

Abundance and Scarcity in the Age of Music Datafication

Student name: Wakaba Kimura (581067)

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Supervised by Professor Thomas Mook

Introduction

What is musical taste, creativity and culture? Modern data driven technologies that entrepreneurs in the music industry are fortifying themselves with, are based on the conviction that these things are a culmination of data that can be aggregated, commodified, and then be exploited by prediction or replication. Whether this conviction is true or not, the result is that turning music and surrounding information into data, and in turn acting upon these data will be further shaping our musical taste, creativity and culture by influencing abundance and scarcity. Throughout the 21st century advances in recording technology followed by digitization of music made recorded music abundant and caused major disruptions in the industry. In a cultural context, new tools birthed whole new genres of sounds, made possible of course with the ingenuity of the humans using them¹.

Datafication in the context of music, namely the datafication of listening (Prey, 2016, 2019) or datafication of sounds (Gallego, 2021) is triggering the next great disruption. The novel technologies we are interested in, are those that are made possible by collection of large data sets and the availability of processing power or logic to make use of such data. Technologies enabled by such datafication of music include algorithmic solutions to recommend songs, track identification by machine listening, or AI powered software to produce or assist production of music in various ways.²

¹ Think hip hop, music concrete, or sound recording pioneers like Conny Plank.

² Many wonderous fruits are borne from the advances in the *datafication of music* we enjoy today. To name a few; personalized song recommendations powered by Echo Nest that not only understand the cultural context of a piece of music through crawling articles written about the music, but also the musical qualities of a song through audio analysis; Instant song identification using audio finger printing by Shazam; Tone Transfer by Google Magenta empowers bedroom producers to hire realistically sounding

How these technologies disrupt and change what is visible and abundant or what is invisible and scarce, have the power to influence individual taste, creative processes, cultural and economic landscape of music, just as preceding disruptions did.

Three reoccurring themes that researchers have pointed out deemed relevant in the analysis of how the new supply side of music will look like, they are: Platform Gatekeeping Mechanisms, Feedback Loops, and Governing Policies in Up- and Downstream Copyright Laws.

Platform Gatekeeping Mechanisms

The platform economy in music dominates various domains. Defined as ‘a programmable architecture designed to organize interactions between users’ (p.9, Dijck, Poell, & Waal, 2018), platforms face and influence various sides of the network not limited to listeners, artists, labels, publishers, promoters, and advertisers. Prominent are 1. Music streaming platforms like Spotify, Apple Music, and Deezer that grant users access to a music catalog, and 2. Service-oriented platforms like Shazam for song identification, as well as various AI music platforms which offer access to software that make machine generated solutions.³

Platforms become gatekeepers due to interdependencies that emerge in the ecosystem with the platform serving as a primary gateway to consumers, and by the asymmetric power hierarchy

virtual horn players through timbre transfer; Apps like Endel aim to provide adaptive soundscapes that matches the listeners environment.

³ (Here we categorize commercial music AI services under platforms and not Software as a Service, due to the view that these software connect a trove of data about music to users. Drott sustains this view claiming that companies utilize the platform model of ‘a group of users being connected to an AI system’ to ‘sidestep a number of unresolved questions concerning the ownership of computer-generated works’ (Drott, 2021).)

where platform operators monopolize the ability to control the interface design, control recommendation systems, collect meta data such as user behavior and either distribute or withhold this data (p.40, Dijck et al., 2018). Personalized recommendation systems enabled by datafication of listening at a music streaming platform allow them to differentiate services against competitors, hooking audiences to spend more time on the platform or lead to paid subscription, and attract ‘high value’ users to the platform or their advertisers (Prey, 2016, 2019). The recommendation system can be seen in various formats on a typical streaming platform, such as a personalized front page based on a user’s listening history that displays featured playlists and paid promotion for new releases, or algorithmic recommendations like auto-play based on similarity, and result as a type of gatekeeping by influencing visibility and narrowing the choices of a user (Maasø & Spilker, 2022). Since the mid 2010s when the recommendation battle among platforms became the focal point, streaming platforms began employing human curators who decide the inclusion or exclusion and order of songs in major playlists (Bonini & Gandini, 2019). This hybrid trinity of interface design, algorithm, and human curation by a few music elites in the industry as a gatekeeping mechanism leads to increased visibility for music with certain aspects, aspects that are measurably gratifying to the benefit of the platforms. These aspects are all related to the business model and economic incentive design of the platforms, such as the 30 second rule for listening to count as a stream, the pro-rata model of distributing licensing fees, needs of the advertisers, or the technologic capability of the music analysis software to identify features of a song (Maasø & Spilker, 2022).⁴

⁴ In the same way that the recording limitations on LPs and CDs shaped the typical song and album length, there are claims that the streaming format is making songs shorter (Mack, 2019).

Razlogva claims that Shazam ‘redraws the visible musical landscape’ due to the selective library that ignores unprofitable markets and marginal music scenes since the app’s move from open source to a tool for surveillance and marketing (Razlogva, 2018).⁵

In a similar way, inclusion or exclusion of data in a training data set for machine learning creates a bias in the outcomes (Paullada, Raji, Bender, Denton, & Hanna, 2021). In the case of the music analytic program Echo Nest that conducts semantic music analysis by ‘machine reading’ web scraped texts to empower algorithms on streaming platforms, researchers found in one case that 89 percent of the analyzed texts about selected musicians with non-English origins were written in English, magnifying the digital presence of the English mainstream (Eriksson, 2016). Inclusion bias of certain works in training sets can arise from copyright and licensing structures as well (Paullada et al., 2021).

