



**BEFORE THE  
U.S. COPYRIGHT OFFICE**

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**Artificial Intelligence and Copyright**

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**Docket No. 2023-6  
Submitted October 30, 2023**

When people think of artificial intelligence (AI), their mind generally goes to generative AI like ChatGPT. But the truth is AI has been influential for many years already and will continue to have a massive transformative impact on the music industry and creator economy.

AI-assisted creative tools will only get better and gain widespread adoption. Many are already widely used and are not controversial, and they are supporting human creativity:

- AI-powered voice improvement, similar to auto-tune such as covers.ai
- AI-powered Stem-separation to assist in creating the “final” Beatles song. Also for mastering (re-issue of Beatles’ Revolver) and in the “Get Back” documentary, to get the sound quality where it needed to be using old recordings
- AI-generated vocals to help songwriters pitch tracks to popular artists who may want to record them
- Tools to help A&R discover new talent
- Enhancement to the creative process like brainstorming and writing
- Music production and mastering technology

The listening experience already touches AI on a day to day basis and this will continue to expand. For example, streamers like Spotify personalize the listening experience via AI algorithms and advanced Automated Content Recognition (ACR) technology, like Pex and ContentID, is used to protect copyright so that artists get paid for their own works.

The volume of works will continue to grow, both because of democratization – more creators will be empowered to create via AI-assistive and other tools – and because of generative AI through the automation of the creation process. The rise of social media and user-generated content (UGC) has fueled this music growth because these creator-friendly platforms let anyone upload and distribute music. And with growth, comes challenges.

From our perspective, these are two major challenges AI poses for music copyright:

1. The need to protect the copyright of existing rightsholders will grow, as will the need to have mechanisms to pay artists for the use of their works, voices and likeness. Pex is at the center of this future and we are the best, and only realistic, solution to the sea change brought by AI.

2. The fear that tech will replace human musicians, composers, and producers. We believe that because fandom is at the center of music, human connection will always be a part of music. Fans feel connected to the artists – fans want to relate to the artists’ emotions. AI is not creative in the way humans are creative, with completely new ideas or genres. AI wouldn’t have created hip hop, that comes from a human cultural movement and was a completely new approach to music. Most of all, AI can’t have experiences like heartache or success.

AI does not need to be an impediment to musicians, composers, or producers. In fact, Pex believes the opposite is true – *we will see more creators than ever as AI lowers the bar to entry and artists will be able to make a living, as long as those creators are able to be attributed and get paid*. Take a look how autotune has changed the music industry along with 808 – drum machines, which allowed access for musicians by no longer needing a drum kit. As the volume of music increases exponentially, Pex’s infrastructure is best equipped to handle the data processing needed to uphold attribution and monetization for all artists, and weed out fraud and infringement.

At Pex, our vision is attribution for all so our goal is to provide artists and creators with the opportunity to get paid for their works through the use of our technology. We want to leverage AI to protect artists and provide revenue opportunities so creativity can continue to thrive.

Because it will soon not be possible to distinguish AI-generated works from those that are human created, and because the lines between these will be increasingly blurred as musicians continue to use AI to assist the songwriting process, the best way forward in protecting artists’ rights is through content recognition technology.

New musical works being uploaded can be compared to an existing catalog of registered works, and this technology can then tag when there is a match to the audio (or audio stem), melody, or voice of known works and artists. Pex is proud to be at the forefront of identifying digital and AI-generated content and we will continue to support artists, creators, and rightsholders as the generative AI landscape continues to evolve.

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## Notice of Inquiry Questions

6. *What kinds of copyright-protected training materials are used to train AI models, and how are those materials collected and curated?*

Developers of AI-based programs can use a wide variety of copyrighted material in order to best train their models. For example, AI models adept at creating images of fine art would almost certainly be trained on examples of human created, and therefore copyright eligible, works of fine art. A similar situation exists for AI models that generate music through their output.

The collection of said works can occur through a variety of means, including through the licensing of catalogues of copyrighted works and through the scraping of publicly available, but not always legal, catalogues of content. Apart from the more known issues around using unlicensed material, there also exists the impossibility of truly knowing what works were used to train an AI once the works have already been used. There is no way to know with certainty what

works were used in the training of any AI model, and we are left to trust the word of the developer.

The same works, regardless of their copyright status, are used for both generative and predictive AI use cases. Generative AI is what the public is most familiar with – those AI models that generate an output based on the directional input of a user. However, predictive AI models are those that are trained to recognize already existing content. For example, Pex’s Melody Match system uses predictive AI to recognize cover songs of known works – even if that cover song has never before been recorded or shown to the Melody Match model. This predictive AI protects rightsholders, especially publishers and songwriters, who are not owners of known recordings but of the underlying composition itself. Restrictions on predictive AI models will have a disproportionate impact on rightsholders as generative models continue to grow and dominate.

*6.4. Are some or all training materials retained by developers of AI models after training is complete, and for what purpose(s)? Please describe any relevant storage and retention practices.*

Recordkeeping could potentially alleviate the need to investigate which datasets AI training models are using – however, few, if any, AI developers use this practice. If it did become law, fingerprinting could be considered as a technical solution to facilitate this process. Fingerprints of training materials could be used to track training history with much higher specificity than regular methods, like metadata, URL tracking, or checksums.

