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Copyright and Authorship in AI-Generated Music

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Abstract: Including music, artificial intelligence (AI) is changing various industries quickly. Recently, AI-generated music has become more advanced and natural-sounding, which means that complete songs can be created using AI-supported software. Nevertheless, there is a complicated and evolving issue concerning the copyright status of AI-generated music. The current copyright law which deals with this issue is explored in this paper. To address the challenges surrounding AI-generated works, there should be improvement to the copyright law and development of copyright enforcement tools for creators of AI-generated music. The paper concludes this argument after exploring potential solutions to this problem.

Keywords: AI-generated music, copyright, copyright law, AI Drake, Deep learning, music generation, copyright laws, AI cover songs, solution to AI music, Machine learning.

1. INTRODUCTION

Copyright law protects original works of authorship, including musical compositions. In order to be copyrightable, a work must be created by a human author. This requirement is based on the idea that copyright law is intended to promote human creativity. [1] AI-generated music is created using machine learning algorithms that have been trained on a large corpus of existing music. These algorithms can generate new music that is similar in style and sound to the music they have been trained on. However, AI-generated music is not created by a human author in the traditional sense.

In 2023, the music industry was surprised by the release of "Heart on My Sleeve" an AI-generated song featuring the voices of Drake and The Weeknd. Created by Ghostwriter977, a TikTok user, the song utilized AI technology to replicate the artists' distinct vocal styles, raising questions about authorship, originality, and copyright protection in the context of AI-generated music.

The question of whether AI-generated music is protected by copyright has become problematic in the light of this development. One of the biggest names in the music industry, Universal Music Group (UMG), has strongly criticised AI music, calling it a "fraud" and pushing for its removal from streaming services.

This research paper explores the challenges of copyrighting AI-generated music and proposes a multifaceted approach utilizing voice biometrics, deep-learning algorithms, and artifact detection to address these challenges.

2. LITERATURE REVIEW

The complex relationships that exist between authorship, copyright, and the emerging field of AI-generated music are examined in this survey of the literature. The idea of authorship and established copyright paradigms are major concerns as artificial intelligence (AI) continues to change the landscape of musical composition. In the context of AI-generated music, this review focuses on three research papers that investigate the legal, ethical, and collaborative aspects of copyright and authorship.

The first research paper "AI-Generated Music and Copyright Law" investigates the legal frameworks that govern music produced by artificial intelligence. It evaluates the current copyright rules relevant to works created by AI critically, focusing on concerns about originality, ownership, and infringement -[2]

The second research paper, "Survey on Copyright Laws about Music Generated by Artificial Intelligence" gives the findings of a survey conducted to find out what people in different nations thought about copyright and authorship rights in music created by artificial intelligence. The relationship between the laws as they currently stand and people's expectations and opinions are further investigated-[3].

The third research, "A Survey on Artificial Intelligence for Music Generation: Agents, Domains and Perspectives" describes how humans compose music and how new AI systems could imitate such a process by comparing past and recent advances in the field with music composition techniques. To understand how AI models and algorithms generate music and the potential applications that might appear in the future, it also explores, analyses, and describes the agents that take part in the music generation process: the datasets, models, interfaces, users, and generated music-[4].

3. UNDERSTANDING AI-GENERATED SONGS

"Deepfake voice" or "voice cloning" are the terms used to describe AI-generated vocals. AI vocals are generated through analysing large amounts of artist's vocal samples and learns the vocal pattern. Once the tool has enough information, tools can learn the unique properties of music, and produce something new based on the data it received. Then these data are used with an AI tool that uses various algorithm to mimic the singer's voice.

These vocals are trained using deep-learning algorithms, such as RNN (Recurrent Neural Network). SampleRNN is the algorithm used to build the model which is required to make Deepfake voice. The below figure explains the process of building model for generating AI voice clone. SampleRNN is a machine learning algorithm that can learn from audio samples and then spit out similar sounds as output. The RNN has now been developed to the extent that it can produce an exact replica of the artist's vocals.

