as basic demographics, shopping interests, or browsing behavior, and then creating unique advertisements tailored to each group of audiences as explained by Wilson Lau [6].

B. Spotify's AI DJ

The musical streaming platform, Spotify, has a feature in its application open to those with a premium subscription

known as the Spotify AI DJ. Apart from regular playlist, radio and podcast listening, users can choose to listen to the AI DJ. With a human-like automated voice, the DJ explicitly but seamlessly blends artificial intelligence and music curation to provide each user with a tailored listening experience. The DJ plays different segments of music such as a user's currently most listened to songs, past favourites, new recommendations, and more. Each segment consists of around 3 to 5 songs per segment and the topic of each segment usually becomes increasingly more specific with continued listening. For example, the DJ may recommend songs of a certain genre, then a few segments later, artists of that specific genre, then again a few segments later, songs of those specific artists of that specific genre and so on and so forth. In between each segment, the DJ will speak to the user using its human-like AI voice to create a more seamless transition between segments, much like a real-life disco jockey or radio host.

III. The Use of AI in TikTok

A. Hyper Personalized Recommendations

TikTok, even more than Spotify, relies on personal recommendations to retain users. If the content a user is seeing on the screen doesn't interest them, they'll scroll. If they scroll too much and find nothing interesting with no stimuli, they're extremely likely to leave the app. Every user on TikTok has a different feed with content curated to exactly interest them to keep them engaged and scrolling. Just like Spotify, TikTok uses AI based recommendation algorithms to drive user engagement.

However, what differentiates TikTok from other social media applications and allows it to retain the number 1 position in social media platforms are two things. Firstly, the actual AI algorithm that they use. Using "Monolith: Real-Time Recommendation System with Collisionless Embedding Table" [7], TikTok is able to reach a level of hyper-personalization like no other social media platform. Studies have shown that TikTok is the most successful social media platform [8]. Secondly, while it may seem easy for other social media platforms to implement the same algorithm, TikTok has a uniquely large emphasis on something unlike other social media platforms. That emphasis is its prominent usage of music and audio. With almost every single video on TikTok having an audio, studies [9] have found almost 90% of users believe that sound is essential to the TikTok experience and that almost 75% of people would even stop and look at advertisements on TikTok compared to other social media platforms simply because the advertisement had an audio playing with it. Advertisements on TikTok have around 75% more traffic simply because of being able to attach an audio to them which clearly shows the impact of adding audio.

B. Trend Prediction

Tiktok's algorithm is not only limited to the type of content that a user consumes like other social media platforms, but is open to a much larger new set of data which is music and audio. Songs such as "Oh no" by Kreepa [10], "Say So" by Doja Cat [11], "drivers license" by Olivia Rodrigo [12] and so many more seem to play around us all day. From grocery stores to at the dentist, these songs popularized by TikTok seem to play everywhere we go. Often associated with trends, TikTok uses AI to recognize when a song is getting more and more attention and will recommend it to more users, creating a trend popular enough to grab the attention and encourage participation of those worldwide.

C. Content Moderation

Although unnamed, TikTok uses a different AI apart from Monolith as well. This AI is specifically used to moderate content and enforce following community guidelines. TikTok themselves have explicitly stated that they use AI to make sure that content does not violate community guidelines [13]. Videos that are uploaded to TikTok are initially reviewed by an automated moderation technology which uses artificial intelligence to identify content that may potentially violate community guidelines. The AI looks at signals across content which include keywords, images, titles, descriptions, and very importantly, audio. With no violation detected, the video will be made available to view on the platform. If a potential violation is found, the automated moderation system will either pass it on to TikTok's safety teams for further review or remove it automatically if there is a high degree of confidence that the content violates TikTok's community guidelines.

