Analysing Privacy Policies and Terms of Use to Understand Algorithmic Recommendations: The Case Studies of Tinder and Spotify

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The algorithmic recommendations used by digital platforms have significant impacts on users behaviours and preferences. For instance, Spotify and Tinder ground their platforms on AI-powered recommendation algorithms that nudge users to either listen to specific songs or romantically match with specific users. Despite the powerful influence of these algorithms, there is little concrete detail about how exactly they work as technology companies are increasingly resistant to independent scholarly scrutiny. This article makes both methodological and substantive contributions to understanding how these influential recommendation algorithms work. We conducted a sequential analysis of historical and contemporary iterations of Spotify and Tinder's Privacy Policies and Terms of Use to ascertain the extent to which it is possible to use this sort of analysis to infer some of the functionalities of the algorithmic recommendations. This research provided certain insights into the companies, such as Spotify altering its Privacy Policy to acknowledge that third parties with a commercial relationship to the platform may be altering the recommendations seen by users. However, the legal documentation of both companies is ambiguous and lacks detail as to the platform's use of AI and user data, and its subsequent impacts on users. This opaque drafting of Privacy Policies and Terms of Use hamper the capacity of outsiders to properly scrutinise the companies' algorithms and their relationship with users.

Introduction

Algorithmic recommendation refers to the use of artificial intelligence (AI) methods to suggest to users new content to be accessed or consumed. This form of recommendation is a core component of many of the most popular digital platforms and applications. For example, the popular matchmaking application Tinder is predicated on a system where users are shown one profile at a time by a recommendation algorithm. While Tinder users can 'swipe' left or right to indicate their interest in other users, the recommendation algorithm plays a determinative role in how matches occur through the order in which they display other users to the person 'swiping'. Another example is offered by Spotify, the largest audio streaming platform, which uses recommendation algorithms to show songs and podcast episodes that are assumed to be aligned with users' preferences.

In addition to music and romantic matching, AI-based recommendations are influencing virtually all aspects of our lives: Facebook and Twitter's personalised newsfeeds, Amazon's suggested purchases, Google's search result ranking, Netflix's movie suggestions, and AirBnb's accommodations - just to name a few. Despite the wide-reaching influence of these recommendation algorithms, companies are very secretive about them, and withhold substantive information about their functionality. Obtaining detailed information on these algorithms is indeed problematic. Platform's underlying algorithms are proprietary, mostly based on closed-source code, not publicly documented. Furthermore, their characteristics and updates are often obfuscated, like Spotify's notable attempt to downplay a software update as a matter of "fixing performance issues" while, in fact, it modified functionalities in a way that limited user agency in deciding what music to play (Morreale and Eriksson 2020).

These problematic practices resulted in a growing suspicion of the public towards Internet giants and in rising remands for increased transparency around their

functionalities. Obtaining access to this information is indeed regularly challenged by the aversion of technology companies to sharing data with platform and AI scholars (Freelon 2018; Bruns 2019; Eriksson et al. 2019). It is thus becoming increasingly difficult to conduct independent scholarly research on digital platforms and, consequently, to investigate and expose the underlying mechanisms, their effects on user preferences, and their potential ethical and legal issues.

This article makes a methodological contribution to this ongoing research challenge through testing a novel approach to discovering information about algorithmic recommendations. We assessed whether a comprehensive analysis of the evolution of platforms' legal documents in the use of user data might suggest new ways in which platforms exploit user data, thus inferring likely implications for the companies' recommendation algorithms. Specifically, we analysed two selected platforms, Spotify and Tinder, and analysed the evolution across multiple iterations of the companies' Privacy Policies and Terms of Use.

The second contribution of this article is related to the new knowledge generated on Spotify and Tinder's recommendation algorithms. Despite being used by hundred million users worldwide, both platforms received little academic scrutiny when compared against social media or search engines. Through the sequential analysis of each iteration of the companies' Privacy Policies and Terms of Use and especially when considered against other sources of information like registered patents, we can identify certain shifts in how the platforms used personal data for a recommendation algorithm. While these conclusions would need cooperation from technology companies to be verified, we offered new evidence that can ground future research and provide further evidence to corroborate our observations. We propose that this iterative research process is critical to understanding recommendation algorithms' broader social and ethical impacts.