Through multiple iterations of training, the AI model becomes increasingly adept at generating speech that sounds convincingly similar to the target voice-[5]. This process is often referred to as voice cloning, as the AI learns to create a "voice clone" of the target speaker.
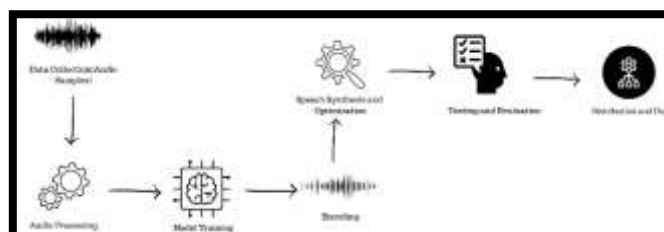

Figure 1 AI Voice generating process

4. PROBLEM WITH AI GENERATED SONGS

AI-generated music introduces a new dimension of creativity. On April 2023, A Drake Song was released featuring Weeknd on all streaming platforms (including Spotify, YouTube, etc). It quickly went viral across various streaming platforms, including Spotify and YouTube. But here the problem was that this track was not created by either of these artists. A TikTok user Ghostwriter977 had created the song "Heart on My Sleeve" using AI.

Ghostwriter977 said in an interview that he had written, produced and he used his own voice to record the song. Then he used a tool which converted his vocals into Drake and Weeknd's vocals. This tool used an algorithm that replicated Drake and The Weeknd's vocals, an audio version of a deep faked image. They aren't the only two artists whose voices were mimicked - artists like Bad Bunny, Rihanna and many others also have been mimicked.

The Song "Heart on My Sleeve" has gained more than 6 million views on YouTube. But later on, this song was taken down from all streaming platforms by Universal Music Group (UMG). They labelled the AI generated songs as "Fraud". The CEO of Recording Academy Harvey Mason Jr. said this song is eligible for winning a grammy award as this was written by a human. Three days later, The CEO stepped back from the decision because the song used voice of Drake and Weeknd.

The problem that arises with the release of AI-generated songs like "Heart in My Heart" is that the artist's voice is used without his consent and then not given proper royalties. While Ghostwriter977's creative efforts showcase the potential of the artist, they ignore the ethical principle of recognizing and rewarding artists who play a role in the development of intellectual skills.

5. TRADITIONAL LAW THAT DEALS WITH COPYRIGHTING THE ORIGINAL MUSIC

Copyright gives the creator or copyright owner the exclusive right to reproduce, distribute, perform, display, and license their work. This means that others generally need permission to use, reproduce, or distribute the copyrighted material. Copyright protection is automatic upon the creation of the work and typically lasts for the creator's lifetime plus a certain number of years (the duration can vary by jurisdiction). The duration of copyright protection varies by jurisdiction. In the United States, copyright generally lasts for the life of the author plus 70 years. The internet raises specific challenges for copyright protection, such as unauthorized uploading and sharing of music. Copyright registration is not mandatory for copyright protection, but it provides certain benefits, such as enabling the owner to file a lawsuit in federal court. Copyright owners can enforce their rights through legal action if their work is infringed.

6. HOW TRADITIONAL COPYRIGHT LAW DEALS WITH AI GENERATED MUSIC?

Current laws don't recognize AI as an author. This leads to ambiguity regarding copyright ownership and who can claim rights over AI-generated music. Copyright requires originality, but AI music often relies on existing data sets and algorithms, blurring the lines of originality. Fair use allows limited use of copyrighted material without permission [6]. However, it's unclear how this doctrine applies to AI-generated music, especially when used for training data or incorporated into new works.

Under the UK laws the, Music generated by AI can be protected as work "generated by computer in circumstances that there is no Human involvement" (s. 178, Copyright, Designs and Patents Act 1988 (CDPA)). But it does not imply on AI generated music [7]. Whereas the U.S. Copyright Office has stated that it "does not recognize AI as an author" under current law, and that "[t]he terms 'author,' used in both the Constitution and the Copyright Act, excludes non-humans." India's Copyright Act, 1957, does not explicitly address the issue of AI authorship. Section 2(d)(v) of the Act defines the author of a computer-generated work as "the person by whom the arrangements necessary for the creation of the work are undertaken."-[8] This suggests that the person who initiates the AI process or the AI developer could be considered the author. However, there is no clear consensus on this issue, and courts may need to interpret the law in the context of AI-generated music.

7. SOLUTION TO THE AI COPYRIGHTED SONG

The rise of AI-generated music presents a unique challenge to the established copyright system. While AI can create impressive and original-sounding music, it raises questions about ownership, creativity, and fair compensation for human artists. Here are some potential solutions to limit the use of AI-generated songs:

