Decentralized Music Distribution: Empowering Independent Musicians Through Blockchain and AI-Driven Discovery

The SoundCloud Era: Analyzing the Rise and Fall of Independent Music Distribution through Actor-Network Theory

A Thesis Prospectus
In STS 4500
Presented to
The Faculty of the
School of Engineering and Applied Science
University of Virginia
In Partial Fulfillment of the Requirements for the Degree
Bachelor of Science in Computer Science

By
Muhammad Al-Atrash

Summer, 2024

On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

ADVISOR

Benjamin Laugelli, Department of Engineering and Society

Introduction

The music industry faces a significant sociotechnical challenge: modern music distribution platforms inadequately support independent musicians. While platforms like Spotify and Apple Music were designed to democratize music discovery and distribution, they have prioritized mainstream artists, curbing musical innovation. Algorithmic biases and current monetization structures within the music industry exacerbate this issue, preventing lesser-known artists from reaching wider audiences and securing adequate revenue. To address this challenge, a new technical solution is required that specifically addresses the limitations of existing music distribution platforms and supports independent musicians more effectively.

To tackle this sociotechnical challenge, the proposed technical project aims to develop a decentralized music distribution platform. This platform will promote independent musicians by leveraging community-driven music discovery, enhanced AI recommendation systems, and blockchain technology for fair revenue distribution. By shifting the dynamics of the music industry to be more artist-centric and community-driven, this platform will empower independent artists and enhance the listener experience.

Understanding the social dynamics that influenced the rise and fall of the SoundCloud era from 2015 to 2017 is essential for developing this new platform. The proposed STS project will investigate this period using Actor-Network Theory (ANT) to analyze the interactions between SoundCloud's technological infrastructure, independent artists, market forces, and competing platforms. This research will provide valuable insights into the challenges faced by independent musicians and the systemic issues within the current music distribution landscape.

Because the challenge of supporting independent musicians is sociotechnical in nature, it requires addressing both technical and social aspects to be successfully accomplished. In what follows, I set out two related research proposals: first, a technical project proposal for developing a decentralized music distribution platform, and second, an STS project proposal for examining the social factors that influenced the SoundCloud era.

Technical Project Proposal

The vast majority of modern music distribution platforms prioritize mainstream artists, leaving independent musicians with limited exposure and stifling musical innovation and cultural representation (Forbes, How Can Streaming Platforms Better Support Independent Musicians?). Although intended to democratize music discovery and distribution, these platforms often fail to address the needs of lesser-known artists. In particular, they do not provide independent musicians with a fair chance to reach wider audiences and secure adequate revenue from their work. The current design of these platforms, with algorithmic biases and existing monetization models, does not facilitate musical diversity and innovation (Spotify R&D | Engineering, Algorithmic Impact Assessments).

To address these deficiencies of the current music distribution industry, several music distribution tools and platforms have been developed. These include streaming services like Apple Music and Spotify, which provide extensive libraries of music accessible to users worldwide. Playlist placements within these services often dictate what listeners discover, heavily influencing music trends (Vulture, How a Hit Happens Now). Additionally, social media platforms are used by artists for promotion, while analytics tools help them understand their audience better. Digital audio production tools and AI mastering services enable artists to create

high-quality music independently. Despite these advancements, the inherent biases within these systems often limit the reach and revenue potential for independent artists.

There are several problems in the design of current music distribution platforms. These platforms do not incentivize the act of discovering and promoting independent music; rather, they simply assume that listeners will explore beyond mainstream offerings on their own. This flaw significantly impairs the effectiveness of these platforms in helping independent musicians gain exposure and revenue. Algorithmic biases favor mainstream artists (LANDR, Spotify's Algorithm Explained), and the monetization models are not favorable to smaller artists (Ditto Music, How Much Does Spotify Pay Per Stream in 2024). Additionally, the centralized nature of the music industry consolidates power among a few major entities (Billboard, The Big Three Record Labels), restricting opportunities for independent artists and curbing musical diversity. Consumers who get discouraged with the lack of new and innovative music or who simply lose interest in the limited mainstream offerings tend to reduce activity on streaming platforms and let their musical preferences stagnate rather than actively search through diverse music. Without the means of facilitating artist discovery and enhancing the listener experience, present music distribution platforms only partially accomplish their goal of promoting musical innovation and diversity.

The aim of this technical project is to avoid these design flaws by constructing a decentralized music distribution platform that promotes user engagement in the discovery of independent music. The proposed system would be equipped with several innovative features, including a community-driven approach to music discovery, enhanced AI music recommendation systems that recognize niche subgenres within broader musical categories, and mobile app integration. This platform will leverage blockchain technology to manage music distribution, ownership

rights, and transactions, ensuring fair revenue distribution through smart contracts (LinkedIn, From Spotify to Blockchain). Such a platform would shift the dynamics of the music industry to be more artist-centric and community-driven, empowering independent artists and enhancing the listener experience.