Some of these mechanisms that amplify certain troves of music are designed by intention, but majority of others are systematic limitations or arise from the market and human behavior. Yet platforms wield increasing power with the ability to design the game, and with it comes responsibility.⁶

⁵ The data coming from Shazam is of particular importance to the music industry in aiding curations and predicting success (Bonini & Gandini, 2019), which contributes to a feedback loop of making what is visible even more so.

⁶ This is why there have been suggestions to make digital market places a public good (Kopp, 2020), or calls for the necessity of stakeholders to organize and negotiate for ‘a democratic, accountable, sustainable, fair platform society cemented in public trust’ (p.146, Dijck et al., 2018). The need for keeping a conscious watch on the platforms workings is of no exception for the music industry, as it influences the scenery with never-before-seen speed.

Feedback Loop

In all the instances above, the human reactions on what is made more visible creates a reinforcing feedback loop. If a listener listens to a recommended track for more than 30 seconds, it is counted as a stream and reinforces the algorithm. Interviews revealed that human curators at platforms rely on algorithmic recommendations to make featured playlists (Bonini & Gandini, 2019). Music industry professionals have come to predominantly base their decisions of what to promote on detailed real time data provided by streaming platforms (Maasø & Hagen, 2020).

Prey analyzes that feedback loops have existed since the incorporation of media measurement systems, but not at the velocity and to the extent of details on listening behavior that can be observed made possible by online listening (Prey, 2016). Researchers point out that since the rise of streaming platforms, the abundance of music has paradoxically ‘reinforced the superstar economy they were supposed to disrupt’ and ‘produced narrowness’ in terms of musical diversity as the outcome of plentitude at the outset, coined as the ‘Streaming Paradox’(Maasø & Spilker, 2022). In order to enter the feedback loop and become a hit, music must first be available on the domain, and also fit the format. Artists responding by creating more of what works on a certain format, completes the loop. Jumping into that loop, competing with human artists or assisting them, will be computer generated music works.

Governing Policies in Up- and Downstream Copyright Laws

Application of copyright law remains a murky gray area depending on the jurisdiction, purpose, and technique that is used in the technology of turning music into machine readable data.⁷ In the field of machine learning and deep learning, because the technology was not anticipated when current intellectual property law was last updated, governments and courts have yet to make harmonized decisions on whether ‘the right to read is the right to mine’, or whether a specific agreement for the use of works to be included in training sets is required (Chiou, 2020; Rosati, 2019; Schönberger, 2018). This is the upstream question in copyright law, and depending on how policies are shaped and enforced, the technology that is developed will be affected by what is used to train it.

Another unsettled question is in the downstream, how the outputs of a machine generated work will be granted an authorship status when it becomes more or less autonomous. There are arguments to grant authorship to each, the user of the program, the author of the program, the program itself, or none at all (Perry & Margoni, 2010). Experts claim that there is neither a necessity or justification to provide programs themselves authorship, due to the lack of incentive structure (Schönberger, 2018), also taking into account that if AI generated works are protected it would create a minefield of potential infringement claims disincentivizing the creation of human authors (Sunray, 2021).

Considering the narrow interpretation by the US Copyright office on ‘music works’ historically failing to grant protection to works that fall out of the western classical music tradition,

⁷ Although Shazam now identifies only licensed content, the startup began constructing their audio fingerprinting database by employees manually ripping records, before even personal digitization of copyrighted material became legal (Razlogva, 2018).

to the likes of serial compositions based on set rules, or, aleatoric music that leaves compositions to chance (Yu, 2015), real-time generative music will likely fail to be seen as ‘fixed’ enough to be copyrighted under ‘music works’. If the output of the generated music is fixed, then they may enjoy ‘sound recording’ rights, which leads to the question, whether the sounds generated by a computer may infringe existing copyrights by means of sampling (Sunray, 2021). Additionally, it is unclear whether the work will be considered an original work, or the derivative of the training data sets⁸. In short, the law has not caught up with the new technological landscape, and policy decisions made in this area will affect stakeholders’ actions in both upstream and downstream.

Conclusion

We conclude to predict from the above that what will be abundant are music that gratifies the new gatekeepers, algorithmically optimized music which is fragmented and pleasing, uncopyrightable simple musical ideas or generative music trained from public domain works. On the other hand, human attention is the scarce factor that will be fought for. This might be listening time (and reading time), attendance at live performances, skilled musicians (or engineers) who have dedicated their attention to master an instrument (or software) to add human ingenuity.

Changes caused by the influx of data and connectivity will shed a light on some, while making others invisible. The analogy of AI as ‘the new electricity’ reminds us of how it is almost impossible to imagine life without electricity. Disconnected from the grid, lost in the dark, so oblivious to each other and unoptimized and clumsy, how did they manage! This is how future generations will regard our generation living at the brink of and prior to datafication. But when the

⁸ this could lead to an argument for a commons based approach for compensation payout for works included in a data set upstream (Drott, 2021)

lights came on and the night illuminated, we lost sight of the stars. Electricity lights up billboards and not stars, because stars only illuminate by the light from within. This light from within is the intrinsic human ingenuity that will continue to create.

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