

OVERVIEW ARTICLE

Where Does the Buck Stop? Ethical and Political Issues with AI in Music Creation

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AI applications for music creation have been available since the last century but, until recently, their adoption has been limited to a small niche of researchers and engineers and their ontology limited to experimentation in computational creativity. The ongoing transformation of the music industry, the increasing injection of capital into AI-music companies, and the technical advancements in AI are in the process of expanding this niche and shifting the ontology of these applications. This expansion and ontological shift raise several ethical and political issues that this article sets out to explore. I contextualise the ideological substrate currently guiding mainstream research in commercial AI-generated music and identify two urgent issues caused by this research. First, the inevitable increase in the artistic surplus population and decrease in creative labour cost; second, the tacit acceptance of neo-colonial practices based on the exploitation of existing music and listeners' preferences. I propose that these issues should be discussed and addressed by the creators of these technologies, and I suggest an ethical and epistemological turn for MIR research.

Keywords: ethics of music-AI; politics of music-AI; dataveillance; surplus population; digital colonialism

1. Introduction

Recent innovations in music created with artificial intelligence—which, from now on, I will refer to as artificial intelligence music (AIM)—have achieved exceptional results in terms of human likeness. Some successful examples are OpenAI Jukebox's sample-based music created 'in the style of' (Dhariwal et al., 2020) and Dadabots' never-ending generative death metal (Carr & Zukowski, 2018). As with most technological breakthroughs (Reijers & Coeckelbergh, 2020), these innovations are receiving mixed reactions, with one Pollyannaish side welcoming the potential for exploring new creative solutions and one despairing side foretelling the end of human composers.

This polarisation is less obvious among the creators of these innovations, who have almost exclusively focused their research efforts on fostering technical advancements while leaving ethical and political aspects of their work mostly unspoken. Only recently have some Music Information Retrieval (MIR) researchers started engaging with inward-looking reflections on the ethical dimension of AIM (Gomez et al., 2019; Holzapfel et al., 2018; Sturm et al., 2019) and called for further discussions of the ethical norms of their work to 'maintain a reputation as a responsible and mature discipline' (Holzapfel et al., 2018).

This article advances and amplifies this call by arguing that it is of primary importance for the MIR agenda to include in-depth, articulated discussions not just of the ethical, but also cultural and political issues of AIM.

I suggest that some of the most urgent issues come from what I name 'commercial' AIM, a subset of AIM that includes industry-driven innovations aimed at commodifying AI-music (thus, it does not include musicians' attempts to use AI to explore new creative possibilities in their musical practice). It might be contended that these innovations are still in their infancy and their adoption still too limited to deserve academic consideration. However, pre-emptive research on technological innovations is particularly important if carried out when these innovations are still in their early stages, in anticipation of their possible impact on society (Boenink et al., 2010; Brey, 2012; Reijers & Coeckelbergh, 2020).

The contribution of this article is twofold. First, it proposes that current efforts to create commercial AIM become particularly problematic when considered against the environment in which they occur: a music industry dominated and directed by streaming platforms. AIM research does not operate in a void but, instead, belongs to a complex socio-technical system that is reshaping music and our relationship with it (Holzapfel et al., 2018; Sturm et al., 2019). Borrowing concepts and political frameworks from social science and the humanities, I contextualise and problematise this research and identify the ultimate beneficiaries of these research efforts.

Second, I aim to bring discussions of the ethical, cultural, and political implications of AIM closer to the MIR community's attention to encourage self-regulatory activities coming from within the community. Whereas critical investigations on the societal impact of technology have historically been the remit of philosophers and social scientists, I aim to emulate the efforts of scholars in other technology fields, who started identifying and addressing the potential adverse effects of their technology on society (Bardzell & Bardzell, 2016; Hayes & Marquez-Borbon, 2020; Keyes et al., 2019; Morreale et al., 2020).

The remainder of this article is structured as follows. Section 2 illustrates current efforts within MIR to address problems of ethical nature and identifies similar actions in other research communities. Section 3 introduces the contexts and political frameworks needed to analyse two ethical issues with commercial AIM. Section 4 discusses why these issues should be a matter of concern for MIR researchers and practitioners and proposes ethical and epistemological turns in MIR research. Finally, Section 5 offers concluding remarks.

