

Music, AI and copyright

Artificial intelligence in music and its
relationship with current legislation

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1. Introduction

The music industry has always been at the forefront of using new technologies, from piano rolls and Edison's phonograph in the 19th century to the massive digitisation at the turn of the millennium and the subsequent file-sharing phenomenon. Such transformations have at times caused anxiety and, in some cases, the exploitation of music creators. But in their wake, these transformations have often – through updated legislation and the emergence of new business and compensation models – led to new ways of creating, distributing and listening to music.

Looking back, the objects and tools used have become clear time markers, symbolising how technologically advanced a particular era was. Take, for example, the gramophone in the 1920s, cassette tapes in the 1980s and the emergence of streaming services in the 2010s.

Artificial intelligence (AI) is now making ever greater inroads into our daily lives and the music industry, both for creators and consumers. However, for many music makers, AI has long been a natural part of the creation process. As early as 1848, the British mathematician Ada Lovelace saw the musical potential in the draft drawing of a programmable computer, namely Babbage's Analytical Engine:

Supposing, for instance, that the fundamental relations of pitched sounds in the science of harmony and of musical composition were susceptible of such expression and adaptations, the engine might compose elaborate and scientific pieces of music of any degree of complexity or extent.¹

A more concrete example is the analysis program Experiments in Musical Intelligence, developed in the 1980s by the composer David Cope and capable of creating pieces of music that mimicked the style of various classical composers. More recently, 'Make The Beat!' the official beat of the Tokyo 2020 Olympic Games, was created using AI.²

In other words, the increased use of AI in the music industry is not a total revolution. However, developments in recent years have been very rapid, leading to concerns that the conditions for creating music will change dramatically, which may affect the type of music that will be widely created and made available in future.

Existing and new legislation that keeps pace with technological developments

The current copyright legislation basically works relatively well for the use of AI in music. This is because it is very much principles-based, has a technology-neutral design and many of the adaptations needed from time to time have been left to market parties to deal with through entering into licensing agreements. However, for the legislation to work as intended by the legislators, existing rules must be followed; the law must be interpreted in line with its intentions; and any loopholes that arise must be dealt with promptly.

¹ Luigi Menabrea and Ada Lovelace, Sketch of the analytical engine invented by Charles Babbage, 1842.

² Intel at Tokyo 2020 Olympics: #2020Beat (www.youtube.com/watch?v=smMVQ6C4Wqg), Intel Newsroom, 2023.

Legislation also needs to maintain a balance between copyright protection and the public interest. This includes ensuring freedom of expression, promoting open debate and guaranteeing access to accurate and sourced information.

The brand new EU act being drafted is a key component in striking this balance. The Artificial Intelligence Act will regulate the development and use of AI. Several aspects of copyright are relevant within this process, and it is very important that such approaches – for example a continued willingness to achieve licensing solutions and clear transparency standards – are included as core values and characteristic elements of the legislation. Another important factor is the application of the Directive on copyright and related rights in the Digital Single Market (DSM Directive),³ which was transposed into Swedish law in January 2023.

Sweden's role in the international music landscape

Sweden is the world's third-largest exporter of music, and the Swedish music industry had a turnover of just over SEK 12 billion in 2019 (before the COVID-19 pandemic).⁴ But the global influence of the Swedish music scene also includes the success of companies offering streaming services, digital musical instruments and music production software. These companies are, in many ways, dependent on effective copyright legislation. They will also influence and be influenced by the development of AI. Historically, the music industry has been an early adopter of new technologies at the production and consumption stages.

Sweden also leads the way in access to and use of collective rights management and flexible licensing systems as a central part of the practical application of copyright. This has facilitated the emergence of many Swedish companies that operate at the interface between the tech industry and the cultural and creative industries. The increased international use of licensing systems will enable these actors to achieve even greater success abroad. A well-designed copyright system that guarantees the rights of everyone who invests time, creativity and money in music is a foundation for sustaining and building on this success.

Music and its creators from a rights perspective

The advent of AI is often compared to other technologies that have been introduced in different industries and consequently reduced or eliminated the need for certain professions. However, what generally distinguishes the development of AI-based technologies that we are now seeing in the creative field is the dependence on input data, that is to say the music and art that humans have created and, more often than not, holds the copyright to. In this context, it is evident that the design and strength of copyright protection will play a crucial role in developments going forward, not least because AI-generated material may, in the next stage, compete directly with the works that provided its input. Moreover, AI tools that are not based on input protected by copyright are being developed. They are likely to further increase competition in the music market.