IV. The Impacts of AI Usage in Spotify

A. The Positive Impacts of AI Usage in Spotify

Creating a tailored recommendation is vital for an application like Spotify to maintain its level of success. Especially in such a diverse and versatile industry, there are many different genres and types of music. With music being in the creative sector, "good music" is completely subjective. Specific to one's own preferences, past experiences, feelings, values, and emotions, music enjoyed by one person is in no way confirmed to be enjoyed by another person. Using AI to deliver content aligned with one's taste is an extremely positive impact. This benefit is also alongside the positive impact of AI being used for music recommendation. Additionally, with Spotify using AI to track the key and tempos of songs to categorize them, it allows the application to automatically sort playlists based on mood. Using user preferences and current trends, AI systems can quickly adapt to changes in musical trends and user preferences, ensuring that the recommendations remain

relevant and reflective of current popular culture. This in turn enhances the overall user experience as well.

Apart from benefiting the user, using AI in Spotify benefits others as well. As a company, Spotify benefits from the user benefiting, much like a symbiotic relationship. By offering relevant and appealing music suggestions, AI contributes to increased user engagement on music streaming platforms. Users are more likely to spend time exploring and enjoying the content, leading to a more satisfying experience, encouraging them to continue using the app, finally generating an increased revenue for Spotify. Alongside this, Spotify is more likely to retain said users and increase user loyalty. Users are more likely to stay loyal to a platform that consistently understands and caters to their musical preferences.

Finally, there are two more benefits for the industry. By using AI and recommendation algorithms, there is a new found support and encouragement for emerging artists. AI-driven recommendations can help showcase and promote emerging or independent artists by introducing their music to a broader audience. This can be beneficial for artists looking to gain recognition in a competitive industry. The second benefit is data-driven insights for the musical industry. Music streaming platforms can leverage the data generated by AI algorithms to gain insights into user behavior, popular trends, and emerging genres. This information can be valuable for the music industry in terms of marketing, artist promotion, and content creation.

B. The Negative Impacts of AI Usage in Spotify

Throughout Kate Crawford's "Between Dystopia and Utopia" [14] response to Acemoglu's article [1], she argues that the collaboration between human and AI is not the answer to the threat of automation. She argues that AI is driving ever-present labor automation by explaining that less attention is paid to the current experiences of AI-modulated workplaces in low wage jobs, particularly for those in surveillance and algorithmic assessment. Crawford also adds that employers can now use AI to observe, assess, and modulate the work cycle and bodily data in such extensive ways that were previously impossible. In the specific case of Spotify, her argument stands strong as those that used to work at Spotify in algorithmic assessment, output recommendation and data analysis are now no longer needed as AI can do their job instead, with Spotify not needing to give out as many paychecks.

Although a hyper-personalized recommendation algorithm can have positive impacts, there are also negative impacts which are overlooked. One such negative impact is the undermining of cultural democracy in one's music taste. Jonathan Gingerich coined the term "CMAI" in his article "Is Spotify Bad for Democracy?" [15] which is an abbreviation for "culture mediating artificial intelligence." Given the assumption that the economic drive of companies such as Spotify using CMAIs is to make money and taking the general interaction between users and CMAIs, Spotify users will interact with new music recommendations that are already very similar to those of their current tastes. CMAI platforms can weaken cultural democracy by making people more likely to allow their existing cultural preferences to become further ingrained rather than discovering new artworks that they did not seek out and perhaps did not expect to enjoy. For example, instead of using AI, we could get recommendations from friends and those who would be eager to recommend new music that they think we would enjoy. The more diverse our group of recommenders, the more diverse our musical palettes will be, even if each friend aims to recommend music that we will instantaneously enjoy. By contrast, neither Spotify itself, nor even Spotify in conjunction with any extent of AI usage can achieve this level of diversity.

V. The Impacts of AI Used in TikTok

A. The Positive Impacts of AI Usage in TikTok

Using AI in TikTok, especially concerning music, has many positive impacts. Like Spotify, it allows a more personalized content discovery experience. AI algorithms on TikTok analyze user behavior, interactions, and preferences to deliver a personalized "For You" feed which leads to a highly tailored content discovery experience, including music that aligns with individual tastes. With TikTok also being in the creative sector of applications, using AI powered audio effects and manipulating audio allows for enhanced video creativity. AI-powered effects and filters on TikTok allow users to create engaging and creative videos. The dynamic effects respond to users' movements and expressions, contributing to a more interactive and visually appealing content creation process. With users able to use these effects, they are able to reach a greater audience, benefitting the content creator, audience, and TikTok itself. One such example is the artist Kyle who talks about how his song "Hey Julie" went viral after TikTok created a customized filter for users to use in their videos alongside the audio [17]. This benefitted app users by letting them produce more engaging content, Kyle himself who drew attention to his song, and TikTok as well which had increased user engagement.