2. Ethics in MIR: Background

The last couple of decades have seen an ever-growing number of studies unpacking ethical and political issues connected to AI. However, until very recently, thorough investigations of the effects of AI in the music domain have been surprisingly overlooked.

Only very recently did some scholars from humanistic disciplinary areas start investigating these issues. An insightful inquiry into commercial exploitations of AI-generated music is offered by Drott (2020b). The author, whose discussions will be detailed later in the article, suggested that the development of AIM should focus on advancing a more equitable musical economy. Sterne and Razlogova (2021) identified several cultural and political issues embedded in AI tools for music production like LANDR, suggesting that these machine learning based tools are 'just the latest chapter in a long story of capitalism failing to fully account for culture'. Finally, Clancy (2021) explored the financial and political issues with AIM. Elaborating upon the concept of technological somnambulism (Winner, 1983), Clancy suggests that it is a research responsibility 'not to sleepwalk' into technological futures and urged researchers to consider how AI advancement will affect work in the broader music ecosystem.

Music technology scholars have also joined this endeavour and initiated discussions to understand the ethical implications of AI research in their field. Following a general trend in algorithmic recommendation studies, most of these discussions have been focused on recommendation bias and fairness (Gomez et al., 2019; Holzapfel et al., 2018; Sturm et al., 2019) and gender representation in music streaming (Epps-Darling et al., 2020). Ethical concerns have also been expressed in relation to user data (Chen et al., 2019; Saurel et al., 2014) and in relation to the legal aspects of AIM. In particular, Sturm et al. (2019) identified and discussed legal elements that are helpful to navigate the currently grey area of

music created using copyright-protected training sets, and opened questions about transparency, e.g. to what extent should a listener be informed about the involvement of AI (ibid.). The authors also pushed the community to ask how will AI 'help and harm' the various stakeholders involved in music creation.

Three workshop/tutorials on ethical MIR have been held at ISMIR (Gomez et al., 2019; Holzapfel & Tzanetakis, 2014) and WIMIR (Velarde & Holzapfel, 2019), raising questions such as: what are the consequences when MIR software is applied in digital markets? (Holzapfel & Tzanetakis, 2014); and who are the people affected by MIR? (Gomez et al., 2019). Also, the ISMIR website¹ now includes links to ethical guidelines developed by computer science academic associations and a document developed after the WIMIR 2019 workshop (Bauer et al., 2019). A call to MIR researchers and practitioners to 'start asking ethical questions' was also recently made by Newton-Rex and Koops (2020) following the first AI-generated music contest.

These examples indicate some MIR researchers' awareness of some of the ethical issues connected to the work in their field and an attempt to bring these discussions closer to the community's activities. To assess the extent to which the community at large shares this ethical awareness, I performed a systematic keyword analysis of all ISMIR papers published in the ten years from 2011 to 2020. I performed a textual analysis to identify all occurrences of the keywords with "ethic" and "politic" prefixes. I then excluded those papers there were not relevant to this investigation. For instance, I removed from this list papers where the 'ethical' occurrence related to having obtained ethical approval for an experimental study. Out of 1095 accepted submissions, only three papers and two workshops (0.45% of total contributions), survived this selection.

This analysis confirms that, to a large extent, MIR is not yet engaging in the 'ethical turn' that other technology research fields are undergoing. Particularly noteworthy is the body of work produced in Human-Computer Interaction (HCI) to question the political and ethical implications of the work in the area (Bardzell & Bardzell, 2016; Dourish, 2010; Frauenberger, 2019; Keyes et al., 2019; Morreale & Eriksson, 2020; Rogers, 2012). This body of work is partly situated within the so-called Humanistic HCI, a research and practice approach aimed to include humanistic epistemologies, theories, methods, and methodologies in HCI (Bardzell & Bardzell, 2016). Scholars following a Humanistic HCI agenda also subscribe to the idea that every technology has implicit and explicit politics. Exposing these politics and studying their social consequences is in the developers' and designers' remit (ibid.).