The remainder of the article is structured as follows: in the next section, we present the related literature. We then move to present our original research on the evolution of the Terms of Use and Privacy Policies for the two companies. Finally, we discuss the findings of our work and pinpoint the contributions.

Background

Algorithmic recommendation systems are defined by Seaver (2019) as a "ubiquitous feature of contemporary cultural life online, suggesting music, movies, and other materials to their users". Different companies have different strategies to base their suggestions on. While a systematic review of these strategies is beyond the scope of this article, these strategies can be roughly divided into content-analysis vs user-analysis. Content-analysis recommendations extract and classify information from the data to be recommended. In the case of music, songs are analysed, and some of their components are extracted and classified – mostly audio components (e.g. spectrum and instruments harmonic distribution) and song metadata (e.g. genre, artist, year, tempo).

User-analysis recommendations extract information from the user interacting with the data via mobile and desktop applications. An example is the *collaborative filtering* technique used by several music streaming companies. This technique consists of extracting information from users' playlists and behaviours, profiling their tastes, and recommending what users with similar profiles liked (Cohn 2019). Spotify admittedly uses this technique to inform their recommendations. As explained by Gustav Söderström, Chief R&D Officer of Spotify: "When a large group of users put the same

bunch of tracks next to each other on the same types of playlists over and over again, they're telling you that those tracks go well together. And that those tracks probably have something in common. Algorithms then use that information to figure out how similar two tracks are mathematically based solely on how often they appear on the same playlist".[1]

Even if advertised as "intelligent" or "autonomous", recommendations need a massive amount of data generated by humans. The intelligent predictions are indeed based on mathematical models created based on existing human-created data, which is often inadvertently volunteered by users. Users thus contribute their intelligence, knowledge, and preferences to improve a commercial recommendation system (Morreale 2021), similarly to Google's PageRank algorithm, which weights different links based on harvested human intelligence (Pasquinelli 2009). Having a thorough understanding of what specific user data the companies have collected can thus offer valuable information to understand the nature of corporate recommendations algorithms. A better understanding of data collection procedures is also needed, as they are opaque and fail to recognise platform users the value of their labour. However, the possibility of obtaining this sort of information depends on platforms' willingness to share information on their algorithm.

Some academic researchers have managed to work with some digital platforms (primarily Facebook and Twitter) to obtain access to targeted schemes for the scholarly data access (Bruns 2019). However, digital platforms are increasingly averse to being academically scrutinised and have even threatened legal action – a notable example being Spotify trying to sue Swedish academics, as reported by Eriksson et al. (2019). Considering the increasing restrictions and refusals from various digital platforms in response to scholarly investigations following the Cambridge Analytical scandal (Bruns 2019), researchers have called for the development of new pathways to conduct independent, public-interest research (Freelon 2018; Zuboff 2019). These new pathways follow an activist agenda (Milan 2017; Kazanksy 2019; Keyes 2019) aimed at reasserting research freedom as a recognised human right (United Nations 1977) and drawing inspiration from existing methods for conducting research in a hostile environment.

Freelon (2018) has identified various methods to collect information on platform functionalities. The "Accommodate and acquiesce" approach relates to acquiring data via authorised methods, for example, by purchasing data from commercial data services and obtaining data via web scraping. The "Lobby for change" approach is a negotiation with platforms to access the information needed to conduct research, for instance, by pushing to obtain bespoke access to API, which cannot currently be used for scholarly investigation (Eriksson et al. 2019). Other approaches include using automated programs (bots) to analyse collected data (Snickars 2018; Eriksson et al. 2019). Digital humanities scholars have also used interviews, research articles, patents, conferences, company policies and job openings to look under the hood of platform functionalities (Eriksson et al. 2019; Morreale and Eriksson 2020). For instance, an analysis of Spotify's recent academic publication has revealed that the company is monitoring and using "song skip" data (Montecchio 2019) in forthcoming "creator tools" that inform artists about the point at which their listeners "drop their attention" (Morreale 2021). In this article, we test whether a new method may be helpful for a

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[1] https://open.spotify.com/episode/0T3nb0PcpvqA4o1BbbQWpp

range of digital humanities and AI scholars who are also seeking to analyse and critique the algorithms of digital platforms.