*12. Is it possible or feasible to identify the degree to which a particular work contributes to a particular output from a generative AI system? Please explain.*

To answer the question directly, the answer is no. There is no way to tell how much the training from a particular copyrighted work influenced a particular output from the AI model in question.

Even if the output work copies a sound directly from its training data, it is impossible to know if it sounded the same because it was in its training data or it simply created something original that turned out to be a copy. Unfortunately, once the training data is fed to an AI model, all output based on that data take the dataset as a whole – and while it may rely on some parts more than others, the output will not be an indication of the makeup of the dataset either as a whole or in part.

For generative AI systems modeled as deep neural networks, the training process is such that every single datapoint used for training updates the weights of the neural network so that the output of the network better matches the training example (“minimize the loss” in AI-speak). This is done repeatedly, for millions to trillions of interconnected weights, and millions of training examples, so there is not a straightforward relationship between each work and its impact on output.

- This means, that when generating a picture of a cat (for example), it’s not the case that the model goes through all of its training data, looks for instances containing cats, and uses those to generate the image.
- Every single datapoint in the training set contributes in some part to the generation of every single output. In the above example, pictures of dogs, ostriches, chameleons, or eagles would all contribute to a degree to the cat picture requested.

- In the layers of the neural network, you might see some layers that have the concept of a line or edge, while the next layer has a concept of an animal vs an object.

The field of explainable AI has the goal of creating understanding and explanations around how AI models make predictions. The field is relatively new, and there are no known useful ways to measure how an individual work contributes to the final output.

The notion of how to define “the degree to which a particular work contributes” is unclear. Take an example of an AI-generated picture of a cat in the style of Picasso. The cat shape and likeness will have been learned from potentially millions of images, while the style of Picasso will be picked up from a much smaller total number of Picasso’s works, to give the work a distinctly Picasso feel. For attribution, from a legal and copyright perspective, we, as humans, care more about linking this work to Picasso’s human creativity, rather than depictions of cats. But the output will likely have used more cat images than Picasso images (it’s possible for AI systems to learn style from very few training examples). This brings into question the feasibility of this effort.

One alternative to linking generated output to specific training datapoints is to score works by similarity in style, similarity in voice, similarity in likeness, to other works. And using that as a basis for determining whether a work is “too” similar. However, this solution would exist outside of the copyright law.

Another emerging idea is that of “poisoning” a dataset by including something so unique that were a generative AI be asked to recall it and do so, it would signal the use of an entire dataset. However, this idea is prone to failure because of the sheer size of training data and how this “poison pill” might end up being a needle in various haystacks.

*27. Please describe any other issues that you believe policymakers should consider with respect to potential copyright liability based on AI-generated output.*

There are certainly copyright issues to consider when it comes to the input of training data into an AI model, however, as it stands, copyright laws are ill-equipped to handle the output of any AI model. First and foremost, copyrights are only afforded to works generated by humans. Second, as mentioned previously, there is no reliable way to determine the training data used to generate any output – so because an output “sounds like” or is “in the style of” any known artist, a Name, Image, and Likeness (NIL) analysis would be appropriate; not a review under existing copyright law. This, in and of itself, will create problems since there is no Federal NIL law. Without a Federal statute on such NIL rights, this may lead to other issues, inconsistencies, or problems that are not covered by copyright.

Lastly, it’s worth considering how AI models may be trained in the near future – only using the output of current AI models that will be considered primitive by comparison. Using AI generated works to train newer and better AI models will take this issue further and further away from the realm of copyright as the number of AI generated works will exponentially grow and eventually dwarf the number of works created by humans.

*29. What tools exist or are in development to identify AI-generated material, including by standard-setting bodies? How accurate are these tools? What are their limitations?*

Currently, identifying whether a work was created in whole or in part by AI is impractical and will be infeasible in the long term. The truth is that AI generators will stay one step ahead of

detectors and eventually it won't be possible to identify these works at all. And for those works that are only partially AI generated, this becomes even more impractical.

Existing methods like watermarking, for example, fully rely on the people behind AI models to reveal the truth about their process – and thereby revealing all of the works created on their model as AI generated or assisted. This devalues those works and ultimately devalues the model as a whole.

As such, the goal should not be to try to identify or label AI generated works, but asking exclusively whether the work represents a copyright infringement. The most effective way to do this is through content identification.

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We thank the US Copyright Office, the Register, and the staff at the Office for taking on this incredibly timely and important topic. We further thank the Office for allowing us to partake in this process and for taking the time to read this submission.

Pex considers itself the leader in content identification, both through the use of advanced AI and through traditional methods. We stand ready to provide the Office any sort of requested feedback and hope to participate in this discussion again in the near future.

Please do not hesitate to contact me at [cesar@pex.com](mailto:cesar@pex.com) with questions arising from this submission or otherwise.

Sincerely,

A handwritten signature in black ink, appearing to read 'Cesar Fishman', with a stylized, flowing script.

Cesar Fishman  
SVP, Business Affairs  
Pex