Similar conversations have recently expanded to New Interfaces for Musical Expression (NIME), a community of musicians and researchers exploring new technologies for music performance, including AI-powered instruments. NIME members have been actively unpacking and addressing political issues affecting their work, particularly those involving gender disparity (Xambó, 2018),

accessibility (Harrison & McPherson, 2017), environmental impact (Masu et al., 2021), as well as questions about data ownership in ML-based NIMEs (Martin et al., 2020). Recently, Knotts and Collins (2020) shared a survey on social media to assess musicians' opinions on the impact of AI music software. Whereas some answers indicate an optimistic view—for instance, most respondents do not consider AIM a threat to musicians' jobs—the survey showed that positive and negative comments appear in equal number 'so a fairly balanced view of music AI was found across all participants'.²

In the 2020 edition of the conference, two papers concurrently aimed to highlight ethical and political considerations about the new instruments designed within and outside NIME (Hayes & Marquez-Borbon, 2020; Morreale et al., 2020). Both papers engaged with humanistic epistemologies (e.g. feminist theory, cultural studies, critical theory, and political ecology) to invite creators of new music technologies to consider the 'prevailing sociopolitical and epistemological struggles' within the field (Hayes & Marquez-Borbon, 2020) as well as the 'political issues that are connected to the things we make' (Morreale et al., 2020). The NIME community has also recently released a number of official manifestos and codes of conduct on diversity, environmental impact, socio-economic fairness, and research ethics aimed at formalising the community's commitment to a more just society.

3. Ethical Issues with Commercial AIM

The political character of AI has strengthened since the 'AI fever' started spreading across the capitalist world (Dyer-Witheford et al., 2019), even in the music creation domain. The corporate interest in this field is demonstrated by the recent deals between music AI companies and big IT firms: Tiktok acquired Jukedeck, an AI company whose software generates new music in various genres (Dredge, 2020); Warner Music signed Endel, an AI-powered 'lullaby generator' (Kaye, 2019); the streaming service Tencent partnered with Amper, an algorithmic composition system that creates new music based on mood and style (Dredge, 2019); and Microsoft signed a partnership with OpenAI (Scott, 2020).

When technological innovation is so firmly situated within and directed by a specific economic system, the argument that describes technology as intrinsically neutral or just maths is a fallacious one (Lazovich, 2020; Terzis, 2020). This fallacy becomes even more problematic when algorithms are involved in decision-making processes, as is the case with AI-created and AI-recommended music. Next, I present two issues related to the rise of commercial AIM. In both cases, I start by defining the context in which they belong: one that is dominated by streaming platforms and music-oriented social media.

3.1 Increased Surplus Population

AI innovations are often criticised for their potential threat of human redundancy, and the validity of these critiques in the music context has been a matter of discussion within MIR (Gomez et al., 2019; Holzapfel & Tzanetakis,

2014). I argue that appreciating the extent of this threat requires us to zoom out and analyse the socio-economic context in which commercial AIM *might* become popular.

The issue of musician redundancy precedes commercial AI-created music applications and is usually referred to as the 'long tail' problem. The long tail (**Figure 1**) describes the situation in which a small minority of musicians are very popular, while the great majority rest in the curve's tail (Celma, 2010). Streaming services offered the illusion of solving, or at least reducing, this issue by democratising access to distribution. So far, this promise has not been honoured as streaming has de facto increased 'the pool of musicians vying for the attention of audiences—which in turn reduces the odds that any of them will succeed in capturing such attention' (Drott, 2020a).

Drott (2020a) proposed a political framework to understand the long tail problem by drawing an analogy with the Marxian notion of 'surplus population'.³ Surplus population refers to those 'who are superfluous for the reproduction of capital and who are excluded from formal employment as a result' (ibid.), i.e. economically inactive individuals. A surplus *artistic* population identifies those affected by the marginalisation exacerbated by streaming services: 'songs are now *more accessible* to listeners and *less likely of actually being accessed*' (ibid., emphasis in original). Unsurprisingly, the availability of more music does not mean that people have more time to listen to music. Thus, the number of musicians who become 'surplus population' increases with the total number of musicians available at the fingertips, i.e. the length of the long tail.