Privacy Policies Analysis

It is clear that both Spotify and Tinder use sophisticated AI algorithms as core components of their respective platforms and business models. However, due to the hostile research environment described above, it is less clear how these algorithms work, how they process data, or what the cumulative impacts for users are. In this context, we explored whether the analysis of the Privacy Policies of Spotify and Tinder could help shed light on their recommendation algorithms and their possible impacts on users. Privacy Policies can potentially be an excellent source for this purpose. The role of Privacy Policies is to set out how a company intends to collect and use personal data. Legal frameworks such as the General Data Protection Regime have imposed a range of new compliance requirements for companies in terms of privacy, such as an explanation of the different categories of personal data collected by the company and the purposes for which that data is being collected (Hintze, 2019). This greater emphasis on transparency in data protection legislation should theoretically make Privacy Policies more informative. We also considered that Privacy Policies were a useful source of analysis because, historical versions of Privacy Policies can be easily and freely accessed online. This possibility allowed us to evaluate how Spotify's and Tinder's approaches to data evolved and outline possible legal and ethical issues raised by these approaches.

Methodology

A lawyer, one of the authors of this article, collected and analysed current and historical versions of the formal Privacy Policy for both Spotify and Tinder. The Privacy Policies were retrieved from the Wayback Machine and the Princeton-Leuven Longitudinal Corpus of Privacy Policies. The Policies were chosen depending on when they were changed, as opposed to a specific time period. Therefore, there is no 2015 Privacy Policy for Tinder. Instead, the assumption was that the 2013 Privacy Policy continued until the 2016 Privacy Policy came into effect.

We note that Spotify and Tinder's Privacy Policies and Terms of Use fall under the category of so-called "sneak-in" contracts, where companies have the broad discretion to unilaterally amend the terms of the contracts 'ex-post' i.e., after users have originally assented to them (Becher and Benoliel, 2021). This dynamic is compounded by the fact that Privacy Policies and Terms of Use are 'click-wrap' contracts, where users have virtually no ability to negotiate or reject specific terms in the contract. (Kim, 2013). In other words, these contracts are shrink-wrapped, so users have little choice but to accept the contract as a whole if they want to use the application. While courts have broadly upheld these kinds of agreements, wrap contracts and sneak-in contracts specifically have been criticised for enabling companies to appropriate personal information and user-created content in the digital space (Kim, 2013).

For both Tinder and Spotify, five Privacy Policies were analysed. For Spotify, these include the existing Privacy Policy (released in 2021) and four historic Privacy Policies (2018, 2015, 2014 and 2012). For Tinder, we analysed the existing Privacy Policy

released in 2018, three historical versions (2017, 2016 and 2013), and the version that came into effect in January 2022.

We conducted a legal analysis of each iteration of each Privacy Policy on its merits as well as a chronological analysis between iterations, noting the differences between each version and where specific terms were added, expanded, reduced or cut altogether. The policies were analysed manually in a spreadsheet. Clauses were grouped together based on their substantive theme, and then compared over the relevant years. For example, a substantive theme in Spotify's Privacy Policies was titled 'Information We Collect'. Where overarching themes could be distilled into further sub-themes, the same method was employed to compare and contrast policy changes. For example, the overarching theme of 'Information We Collect' could be further broken down into 'Usage and Log Data', 'Mobile Device', and 'Cookies'. We analysed these changes with an eye to changes in the global regulatory context (where, for instance, the European Union's General Data Protection Regime (GDPR) required additional specificity from data controllers like Spotify and Tinder). We also compared the evolution of terms in Spotify's Privacy Policy against Tinder's Privacy Policy.