7.1 VOICE BIOMETRICS

This technology can analyse vocal characteristics like pitch, timbre, and vibrato to identify a specific singer's voice, even if it's been manipulated or synthesized. This could be used to detect AI-generated vocal. Voice biometrics is an authentication method that uses a person's unique voice pattern to verify their identity. This pattern includes characteristics like the tone of voice, intonation, speed of speech, and pronunciation. Currently Voice biometrics is used in Banking Sector as where user can authenticate themselves with their Voice. The below Figure explain how voice biometric engine works. Voice Biometrics Identifies unique characteristics in Human voice that distinguish person's voice from other. This technology can be used to extract the unique characters from the artist and can later on used to authenticate his presence in AI-song as AI song are generated using the artist multiple voice sample.
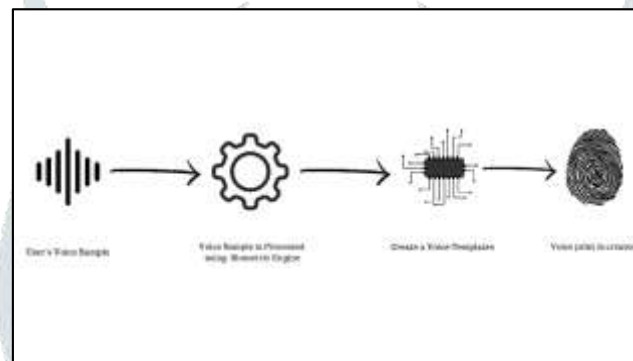

Figure 2 Voice Biometrics Working

7.2 SPECTRAL ANALYSIS

This technique involves examining the frequencies and harmonics present in a song. AI-generated music might exhibit distinct patterns or anomalies in its spectral makeup compared to human-created music. Advanced algorithms could be trained to recognize these patterns and flag suspicious songs for further investigation.

Human voice consists of diverse range of Audio frequencies. Spectral analysis breaks down sound into these individual frequencies, revealing their relative strengths and how they interact over time. This creates a unique "fingerprint" for each sound, capturing its essence beyond just the notes played.

Machine learning algorithms can be trained to recognize these spectral anomalies. By feeding them a massive dataset of human-composed music alongside labelled AI-generated samples, the algorithms can learn to distinguish the subtle differences.

7.3 DEEP LEARNING ALGORITHM

A complex AI model could be trained on a massive dataset of human-composed music and learn to identify the stylistic fingerprints of different artists, genres, and eras. This model could then be used to analyse AI-generated music and determine the likelihood of it being an original creation or a derivative work infringing on existing copyrights.

For training, a dataset consisting of large library of music, containing every genre and artist is used. The model can be developed by analysing millions of songs, the algorithm learns to identify the unique "fingerprints" of different styles. It can be a powerful tool for protecting artists' rights, promoting originality of the song. [9]

7.4 NEW COPYRIGHT LAW FOR AI GENERATED SONG

Establishing a new legal framework specifically addressing AI-generated music is crucial. This could involve:

- **Defining authorship**: Recognizing both the human programmer and the AI as co-authors. This acknowledges the programmer's role in defining the parameters and training the AI, while also acknowledging the AI's independent creative contributions. Copyright percentages: A system for determining the percentage of copyright ownership for each party based on pre-defined criteria, such as the complexity of the AI algorithm, the amount of human input, and the originality of the generated music.
- **Open Data and Transparency:** Requiring AI developers to disclose the training data and algorithms used to create their AI music tools. This transparency promotes ethical use, protects against potential plagiarism, and allows for informed discussions about originality and copyright ownership.
- **Public Domain Access and Innovation:** Establishing provisions for public domain access to certain AI-generated music after a defined period, fostering remix culture, experimentation, and further innovation in music creation. This could involve specific criteria for public domain access, such as a combination of time elapsed, minimal human input, and demonstrably significant contribution by the AI. For e.g.: Google YouTube's Dream Track for shorts is a project in which you can create music using AI that can be used in the shorts (a 60s video platform). In which artist like Charlie Puth, T-pain, SIA, etc have contributed into the to the project.-[10]

8. CONCLUSION

AI-generated music raises complex questions about copyright and authorship. But the current copyright law struggles to do so. By combining voice biometrics, spectral analysis, and deep learning algorithms, we can develop tools to detect AI-generated music and ensure proper attribution or compensation for human artists whose voices or styles are mimicked. Additionally, a new copyright law specifically addressing AI-generated music is necessary, recognizing the dual nature of authorship, promoting transparency in data and algorithms, and establishing safeguards for originality and ethical use.

AI music has a bright future and a lot of creative expression possibilities. However, musicians, AI developers, lawyers, and legislators must work together to navigate the complex issues of copyright in this field. We can guarantee that AI-generated music flourishes inside a system that promotes creativity, justice, and respect for intellectual property by embracing innovation while defending the rights of human creators.

This is only the start of a discussion that will develop further as artificial intelligence technology progresses and our knowledge of artificial creativity expands.

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