Despite their promises, reducing the length of the long tail does not seem to be a priority item in the agenda of mainstream streaming platforms. Evidence suggests that the opposite appears to be true: in 2017, Spotify included 'fake artists' in their curated playlists, taking up attention slots and royalty revenues from real musicians (Drott, 2020a; Eriksson et al., 2019; Goldschmitt, 2020). In the age of attention economy, or attention capital (Franck, 2019), the product is people's attention and the object of the attention is of little importance. Thus, it is not surprising that new competition for musicians' on-air time—fake artists and podcasters—comes from music streaming services themselves.⁴

The 'fake artists scandal' (Goldschmitt, 2020) and Spotify's ongoing effort to reduce artists' royalties (Hern,

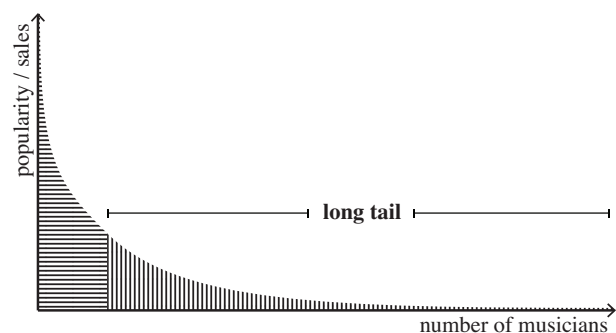


Figure 1: The 'long tail': the great majority of musicians have very limited popularity.

2020) becomes particularly problematic when considered against Spotify's research activities in AI-created music (more details in section 3.2). Research in AIM can open highly lucrative business opportunities given the low cost of non-human musicians and their inability to organise in unions to protest against unfair treatment (Union of Musicians and Allied Workers, 2020). However, non-human musicians will compete with the already-struggling musicians in striving to escape the long tail for the short head. If unchallenged, the apparently innocuous and somehow alluring effort to create music that 'sounds like humans' will inevitably increase competition with real musicians.

This prediction becomes more meaningful when taking into account that many listeners 'simply do not care as much about genre or albums as they do about the overall function of the music in their playlists' (Goldschmitt, 2020). The *overall function of music* has indeed been artfully shaped by streaming services, which turned music listening into a mood-enhancing background experience (Anderson, 2015; Drott, 2020b; Eriksson et al., 2019; Pelly, 2018). This is particularly the case for the numerous human-curated 'chill-out' playlists that are available on nearly all streaming platforms, which are composed of songs that flow 'seamlessly into the next, a formula that guarantees a greater number of passive streams' (Pelly, 2018). In her recent analysis of AI pop creations, Avdeeff (2019) anticipated that it is only a matter of time before we will have available 'infinite *chill* playlists that are entirely AI-produced and platform-owned'.

When considered holistically, these reflections suggest that the ultimate criteria of success for commercial AIM are not likely to be about the *persuasiveness* and *human-likeness* of the generated music. Instead, success criteria are more likely to include AIM's efficiency in driving down the cost of creative labour (Drott, 2020b). The simple existence of these commercial AI music services indeed 'may be enough to exert downward pressure on the market rate that creators of production music can demand for their work' (ibid.).

3.2 Colonialism, Dataveillance, and Manipulation

In machine learning based AIM, new music material is generated from a corpus of existing music, either in symbolic/notational format (MIDI) or raw audio. Despite the different abstraction levels, the generated outcome of both approaches is directly influenced by the training data. The legal implications of this practice are significant, mainly when the training data include copyright material (Sturm et al., 2019). However, the unconsented use of music created by someone else for lucrative reasons also has distinct cultural and political implications.

This practice extracts value from a 'common-pool resource—the shared knowledge of a given music community' (Drott, 2020b). The cultural capital of individual musicians and communities is thus exploited by capitalist firms for private interests. This exploitation becomes even more contentious when the original creators are not consulted, nor acknowledged. From an ideological standpoint, this practice has clear traits both

of modern-day colonialism, whereby everything can be possessed, exploited, occupied, invaded, and commodified (Whaanga, 2020), and also digital colonialism, whereby human lives are exploited as data for commercial gain (Mejias, 2019; Taiuru, 2020).

Unsurprisingly, AIM companies avoid volunteering details about the specific data source used to train their models. Methodologies from digital humanities, however, can help to circumvent this secrecy and obtain this information, for instance by analysing job postings, patents, and interviews. For example, a recent Spotify job opening for a research scientist working in AI-music creation indicated that the new team member would be 'using the latest Artificial Intelligence techniques, as well as the huge data sets available at Spotify' (Spotify, 2021a). It is not specified whether these data sets include the 50 million songs from their database, but it is a definite possibility. This data is also likely to include information about user preferences, behaviours, and the environment.⁵ Every time a user interacts with a song by liking it, skipping it (Montecchio et al., 2019), or adding it into a playlist, they feed their intelligence, knowledge, preferences, and emotions into a proprietary system. In this sense, this exploitation resembles the functionality of Google's proprietary PageRank algorithm, where each link represents a 'concretion' of human intelligence (Pasquinelli, 2009).