We also compared the incremental changes to the companies' policies. Such changes could be contextualised against the regulatory backdrop in which they were instituted. Further, a simple comparison between the oldest and newest versions would have failed to capture the increasing tendency with which Spotify and Tinder gave themselves leeway to extract more user data.

Findings

This section sets out the findings from our sequential and chronological analysis of Spotify and Tinder's Privacy Policies in turn. We then report a comparative analysis of the two companies in terms of the evolutions of their respective policies.

Spotify

A quick numerical analysis reveals that Spotify's Privacy Policy word count increased from 2500 words in 2012 to roughly 4200 in 2021. The textual analysis of the Privacy Policies revealed a range of insights about the company's evolution in collecting and using personal data and the relationship between Spotify's algorithms and its users.

One of the most striking observations from our analysis of Spotify's Privacy Policies is that the company collects much more personal information than it did in its early years, including new types of data. In the 2012 iteration of its Privacy Policy, Spotify's data practices only included basic information: kinds of songs a user plays, playlists a user creates, and basic personal information such as the user's email address, password, age, gender, and location. If a user interacted with the Spotify application through their Facebook profile, the company could also access a user's Facebook profile information, including their display picture, their friends' names and their friends' display pictures.

Spotify's Privacy Policy has later expanded the scope of personal information collected by the platform, as well as the uses to which this information can be put. After several iterations of the Privacy Policy, the existing 2021 policy allows the company to collect users' photos, location data, voice data and other types of personal information. Notably, in the 2021 policy, Spotify indicates explicitly that some data will be used in

their recommendations. Indeed, the company reserves for itself the right to "make inferences" about users' interests and preferences and to use these inferences to personalise the Spotify user experience.

Spotify has also indicated that it collects voice data, for instance, to "evaluate and develop new features, technologies, and improvements to the Spotify Service". This policy entry gains relevance when compared against the company's patents. On 12 January 2021, Spotify was granted a patent that allows the company to promote "personalised content" based on the "personality traits" it detects from voice data and background noise (Hulaud 2021). The combination of this legal documentation thus suggests a change in the platform's recommendation algorithm to capture voice data.

Finally, at its most basic, the tendency to glean more data over the years is reflected in the number of words within each company's Privacy Policy. Spotify's 2012 Privacy Policy was around 2500 words, while its 2021 policy is roughly 4200. Tinder's 2013 Privacy Policy was approximately 980 words, while its latest one is more than four times as much, at around 4500.

Tinder

Similarly to Spotify, Tinder's Privacy Policy document dramatically increased from 2012 to 2021, going from 980 words to around 4500. The chronological analysis of Tinder's Privacy Policies also revealed a similar expansion of personal information collected by the company through its platform.

Tinder's original Privacy Policy, dated in 2013, was closely connected to Facebook, as early Tinder users could only access the Tinder platform through their Facebook account. At this early juncture, users authorised Tinder to access their Facebook information, including their names and profile pictures and the names and profile pictures of the user's Facebook friends. In addition, the Tinder Privacy Policy in 2013 provided automatically collected personal information amounting to a user's geographic location and the URL of the last website the user had visited before accessing the Tinder application.

Subsequent versions of the Tinder Privacy Policy in 2015, 2017 and 2018 (the current version) have dramatically expanded the personal information collected by the platform. In 2017, Tinder began to collect "sensitive data" in addition to the personal information previously included in the Privacy Policy. The expansion of the Privacy Policy to have "sensitive data", following terminology used in the GDPR, allowed users to provide information that revealed their ethnic origin, nationality, religion and/or sexual orientation. Tinder also collects information from users' photo and video content.

It is not possible to directly extrapolate from Tinder's Privacy Policies how this information is incorporated into Tinder's recommendation algorithms. However, the most recent Privacy Policy is more open-ended than prior versions. For instance, an earlier version of the Privacy Policy provided that "other users may provide information about you as they use our services. For instance, we may collect information about you from other users if they contact us about you." This wording was replaced in the Privacy Policy that will come into effect in January 2022 to include information about any given user from other Tinder users "as they interact" with that user.