³ Directive (EU) 2019/790 of the European Parliament and of the Council of 17 April 2019 on copyright and related rights in the Digital Single Market and amending Directives 96/9/EC and 2001/29/EC.

⁴ This includes copyright revenues, revenues from recorded music and concert revenues. See Linda Portnoff, *Musikbranschen i siffror 2009-2021* (Stockholm: Musiksverige, 2022).

Legally, human creativity has had a special status, one reason being that legislators have wanted to ensure diversity of expression. Many AI researchers now warn that we will have an abundance of AI-generated texts, pieces of music and other material in open channels.⁵ Furthermore, tests in which AI trains on AI-generated content have led to a gradual deterioration in quality.⁶ An uncontrolled use of AI thus risks countering fundamental human interests in diversity of expression, culture, etc.

The moral rights in copyright and freedom of expression are two sides of the same coin. Both are constitutionally protected rights and are enshrined in the UN Declaration of Human Rights. Freedom of expression confers on the individual the right to express themselves, and the moral rights guarantee the authenticity of the expression.

In the AI debate, it is sometimes claimed that copyright limits freedom of expression. However, copyright law has always contained rules aimed at ensuring a good balance between different fundamental interests. For example, quotations or parodies have always been permissible under modern copyright law. Similarly, it is possible to introduce balanced regulation of AI. Today's democratic societies see a growing need to counteract disinformation and fake news. Consequently, the demands for transparency and disclosure of sources will increase going forward. This development should also include copyright law, one of the aims of which is to ensure that a message genuinely comes from a given source.

An objective discussion about music and copyright

The explosion in AI services has seen the debate on the use and regulation of AI really gather momentum over the past year. With this report, STIM aims to explain some of the basic concepts and issues surrounding AI in the music sector. The report is based on four simplified categories of AI use. Taking them as our starting point, we will discuss what form the relationship with current legislation takes and what courts and legislators need to be alert to in future.

We have been greatly assisted in the preparation of the report by the following interviewees: Johan Axhamn, senior lecturer at the Department of Business Law at Lund University; Daniel Johansson, music industry researcher at Inland Norway University of Applied Sciences and Linnaeus University; and Christina Wainikka, policy expert in intellectual property at the Confederation of Swedish Enterprise. However, STIM is solely responsible for the assessments and interpretations presented here.

STIM hopes that the report will provide a basis for a nuanced and forward-looking debate where there is, of course, room for optimism about the opportunities that AI offers but also a desire to ensure a sustainable development where the supply of music is protected and concentration of power is discouraged. Swedish stakeholders have resolved thorny copyright issues before. With the same ambition that STIM has been a driving force in developing agreements and forms of licensing over the past 100 years and in doing so has helped develop the music industry in line with technological developments, we intend to do so for the next 100 years.

⁵ Publications Office of the European Union, *Facing reality? Law enforcement and the challenge of deepfakes, an observatory report from the Europol Innovation Lab* (Publications Office of the European Union, Luxembourg: 2022).

⁶ Maggie Harrison, 'AI loses its mind after being trained on AI-generated data', *Futurism*, 12 July 2023.

2. Category A

AI as a tool in human music creation

A proven and widespread use that promotes creation

Since the widespread introduction of digitisation with drum machines, sequencers and synthesisers, the use of technology has become a natural part of music creation. In the past, these were mainly simple harmonisations or variations of digital loops, whereas today the technology exists to make sophisticated analyses of analogue recordings. Such analyses can then be complemented by rhythm sections and bass lines, often based on loops to suit the tempo and key, which virtually anyone with a smartphone can create. These are usually music production tools or plug-ins for them or websites where music is uploaded for automated processing.

Examples of AI tools that can assist human music creation

Logic Pro
FL Studio
AI Mastering

This type of AI use, which has gradually increased over time, has resulted in more people being able to easily create music. At the same time, the role of AI in this context is relatively small and often isolated to individual parts of the music production process. In addition to creating, for example, new bass lines or harmonised strings, it may involve mixing or the final mastering of otherwise finished songs.

Effective copyright legislation

In terms of copyright, the use of AI described above has worked without major problems for many years. Any disputes can normally be dealt with within existing legislation and agreements.

The music market is also in good shape due to the relatively low entry barriers and the numerous actors and services. However, going forward, this situation might change for the worse if the general development of AI and progress in more all-encompassing areas lead to a concentration of power. In such a situation, actors in the music market risk being bought up, copied, or simply put out of business by a few companies.



3. Category B

**AI-generated music
inspired by existing
works**

A music theory database that can create new pieces of music

To a certain extent, all musical creation follows rules, harmonies and traditions while adding new elements. AI-generated music is created using a computer program that masters such rules and creates new music based on them. While it is possible to program in rules based on human knowledge, today's generative AI usually uses trial and error to learn music theory. It does this through listening to and reading existing sources, of which many are protected by copyright.