The project will be divided into three subprojects to be developed concurrently. To support this division of labor, a requirements specification document will be generated to specify the deliverable of each subproject and the conditions it must meet to pair well with the deliverables of the other two subprojects. The first subproject will deal with the system's user interface. The graphical user interface will be programmed in React Native to ensure cross-platform functionality and developed using the agile software development model. The second subproject will be the actual system implementation. This application will be coded in Javascript and use the agile software development model as well. In addition, a blockchain infrastructure leveraging existing platforms like Ethereum or Solana will be employed to store and manage the system's data securely (GitHub, Solana Whitepaper). The final subproject will focus on creating the system's AI music recommendation engine and community engagement features, leveraging advanced datasets and machine learning techniques (HIVO, Deep Dive into AI-Based Music Genre Identification). All requisite software for this part of the project will be coded in Python. After the completion of all subprojects, the system will be brought together as a whole, and several user groups will be recruited to test the system.

Initial design data for the system will be obtained from scholarly articles pertaining to the construction of music distribution systems and blockchain technology, as well as patents for existing systems. As the subprojects for the proposed system utilize iterative development, each iteration of the system will provide design data for the next iteration. Demonstrating the value of

the system will occur in the final stages of the project when it can be tested on a small group of users to prove that it accomplishes its intended goal of fostering user engagement and promoting independent music. User engagement metrics will be collected and analyzed to measure the effectiveness of community-driven curation features, while artist revenue will be monitored to ensure that independent artists receive a fair share of the profits compared to traditional platforms. Additionally, the performance and scalability of the blockchain infrastructure will be continuously evaluated to ensure smooth and secure transactions.

In conclusion, a decentralized music distribution platform represents a significant advancement over current systems, aiming to reignite the 2015-2017 SoundCloud era in hip hop (Pitchfork, SoundCloud Era Revolutionized Music Business). By ensuring fair monetization through automated transactions, community-driven curation, and decentralized distribution, this project offers a revolutionary approach to music distribution.

STS Project Proposal

The proposed STS project investigates the SoundCloud era from 2015 to 2017, a period that democratized music production and distribution for independent artists, particularly in the hip-hop genre. The research question guiding this project is: How did the democratization of music on SoundCloud during 2015-2017 impact the music industry, and what were the social and market forces that led to its decline?

Previous studies have highlighted the revolutionary impact of SoundCloud on the music industry during its peak years. Researchers have noted that SoundCloud provided a platform for independent artists to gain visibility and build audiences without the need for traditional music industry gatekeepers. This era saw a surge in musical innovation and diversity, with many artists

achieving mainstream success directly through their SoundCloud presence. (Billboard, Mumble Rap in 2016)

Existing literature primarily focuses on the technical aspects of SoundCloud's platform and its role in music distribution. However, these studies often overlook the broader social implications of this democratization and the external pressures that led to its decline. While some researchers have examined the rise of competitor platforms like Spotify and Apple Music, they have not adequately addressed how these platforms' business models and market strategies affected independent music on SoundCloud.

The current research fails to comprehensively address the social factors that influenced both the rise and fall of the SoundCloud era. Specifically, there is a gap in understanding how market pressures from dominant streaming services like Spotify and Apple Music, with their algorithmic biases and monetization models, contributed to undermining SoundCloud's initial promise of democratization (Vice, SoundCloud Strikes Deal with Universal Music). Additionally, the impact of these pressures on independent artists' opportunities and revenue generation has not been thoroughly explored.

This research will provide new insights into the social dynamics that influenced the SoundCloud era, highlighting the complex interplay between technological innovation and market forces. By understanding these dynamics, readers can gain a deeper appreciation of the challenges faced by independent musicians and the systemic issues within the current music distribution landscape. This understanding is crucial for developing strategies to support independent artists and promote diversity in the music industry.

The research argues that while SoundCloud initially democratized music production and distribution, providing a platform for independent artists to thrive, market pressures and competition from Spotify and Apple Music significantly contributed to its decline (Rolling Stone, SoundCloud Revolution Redefining Rap). These dominant platforms' business models and algorithmic biases prioritized mainstream content, marginalizing independent music and stifling the innovation that characterized the SoundCloud era.

This study will employ Actor-Network Theory (ANT) to analyze the interactions between various human and non-human actors that shaped the SoundCloud era. ANT analyzes the human and nonhuman factors that influence the behaviors of various systems within a human and non-human network (An Introduction to Actor-Network Theory). ANT will be used to explore how SoundCloud's technological infrastructure, independent artists, market forces, and competing platforms interacted to create a network that both enabled and ultimately constrained the democratization of music.

The research will analyze a variety of sources, including internal documents and communications from SoundCloud, market analyses of the music streaming industry, interviews with independent artists who gained prominence during the SoundCloud era, and case studies on the impact of Spotify and Apple Music's business strategies. Additionally, data on user engagement and revenue distribution from this period will be examined to understand the broader market dynamics at play.