Tinder is not specific about what information it is collecting about Tinder users' interactions with each other. Still, extrinsic evidence suggests that a variety of information is used in the platform's proprietary algorithms. For instance, Tinder's CEO Sean Rad has stated that Tinder's recommendation algorithm is not just determined by "how many people swipe right on you… It's very complicated. It took us two and a half

months just to build the algorithm because a lot of factors go into it." (Carr 2016). Further research will be necessary to ascertain these other factors and how this information is incorporated into the recommendation algorithms. One possible example of this is the use of 'cookies' by technology companies, including Spotify and Tinder, to furnish additional data.

Terms of Use Analysis

As part of our analysis of primary sources, we also looked to Spotify and Tinder's Terms of Use policies as a potential source of information about each company's recommendation algorithm. Because a Terms of Use document sets out a legal agreement between a platform and its users, we would expect some degree of transparency if users are being influenced or instrumentalised through the platforms. However, in practice, Terms of Use are typically written in an opaque style, with vague language and ambiguous wording (Benoliel and Becher, 2019). This hampered our analysis of Spotify and Tinder's Terms of Use to some extent.

Methodology

Similarly to our earlier primary analysis of Spotify and Tinder's Privacy Policies, one of the authors manually collected and analysed current and historical versions of the formal Terms of Use policy for Spotify and Tinder. Clauses were once again grouped together based on substantive theme, distilled into relevant sub-themes, and then compared. For Spotify, five Terms of Use policies were analysed. These include the current policy released in 2021 and historical iterations released in 2017, 2015, 2014 and 2012. Similarly, for Tinder, five Terms of Use policies were analysed. These include the current version released in November 2021 and historic policies released in June 2021, 2020, 2016 and 2013. As with our analysis of Privacy Policies, we analysed these Terms of Use policies from a legal perspective and context informed by external changes in the regulatory environment. Certain changes, such as a post-2016 revision of the terms to detail "legitimate interests", reflect contemporary requirements of the GDPR..

Findings

This section sets out the findings from our sequential and chronological analysis of Spotify and Tinder's Terms of Use policies.

Spotify
The most noteworthy evolution in Spotify's Terms of Use relates to Clause 7, "Rights You Grant Us", specifically highlighting "the Content you view" within the Spotify platform. Unlike earlier versions of Spotify's Terms of Use (before 2015), contemporary versions note that extrinsic factors influence viewers' content within the platform. Specifically, the clause changed in 2015 to read that: "In any part of the Spotify Service, the Content you view, including its selection and placement, may be influenced by commercial considerations, including agreements with third parties. Some Content licensed or provided to Spotify (e.g. podcasts) may contain advertising as part of the Content. In such cases, Spotify will make such Content available to you unmodified."

This clause raises a number of questions about the recommendation algorithms employed by Spotify and the extent to which they are influenced by extrinsic factors outside a user's listening data. This is a broad and open-ended provision for commercial

influence, as Clause 7 in the Terms of Use provides ample room for the company to legally highlight content to a specific user based on a commercial agreement.

This finding acquires specific meaning when considered against Spotify's Payola-like schema that was recently introduced, in which artists can volunteer to lower their royalty rate in exchange for an increased number of recommendations (Stassen 2020). From the user's perspective, this "exchange" is problematic. Spotify promises that the "playlist is crafted just for you, based on the music you already love" (Spotify 2021); however, Spotify's Terms of Use detail how an algorithm could be influenced by factors extrinsic to the user, like commercial deals with artists and labels.

Tinder

Tinder's Terms of Use offer little detail or information about how the recommendation algorithms work. With Tinder even more than Spotify, a critical component of how the platform works is the recommendation algorithm and how it recommends possible matches or partners for each user. Unlike Spotify, however, Tinder does not clarify in its Terms of Use whether or not there are extrinsic factors that can impact these recommendations (or, indeed, how these recommendations work at all). This lack is unsatisfactory given that statements by the Tinder CEO suggest that a "lot of factors" affect how the algorithm works (Carr 2016).