This allows the AI tool to learn structures, which instrument to choose, phrasing and so on. By doing so, the AI can develop the kind of music-theoretical rules that, like a text-based AI model such as ChatGPT, can suggest new pieces of music based on user instructions. The final product can then be presented in sheet music format, as MIDI files, or as audio files of finished music.

When using this kind of generative AI, there is no obvious link between the music used to train the AI model and the files generated. The AI-generated material – known as the output – is instead the result of the probabilities the AI has learnt through input training. The more input data fed into the AI and the more precise instructions a user enters, the more specific and unique the music production can be.

This type of AI is more sophisticated than the one described in the previous section. Now this AI no longer has an isolated role in the process. Instead, acting on a number of commands, it helps to seamlessly create entire pieces of music, either written or as short recorded melodies and rhythms of its own.

**Examples of AI tools that can create music
using existing works as inspiration**

Boomy
AudioCraft (Meta)

Existing copyright essentially covers both learning and use

Copyright comes into play at two stages of the process described above: first, when the AI tool is fed input data and trained, and second, it is also extremely important in relation to the AI-generated material (output). What both these elements have in common is that existing copyright is generally applicable and effective.

When the creator of an AI model feeds it with a music dataset for it to train on, an act known as reproduction occurs. Copyright protects against reproduction, meaning anyone wishing to make copies must obtain permission from the copyright holder(s). Thus, material protected by copyright cannot be used any old way. Instead, market actors can regulate its use through licensing agreements and other arrangements, thus ensuring that fair compensation is paid and the system is sustainable over time.

However, a problem in this context is that it is difficult for someone whose music has been used as input to hold accountable the person who has fed music into the AI without permission. By extension, this means that it may be difficult to litigate and prosecute those actors who do not enter into agreements and thereby commit copyright infringement.

There is also an ongoing debate about how the DSM Directive, which permits text and data mining (TDM) and was transposed into Swedish law at the beginning of 2023, may be interpreted in future. One option discussed is that it might be considered permissible to make copies of works for training AI as long as the creators of the works do not reserve their rights. Should this be the case, the organisations, including STIM, that represent creators are likely to play an important role in addressing through standardised solutions the need for creators to easily reserve their rights to the works.⁷ This is so that they can set conditions such as certain compensation for such use.

History shows that if the responsibility for this infrastructure only applies to civil matters, a few large tech companies will exploit the situation to set the agenda themselves. They can then, through pursuing long and expensive legal action, delay and make it difficult for copyright holders to assert their interests. Even record companies seem to be concerned about this development. One of them is Universal Music Group, which has asked streaming services, including Spotify and Apple Music, to block AI tools from training on its music catalogue.⁸ In light of this, it is also clear that the copyright system will need the support of public law enforcement authorities.

In summary, it can be said that these changes reinforce the need for solutions based on licensing requirements for the music on which AI tools are trained.

Regulation of AI use for research needs to be discussed and reviewed

Some use TDM legislation to argue for unrestricted use of all material protected by copyright for research purposes. However, when the current legislation was drafted, the clear primary focus was not on music

⁷ Alf Sjögren, 'Blir AI spiken i kistan för upphovsrätten?' *Sydsvenskan*, 16 June 2023.

⁸ Bill Donahue, 'Universal Music asks streaming services to block AI companies from accessing its songs', *Billboard*, 12 April 2023.

or other arts at all. Instead, the focus was on large-scale data exploration through producing databases of facts in the form of text and figures. There is also a legal requirement that the purpose of the data collection must be to obtain new knowledge and information about patterns and trends. In this respect, it is very difficult to see permission to produce new works as directly competing with the works under research. Consequently, the link to AI in the legal preparatory work is also weak. One such example is that AI was not addressed at all in the impact assessment produced by the European Commission during the DSM Directive's legislative process.

Given this, it is reasonable that uses other than the actual research, to which the law refers – research carried out to gain new knowledge and identify trends – should be addressed like all other uses, i.e. through licensing.

To ensure that the system works as intended and, by extension, that copyright holders receive fair compensation when their works are used, the use of publicly funded databases may also need to be regulated. One such example is the Swedish Media Database at the National Library of Sweden. This database contains moving images (television, video, cinema films, films), recorded sound (radio, records) and video games that students and researchers can access for research purposes. Since the database can theoretically be accessed by hundreds of thousands of people annually, the internal controls and governance over how such a database is used become a matter of great importance, both to ensure that copyright infringement does not occur and that the stakeholders who continuously provide the databases with new content retain their confidence in the system. As always in research, sources should also be referenced.