This form of monitoring and exploitation of user data and preferences is known as data surveillance, or dataveillance (Clarke, 1988; Drott, 2018; Prey, 2015). Dataveillance practices involve mining, processing, and analysing extensive user data to profile and commodify personal information and human behaviour. Dataveillance practices are already firmly established in the music industry. Streaming companies openly embed dataveillance practices in order to sell user profiles to advertisers (to enable them to target advertisements more precisely at consumers) and adjust the content presented to the user via algorithmic recommendations (Eriksson et al., 2019). From being passive or neutral intermediaries that simply transmit music from artists to listeners, these companies have become active mediators that interfere with the processes of distribution (Eriksson et al., 2019; Morris, 2015; Prey, 2015). If it is not already happening, it seems to be only a matter of time before research in AIM will be integrated with dataveillance practices to create new music tailored to user preferences.

Spotify is already active on this front, as evident from their job vacancies (Spotify, 2021a) and their stated mission of being in the process of 'developing novel technologies for AI-assisted music creation' (Spotify, 2021b). Furthermore, some recent interviews given by Spotify employees revealed that the company is currently developing some 'creator tools' for artists. User consumption data will be used to identify listeners' attention drops, and this information will be integrated with certain AI tools that will suggest to artists how they can optimise their songs (Fridman, 2019). These tools, as revealed by François Pachet, now head of Spotify's Creator Technology Research Lab, during an interview, will allow

musicians to ‘manipulate their audience in a very precise way’ (Solomon, 2019).

While technical research is carried out in developing mathematical and computational models that enable these practices of song optimisation and audience manipulation, there is little questioning on whether these innovations should be undertaken in the first place and what their effects might be on musicians’ practice and listeners’ preferences. For instance, once data-driven creator tools are available, composers might feel forced to systematically accommodate users’ tastes or have less incentive to innovate. Concerning listeners’ preferences, the availability of AI music tailored to one’s tastes might potentially amplify the ‘echo chamber effect’ (Barberá et al., 2015) or even become the ‘soundtrack to your life’⁶—i.e. the only music you will ever need to listen to. Also problematic and unchallenged is the axiomatic assumption that ‘AI will help musicians make music’. To the best of my knowledge, no investigations have been conducted to pinpoint what specific help musicians need, prove that such help is actually beneficial, or ensure that these tools will contribute to a more just music industry.

4. Where Does the Buck Stop?

‘Passing the buck’ is a phrase used to signal that someone is absolving themselves of responsibility or concern by denying authority or jurisdiction over a given matter. Thus, asking ‘where the buck stops’ is an invitation to MIR community members to take ownership of the responsibility for their work. MIR research feeds into the ethical and political issues described in this article both from music-recommendation and music-creation aspects. Genuine attempts to investigate and address these issues are not likely to come from big firms throwing capital into AIM. Even when corporate AI companies volunteer to conduct ethical inquiries, this commitment is often part of a strategic plan to create a ‘legitimacy buffer for objectionable corporate action’ (Bietti, 2020). Thus, following the trend traced by scholars from other technical research communities, I propose that MIR researchers and developers appoint themselves as regulators.

To start with, we must acknowledge that AIM research is not merely a matter of mathematical models and computational optimisation. Even purely theoretical AIM research is not happening in a void and does have implications for the future of music. MIR research should then commit to an ethical turn and pivot towards identifying and researching cultural and political issues, some of which have been presented in this paper and by other scholars both within (Gomez et al., 2019; Holzapfel et al., 2018; Sturm et al., 2019) and outside (Clancy, 2021; Drott, 2020b; Sterne & Razlogova, 2021) the field. In the end, ‘we are responsible for what we do, and there is nowhere we can lay this burden other than our shoulders’ (Terzis, 2020).