Our findings echo a range of previous investigations into Tinder's Terms of Use, specifically with regard to data and algorithms, especially by national consumer representative groups. For example, the Norwegian Consumer Council investigated Tinder's Terms of Use. The Council found that Tinder's terms were "a bad example of the types of terms confronting consumers in the digital world... Not only do such terms disrespect the users of Tinder, but they also breach the Norwegian Marketing Act, the EU Unfair Contract Terms Directive and the EU Data Protection Directive" (Norwegian Consumer Council 2016). The Consumer Council concluded a withering analysis of Tinder's Terms of Use by noting that the terms were ambiguous and inaccessible and that they enabled the company to use user data for its marketing without gaining the user's consent prior.

Tinder has been responsive to some extent to these criticisms. For instance, following the investigation by the Norwegian Consumer Council, our analysis revealed that Tinder altered some of the terms that the Council had highlighted as bad practice. In the current iteration of Tinder's Terms of Use, there is no provision for the company to use user data for marketing without the user's consent. In addition, Tinder does not claim an "irrevocable" licence to user-generated content as it previously did. However, other criticisms of Tinder's terms, such as the ambiguous nature of the document, remain unaddressed. Our investigation confirms the concerns of the Norwegian Consumer Council about the company's Terms of Use not providing enough clarity as to how users' information is collected and used from the perspective of the recommendation algorithm.

While the Tinder Terms of Use document is not clear as to how the content or matches that users view are generated, the policy does grant Tinder (at Clause 7) a broad and open-ended right to access, use and manipulate any account information or content made by the user, so long as doing so satisfies a "legitimate interest", including to "enforce the Agreement". It is plausible, though not possible to confirm without the company's collaboration, that Tinder feeds user information into its recommendation algorithms and that Clause 7 provides for this in a broad fashion.

Discussion

Our results outline that, while neither company is clear on the use of data in their recommendation algorithms, certain terms do illustrate possible legal and ethical issues flowing from the platforms' use of these algorithms. Thus, we consider that our sequential analysis of Privacy Policies and Terms of Use was partially fruitful in revealing some information about Spotify and Tinder's recommendation algorithms that is not readily apparent to users or the general public. However, this approach faces inherent limitations. In particular, as legal documents, the language in both companies' policies tends towards the legalistic and vague, and there is little specificity. Particularly when it comes to how data is processed or the uses to which it is put, technology companies use generalised language even where it is clear that there are implications for the relationship between the user and the platform. This observation raises issues around whether a user is genuinely consenting to the digital platform's terms, an important point that has been raised by a number of consumer watchdogs as well as scholars (Benoliel and Becher, 2019).

However, while neither document is specifically intended to cover terms about algorithms and mainly contains general language in any case, the scope of both Privacy Policies and Terms of Use do reference aspects related to recommendation algorithms. With respect to Privacy Policies, companies are required to disclose the kinds of information they collect from users, particularly due to more demanding data regulations like the GDPR. That information is highly relevant for researchers interested in recommendation algorithms, as those algorithms rely on user information to provide personalised recommendations. Our analysis shows that some persuasive implications can be drawn from the evolution of Privacy Policies to include different kinds of information. For instance, the newest iteration of Spotify's Privacy Policy to allow the platform to collect users' voice data came at a similar time as a patent for Spotify to determine users' preferences for media content based on the metadata collected from users' speech and background noise (Hulaud 2021). While Spotify has not confirmed this expansion of its recommendation algorithm, this is a clear example of the insights that can be gleaned from a critical analysis of how legal documentation changes over time. There are fewer clear insights stemming from our analysis of Tinder's Privacy Policies in terms of that company's recommendation algorithm.

We did note some commonalities between Spotify and Tinder and suggested that these would also prove true for other technology companies and their platforms. For instance, there has been a significant broadening of the types of information Spotify and Tinder extracts from their users. This broadening, in turn, influences how both companies use that information – especially as it relates to marketing and advertising. While the increased length of Spotify's Privacy Policy documents this increase reflects more significant regulatory requirements to some extent, both Spotify and Tinder carved much more space out to collect a wide variety of data (and its subsequent use) over time.