Copyright for AI-generative music

For the copyright of AI-generative music, text and images to fall under existing legislation, it is necessary to assess whether the instructions given to the AI are sufficiently original. In practice, it can be difficult to know this at all. Suppose the creator of a wholly or partially AI-generated work claims copyright in the material. In that case, it may be difficult for a third party to show that it was created in a way that does not warrant copyright protection.

Music and lyrics must not be too similar to a work protected by copyright, as this could be seen as plagiarism. Therefore, individuals and AI creators need to look out for similarities with existing works.

Transparency and documentation as a basis for copyright

Transparency about what input has been used in a given process is central to the future development of AI. This is true both from an academic perspective, where citing sources has always been a given, and from a user perspective, where the credibility of the original sources is increasingly important. To ensure that the creators whose works are used in the training of an AI receive the compensation they are entitled to, issues of transparency and documentation of creation are therefore important. Under the EU AI Act currently being negotiated, an AI developer will, in some cases, have to provide information to an authority on how the AI has been trained. This control function may need to be further built on in the future as the use of AI increases.

Therefore, in parallel with enhancing licensing solutions, the principles of transparency, which help parties to agree on fair compensation for the material used, are important starting points. Being able to identify which works have been used and which creators should be compensated for this is also key. AI tools are already being developed to ensure the traceability of works, but legislators need to promote the use of these solutions.

Greater transparency also makes it easier to determine how much human involvement should be required to copyright a work. However, it is not clear where that line should be drawn. In the United States, an author applied, in autumn 2022, for copyright registration for the images used in a new comic book. These were AI-generated based on specific instructions but with a large number of copyright-protected images as input. The U.S. Copyright Office (USCO) issued a decision in February 2023 stating that the images were not works of authorship protected by copyright.

4. Category C

**AI-generated music
based on existing works**

Generative AI can also create music directly based on existing works and where individuals give the instructions for creating. Below are two examples of what an AI tool can be asked to do:

- Create a three-minute song using drums from James Brown's song 'Funky Drummer', strings and melody from Mozart's Ninth Symphony and lyrics and vocals inspired by Adele's song 'Hello'.⁹ The text will be inspired by the poet Amanda Gorman's 'The Hill We Climb', but it will be about France.
- Set Johannes Anyuru's collection of poems *Det är bara gudarna som är nya* (Only the Gods Are New) to music and translate it into English, inspired by Lykke Li's song 'I Follow Rivers',¹⁰ as performed by the Swedish Radio Symphony Orchestra at Berwaldhallen concert hall in spring 2023.

In these instances, AI acts as a mixer, mixing different parts of individual pieces of music and texts together. Thus, AI goes beyond simply training on material protected by copyright to build the general algorithms (input); it also uses the material as content in the music itself (additional input), which then becomes part of the music created (i.e. the output).

Copyright with solid foundations and in need of development

In this use of AI, there is a clear link between the music fed in as a foundation (including performance, orchestration, melody, structure, lyrics) and what then comes out. Similar to the previously described use of generative AI, there is reproduction when AI is fed input data, thus entitling the copyright holders of the original works to compensation, possibly in both stages presented above.

The legal situation is more unclear for the music produced (output) because, among other things, it can be difficult to determine who owns the rights to the output, how much of the music is the creator's own creation and how much is the creation of others, and so on. Furthermore, the differences between copyright regulations in different countries are a complicating factor. Here again, issues of transparency and traceability are likely to be crucial to a well-functioning system.

Examples of AI tools that can create music based on existing works

Jukebox (Open AI)
MusicLM (Google)

⁹ Authors: Adele Adkins and Greg Kurstin.

¹⁰ Authors: Rick Nowels, Björn Yttling and Lykke Li Zachrisson.

5. Category D

**AI-generated music
without human
intervention**

There are already a number of AI tools that create music without any human intervention. Basically, all the user has to do is press the start button, and they are away. Several online services allow users, for example, to choose a genre and mood from a list, set the length of the song, and from there create new, unique music. AI can normally generate new material every time, even if no settings are changed. In other words, a service like this can produce unlimited amounts of music at the touch of a few buttons.

The material created today using these services is mainly used as background music, for example for video clips and adverts. In the future, online services are likely to create much more sophisticated music than this. If this type of AI-generated music takes over some of the music listening time from human-made music, it will have a huge impact on the entire music industry. For the initial learning phase (input) of this form of AI, as with the previously described types of AI learning, the existing copyright licensing requirements for reproduction may still come into play.