One key difference between Spotify and TikTok is that TikTok has not only a prominent audio component, but primarily a visual component as well. This allows for creators to associate trends with audios which further create popular and viral trends associated with music. AI helps identify and promote viral music trends on TikTok. As users create content using specific songs, these trends can quickly gain popularity, benefiting both established and emerging artists. Alongside this, these trends can popularize globally, creating a global music exposure. TikTok's global user base allows for the discovery of music from various cultures and regions. AI recommendations help bridge cultural gaps,

introducing users to a diverse range of musical genres and artists.

Finally, similar to Spotify, using AI in the music applications of TikTok can benefit the industry. It promotes the discovery of new and upcoming artists. TikTok's AI-driven content recommendations can help independent and emerging artists gain exposure. If a song goes viral on the platform, it can lead to increased visibility and recognition for artists who may not have mainstream representation. For example, recently, a new and rapidly upcoming artist named Tyla, from South Africa, released a song called "Water" [18]. Tyla and her fans have turned this into a trend which has caused the song to reach global levels of exposure, further promoting the growth of her culture. AI in the music side of TikTok also allows for Data-Driven insights for musicians as musicians and record labels can benefit from the data generated by AI algorithms on TikTok. Insights into how users engage with specific songs can inform marketing strategies and help artists understand their audience better.

B. The Negative Impacts of AI Usage in TikTok

Just like Spotify, the introduction of AI in algorithmic filtering replaces a lot of low wage jobs. Specifically, it includes automating jobs such as content moderation, tagging and categorization, data analysis, data insight, dynamic content recommendation and trend recognition. TikTok themselves have stated [9] that only if the AI is unsure if a video meets community guidelines, will it be passed on to a real human that will check, slowly decreasing the need for human workers in content moderation as AI advances. From an audio perspective, as AI develops, it will become better at recognizing inappropriate sounds in audios that should not be allowed on the platform, soon no longer requiring a person to even double check.

With a personalized feed curated to hit a user with a hit of dopamine at every swipe, one of the most occurring and most problematic issues that users face is addiction. We know that with the AI-driven algorithm that analyzes user interactions such as likes, shares, favourited audios, and watch time, to curate content tailored to individual preferences, it can create a highly engaging experience. In addition to this, TikTok's algorithm introduces an element of surprise by recommending unexpected but enjoyable content. This element of serendipity can be addictive, as users are curious to see what the algorithm will present next - or perhaps which audio will be presented next.

There is also an overlooked issue with using AI in the music applications of TikTok for the popularization of trends. When an audio starts to gain popularity and there is nothing wrong with the audio, TikTok will promote it. However, there is often the possibility that the audio is associated with a negative trend. For example, in September of 2021, the "Devious Lick" trend was trending within North American teenagers where they were stealing items from schools under the influence of a "trend" [19]. The problem rapidly evolved as students went from stealing masks to stealing sinks and electronics. Every video was associated with the TikTok Audio "Ski Ski BasedGod - Lil B (sped up TikTok Remix)" which is from the original song "Ski Ski BasedGod" by artist Lil B [20]. The audio seems to be completely normal and nothing seems absurd or inappropriate about it. But with TikTok's AI promoting trending sounds, it resulted in promoting this negative trend which became a very serious issue.

VI. Conclusion

With music playing around us all the time and sneaking its way into our daily lives, whether we're choosing to listen to it or hear it in the backgrounds of places we visit, artificial intelligence has had more of an impact in bringing that specific song to our ears than we realize. With two of the most popular social media platforms, Spotify and TikTok, there is a great deal of AI usage. The deep exploration of AI in musical social media platforms sheds light on the nuanced impacts and challenges posed by AI shaping our musical experiences. The examination of AI usage in these platforms has revealed a spectrum of positive and negative consequences that are associated with the critical integration of AI while further creating examples of Acemoglu's [1] arguments and propelling the need to change the way we use AI to create a "perfect" AI.

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