However, such a pivoting requires an epistemological turn. When discussing the challenges that traditional musicologists face in analysing algorithmic and generative music, Magnusson (2019) suggested that the ability to read code should be ‘a natural extension of the

musicologist’s skill set in the modern age’. Similarly, if MIR research’s scope were to be widened as I have suggested, the AIM research scientist’s skill set must be extended. This observation extends the call of Chen et al. (2019) who proposed establishing an ethics training module to educate MIR researchers ‘on the ethical, cultural, and financial issues at play in using and misusing music data’. Arguably, the scarcity of in-depth discussions from media scholars about the effects of AI on the ways in which music is created and consumed might be attributable to the technical complexity of the matters at hand; thus, MIR should take ownership for carrying out this sort of inquiry.

I borrow the suggestion of Bardzell and Bardzell (2016) that, within graduate education, there should be systematic support to technology researchers without advanced training in the humanities to learn and use humanistic ideas and approaches in their work: ‘We expect that humanistic approaches will improve their ability [...] to keep the field honest and reflective, and to help all of us imagine better futures and better forms of life [...] that are worthy of our “users” (pretty much everyone now) and their children’s children’ (ibid.). Embracing an ethical and epistemological turn would also guarantee that AI researchers would maintain these values when transitioning to the industry so that they would be able to communicate the impact of their work. However, ‘this requires training, mentorship and sponsorship much beyond technical or research skills’ (Rakova et al., 2020).

5. Conclusion

We speak so spectacularly and so readily of computer systems that understand, that see, decide, make judgements, and so on, without ourselves recognizing our own superficiality and immeasurable naivete with respect to these concepts. And, in the process of so speaking, we anaesthetise our ability to evaluate the quality of our work and, what is more important, to identify and become conscious of its end use. [...] One can’t escape this state without asking, again and again: “What do I actually do? What is the final application and use of the products of my work?” and ultimately, “Am I content or ashamed to have contributed to this use?” (Weizenbaum, 1986)

A limited number of music corporations are leveraging technological innovations to engineer the future of music unilaterally. These innovations are the by-product of a techno-enthusiast environment (Morozov, 2013) connected to the hegemonic economic system based on the constant exploitation of new markets. These innovations are also carried out ‘behind closed doors’ in a way that does not account for the needs of many music industry stakeholders and seems unnecessary for anyone apart from a closed circle of investors and certain stakeholders in music platforms. Thus, the effort to create AI music that ‘sounds human’ hardly offers any benefits for listeners and musicians but does help to boost the profits of corporate actors that have already largely demonstrated a lack of interest in a fair music economy, given their

successful endeavour in artfully de-commodifying music to commodify non-musical elements such as user data, preferences, behaviours, subscriptions, listeners' attention, and advertisement slots (Drott, 2018; Negus, 2019; Prey, 2015).

This article has identified and unpacked two main pressing issues that have distinct cultural and political implications related to research in commercial AIM carried out within MIR. First, I discussed how the proliferation of AIM might pose an actual threat to musicians as it will compete for listeners' attention on leading music platforms. Second, I showed how ML-based AIM is ideologically grounded in neo-colonialist practices, where user data and existing music are used as an all-you-can-grab resource for lucrative reasons. However, many other urgent political issues affect AI in general, which deeply intersect with work on MIR and which others might want to examine—for example, the environmental costs and the dominance of Western rationalist epistemologies in AIM applications.

I argue that these discussions cannot be delegated to others as we are accountable for our work, the work we fund, and the recipients of the models we develop. By avoiding a deep engagement with issues like environmental costs, manipulation of listeners, and human redundancy and exploitation, we are implicitly stating that these are not priorities for research in AIM with the consequent acceptance of the status quo.

Notes

- ¹ <https://www.ismir.net/resources/ethics/>.
- ² This result is noteworthy considering the respondents might have been attracted to the survey due to their interest in AIM (self-selection bias, Bethlehem, 2010; Greenacre, 2016).
- ³ More information on “surplus population” and how it is aggravated by AI can be found in (Dyer-Witheyford et al., 2019).
- ⁴ Gustav Söderström, Research and Development Officer at Spotify, revealed that Spotify expanded their mission ‘from being music to being audio’ (Fridman, 2019).
- ⁵ Spotify recently patented an algorithm that collects audio signals to infer environmental and personal metadata, e.g. emotional state, gender, location, number of people the user is sharing the space with (Hulaud, 2021).
- ⁶ The vision for an AI-generated soundtrack is popular among commercial AIM companies (Barreau, 2018; Clancy, 2021; Lifescore, 2021).

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Competing Interests

The author has no competing interests to declare.

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