Copyright challenges

In the next stage, when the input music itself is the basis for an unlimited production of new pieces of music (output), the area of copyright needs to be examined and clarified. In February 2023, the USCO issued a decision on a comic book containing images generated by Midjourney, a generative AI tool. The USCO wrote that 'Midjourney generates images in an unpredictable way' and that they 'are not the product of human authorship'. Consequently, the USCO concluded that the images should not be protected by copyright. In its written decision, the USCO requires the copyright claimant to clarify whether and how AI has been used in the process and whether their work is the product of 'human' authorship.

In a US legal case, *Thaler v Perlmutter*, the owner of a generative AI system tried to register for copyright an AI-generated piece of visual art, listing the AI system as the author. The USCO refused his application, and a federal court upheld this decision. The reason given in the ruling was that the Copyright Act provides copyright protection to a work by an 'author' – which when the law was written could only refer to a human – and that an AI system does not require copyright incentives. The AI system operates 'algorithmically rather than responding to legal rights and protections'.¹¹

As noted above, it is difficult for a third party to prove that the person claiming to be the author of an AI-generated work has, in fact, solely used an AI tool. Also, in this context, rules are needed to ensure transparency regarding the tool's input.

Examples of AI tools that can create music without human intervention

Endel
Brain.fm
LifeScore

¹¹ Dennis Crouch, 'DC district court: AI-created works ineligible for copyright', *Patently-O*, 18 August 2023.

6. Conclusion: Ways forward

We are currently in the midst of rapid change, where technological developments require us to constantly revise analyses on how both licensing and legislation should be adapted.

Historically, copyright has proven to be strong enough to withstand technological change. This presupposes, however, that basic copyright principles have been applied, that infringements of these principles have been enforced and that interested parties have been given ample opportunity to negotiate the commercial terms. STIM therefore sees the following areas as particularly important to consider going forward.

Promoting the use of licensing

In international and Swedish legislation, licensing through collective management societies is a central part of the infrastructure. Here STIM has an important role in ensuring that those wishing to do so have access to, and permission to use, a wide range of music, thus balancing the creators' rights to their works with the public's legitimate interest in an open public debate and a wide range of culture and information.

Demanding transparency and traceability

The proposals for the EU AI Act emphasise that an AI developer needs to be able to provide information on how the AI has been trained. It serves as a good basis for enabling output assessments and ensuring that right holders are compensated when their protected material is used. However, it also requires an increased focus on traceability of use, thus placing new demands on companies and collective management organisations to develop workable technical solutions.

Limiting the need for opt-outs and making things easier for copyright holders

The provisions regarding the requirements for when copyright holders need to actively state that their works cannot be used for training AI are currently too unclear. The legislation and its application should make things easier for individual copyright holders, for example by requiring licensing through collective management societies.

Prosecuting copyright offences

Experience dealing with illegal file sharing shows that sensitivity to what users want, combined with business development, licensing and prosecution of copyright offences, is needed to develop long-term sustainable solutions. However, there must be an even and predictable playing field for market forces to reach their full potential and contribute positively to development. Law enforcement authorities must therefore be better equipped and develop more expertise to prosecute copyright infringements. It also reduces the risk of a few powerful tech companies forming an oligopoly and accelerates the development of legal business models, thus increasing the likelihood of copyright holders receiving fair compensation when their works are used.

A music industry for the future

The music industry develops best when new business models are combined with the protection of copyright holders' rights through licences. We do not know exactly what the future holds. However, we do know, for example, that Google is already in talks with Universal Music Group about licensing artists' melodies and vocals for AI-generated songs.¹² There are also services on the market that license artists' voices 'legitimately', i.e. with the permission of the artist in question.¹³ In other words, it is not unlikely that we will soon see a plethora of AI tools that allow users to become co-creators on their own, making music with a particular artist's voice or tonality or composing music inspired by the artist's back catalogue. Even in such a situation, artists, songwriters and other copyright holders could be compensated for the added value their work generates. However, to create a functioning market for this type of use, right holders must therefore be given reasonable opportunities to negotiate effective licensing agreements.

The music industry has a potentially very bright future, both with and without AI. For Sweden, music is also an important export, economically and culturally. To maintain and develop its strong international standing, Sweden must be actively committed to copyright, at home and in the world. Sweden is today seen as a pioneering country when it comes to music and copyright, and STIM is ready to continue to play a central role in this process.

¹² Ty Roush, 'Google and Universal Music Group negotiating AI-generated music tool, report says', *Forbes*, 8 August 2023.

¹³ Examples of such services include Voice-Swap AI and Myvox.

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