While our analysis of Spotify and Tinder's Terms of Use did not provide as much information as the companies' respective Privacy Policies, this limitation might reflect a systematic issue in the clarity of the terms. Given the paramount importance of algorithms to the relationship between users of both Spotify and Tinder's platforms, users should be provided with some degree of insight into how those algorithms work and their impacts on the user's experience on the platform. However, while Spotify's Terms of Use did reveal some interesting insights into how commercial considerations may affect recommendations algorithms, other details were sparse, and Tinder's terms were not useful for this purpose at all.

Overall, this analysis must be situated methodologically in the hostile research environment described earlier in this article. A systematic analysis of Privacy Policies and Terms of Use, particularly when performed alongside other legal documentation like registered patents, or other tools used in Digital Humanities as described above, can be a helpful research tool for other digital platforms. It must be noted that any analysis such as the one discussed in this article must be understood against a shifting regulatory background. For instance, both Spotify and Tinder's legal documentation saw a growing linguistic emphasis on users' privacy rights over time. This change is largely due to legal developments such as the introduction of the GDPR as well as the California Consumer Privacy Act (CCPA) in 2018. For example, Tinder recently came out with a California-specific addendum to its Privacy Policy which, among other things, allows users in California to request information about the business or commercial purpose for which Tinder collected or sold their personal information (Tinder 2022). This type of change is welcome and may help provide further information in the future about Tinder's recommendation algorithm and how Tinder integrates user data. As a result of these developments, the latest iterations of both companies' privacy policies place a greater emphasis on transparency, the importance of user consent, and a better explanation of the legal bases relied on by the companies.[2]

As a final consideration, we argue that the hostile environment we are operating needs to be taken into account to explain the speculative character of some discussions. When companies are uncooperative, and typical academic inquiry cannot be complete without breaching contractual agreements, we maintain that scholarly investigations can have a speculative character. This suggestion does not mean that a less academic rigor can be expected or granted about making assumptions on the basis of partial, observable data. Instead, we propose that it is the companies' remit and burden to refute such assumptions and communicating the clarity of their systems.

Conclusion

This article offered methodological and substantive contributions to the ongoing effort to better understand the algorithmic recommendations of prominent digital platforms. Our analysis centred on Spotify and Tinder, two large and influential technology companies and digital platforms that have received relatively little academic scrutiny. Like other technology companies, there is very little definitive research or access to the companies' proprietary recommendation algorithms, and the technology industry is increasingly hostile in the face of academic research and criticism (Bruns 2019, Eriksson et at 2019, Freelon 2018). However, it is vitally important that these algorithms are better understood to be adequately analysed and assessed from a legal, societal and ethical perspective.

To that end, we conducted a sequential analysis of several iterations of Spotify and Tinder's Privacy Policies and Terms of Use to assess possible implications for how the companies' recommendation algorithms work. This exercise produced certain substantive insights about the algorithms, particularly as a result of analysing the companies' respective Privacy Policies. Though the significant influence of the recommendation algorithms would seemingly indicate that they ought to be described in the platforms' Terms of Use, this detail is missing across both Spotify and Tinder. We have noted that this criticism has been levelled by a range of national consumer groups in recent years. Nevertheless, we believe that the development of these methods may

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[2] See Tinder's 2018 policy, clause 5; Spotify's 2021 policy, clause 6.

assist future researchers across AI and digital humanities and AI scholars who seek to analyse and critique recommendation algorithms of digital platforms.

In addition to this methodological contribution, this article also summarises some of the critical substantive insights following our analysis. By looking at each iteration of the companies' Privacy Policies and Terms of Use comparatively and with reference to other documentation such as registered patents, we can identify definitive shifts in how the companies' recommendation algorithms may work. For instance, in our article, we highlight the newfound role of voice data for personalised content on Spotify and an evolution in the Terms of Use to provide for commercial influence over the content presented to users. With these powerful digital platforms possessing considerable influence in contemporary society, their users and society at large deserve more clarity as to how recommendation algorithms are functioning This article thus amplifies calls for transparency that have been gaining momentum among academics and public thinkers, including podcasts such as "Tech Won't Save Us" and "In Machine We Trust".

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