In conclusion, this STS project aims to shed light on the transformative yet fleeting democratization of music during the SoundCloud era from 2015-2017. By analyzing the social and market forces that both enabled and ultimately constrained this period of musical innovation,

this research will contribute to a deeper understanding of the challenges faced by independent artists. Through the lens of Actor-Network Theory, the project will uncover the complex interactions between technology, market dynamics, and social factors, offering valuable insights into how future platforms can better support and sustain musical diversity and independence. This knowledge is vital for fostering a more inclusive and innovative music industry.

Conclusion

The technical project will deliver a decentralized music distribution platform that promotes independent musicians through community-driven music discovery, enhanced AI recommendation systems, and blockchain technology for fair revenue distribution. This innovative platform aims to empower independent artists and improve the listener experience by addressing the limitations of current music distribution systems.

The STS project will provide a deeper understanding of the social dynamics that influenced the SoundCloud era from 2015 to 2017. By using Actor-Network Theory (ANT), the research will analyze the interactions between SoundCloud's technological infrastructure, independent artists, market forces, and competing platforms. This analysis will offer valuable insights into the challenges faced by independent musicians and the systemic issues within the current music distribution landscape.

By addressing both the technical and social aspects of the sociotechnical challenge, these projects contribute to a more comprehensive solution. The technical project proposes a platform that corrects the flaws in current systems, while the STS project provides a framework for understanding the broader context and implications of these technological changes.

Insights from the STS research, such as the impact of market forces and algorithmic biases on independent music distribution, will inform the development of the technical project. Understanding these dynamics is crucial for designing a platform that not only supports musical innovation but also sustains a diverse and inclusive music industry.

By combining these technical and social perspectives, this project aims to create a more equitable music distribution ecosystem that fosters innovation and supports independent artists, ultimately contributing to a richer and more diverse musical landscape.

Word Count: 2,093

References

Forbes Business Council. (2021, July 7). How can streaming platforms better support independent musicians? *Forbes.* https://www.forbes.com/sites/forbesbusinesscouncil/2021/07/07/how-can-streaming-platforms-better-support-independent-musicians/

Spotify R&D | Engineering. (2022, September). Lessons learned from algorithmic impact assessments in practice. *Spotify.* https://engineering.atspotify.com/2022/09/lessons-learned-from-algorithmic-impact-assessments-in-practice/

Herman, T. (2017, September 27). How a hit happens now. *Vulture.* https://www.vulture.com/2017/09/spotify-rapcaviar-most-influential-playlist-in-music.html

LANDR. (n.d.). Spotify's algorithm explained. *LANDR Blog.* https://blog.landr.com/spotify-algorithm/

Ditto Music. (2024). How much does Spotify pay per stream in 2024. *Ditto Music.* https://dittomusic.com/en/blog/how-much-does-spotify-pay-per-stream

Billboard. (2023, March 31). The big three record labels. *Billboard.* https://www.billboard.com/music/music-news/record-labels-billboard-explains-1235296400/

Johansson, N. (n.d.). From Spotify to blockchain. *LinkedIn.* https://www.linkedin.com/pulse/evolution-music-industry-from-spotify-blockchain-nova-johansson/

Solana Labs. (n.d.). Solana whitepaper. *GitHub.* https://github.com/solana-labs/whitepaper/blob/master/solana-whitepaper-en.pdf

HIVO. (n.d.). Identifying music genres with AI: A deep dive. *HIVO.* https://hivo.co/blog/identifying-music-genres-with-ai-a-deep-dive#:~:text=AI%20can%20analyze%20massive%20amounts,for%20organizing%20and%20discovering%20music.

Jenkins, C. (2018, August 20). How rap's SoundCloud generation changed the music business forever. *Pitchfork.* https://pitchfork.com/thepitch/how-raps-soundcloud-generation-changed-the-music-business-forever/

Billboard. (2016, December 23). The rise of mumble rap. *Billboard.* https://www.billboard.com/music/rb-hip-hop/rise-of-mumble-rap-lyricism-2016-7625631/

Vice. (2016, January 15). SoundCloud strikes deal with Universal Music Group. *Vice.* https://www.vice.com/en/article/soundcloud-strikes-deal-with-universal-music-group/

Rolling Stone. (2017, June 28). Look at me! The noisy, blown-out SoundCloud revolution redefining rap. *Rolling Stone.* https://www.rollingstone.com/music/music-features/look-at-me-the-noisy-blown-out-soundcloud-revolution-redefining-rap-123887/

Latour, B. (2005). *Reassembling the social: An introduction to Actor-Network Theory.* Oxford University Press. https://www.researchgate.net/publication/308602144_Bruno_Latour_Reassembling_the_Social_An_Introduction_to_Actor-Network_Theory