CEU | CENTRAL
EUROPEAN
UNIVERSITY

AI: a change or paradigm? Authorship and ownership in the film scoring industry

by Ignacio Rejón Linares

LLM Capstone Thesis
SUPERVISOR: María José Schmidt-Kessen
Central European University Private University
Quellenstrasse 51-55, 1100 Vienna
Austria

TABLE OF CONTENTS

ABSTRACT

Due to the advances that artificial intelligence has made in recent months, entire industries are reshaping the way they are conceived. On the other hand, others industries that have not yet been affected are deciding how to act. This is the case of film scoring, which is waiting to see what the new language models (MusicLM) will mean for its future. Adaptation is inevitable, but it will depend to a large extent on other external factors, such as the adaptation of legal systems to the new realities (which are not currently prepared to assume the changes that are coming), as well as the assumption of what these new scenarios will mean for the actors involved.

KEY WORDS: artificial intelligence, film scoring, authorship, ownership, anthropocentrism.

INTRODUCTION

Recently, the conversation about the "art" of AIs has been hot, due to the large number of models that have been launched by the big tech companies. The quality offered at the beginning by these models did nothing but gain the indifference of artists, since, despite being an unprecedented technological breakthrough, the results obtained did not show any artistic value worth mentioning. Hardly anyone paid any attention to these beginnings, since at the most it gave you a few laughs at the sight of the machine's still very rudimentary sketches. The question that was the subject of speculation was when these models would be ready to deliver decent quality results that could compete at least minimally with what a human might be able to create.

And you don't have to go very far back in time. If we compare the qualitative leap from DALL-E 1 (January 2021), to Stable Diffusion (August 2022), to DALL-E 2 (September 2022), we can see that each new version or product makes the previous one practically obsolete. This is true for the change in image generation, but it is equally true for chatbots as language models (ChatGPT3 and its following model ChatGPT4 (and its integration with Copilot), Bing or Bard), or for audio generation models (Magenta, MusicLM, AudioLDM).

We only need a quick overview of the results that the latest models generate to be able to state that the term "rudimentary" no longer fits their description. This is the reason why all the groups affected by these developments in our society have reacted to changes of such enormous proportions.

There are some of these groups who have joined the current that supports these new technologies, but there are others who have objected against them outright. Of course, debates are being raised which until now were only part of science fiction - will we be able to develop the AGI? Will the machines outsmart the human race? -, but which now, being part of our reality, must be taken into account if we want to adopt the new changes in the most appropriate way.

The legal limitations that our current system contemplates collapse thunderously with what AIs have to offer. There is no unitary answer to questions such as who is the author, owner or inventor of a work or invention developed/created by an AI? Or is it copyright infringement when an AI uses a human's work to develop its own? And if so, how is such a problem solved within our current legal limits?

All this exponential growth is putting various industries in check. One of the industries that may undergo the most changes in the coming years is the film scoring industry, which is often subject to easily identifiable and therefore replicable canons and stereotypes. This is why the advance of AI can substantially impact its medium-term future due to the extremely sensitive nature of film scoring, in which not only aspects such as the artistic value of the final result are taken into account, but also the efficiency with which it was conceived (time, resources and elements consumed, etc.).

This research will therefore address the question of authorship and ownership in the film scoring industry by considering the impact that AI may have on it and whether there are alternatives that are capable of alleviating the deficiencies that our legal systems may present.

Therefore, the industry itself will be investigated in more depth, pointing out its greatest strengths and weaknesses and how the implementation of IA can work in this environment. This adaptation will bring with it major unknowns and legal issues that we will try to identify and analyze here in order to facilitate future research that will provide solutions to all of them.

Given the multi-faceted nature of this topic, the research methodology will encompass an interdisciplinary approach, integrating legal and technical perspectives (from both the field of AI and film scoring), the study of which is considered necessary in order to reach the desired conclusions.

The proposed final statements start from an analysis of the foundations of our intellectual property protection systems that will help us to understand what adaptations we can expect from them in the future due to the irruption of artificial intelligence and, specifically, applied to the film scoring industry, which must be dissected in order to understand the way in which the coming changes will appear.

Significantly, in order to gain a profound understanding of the possible impact of AI on the film scoring industry and its potential legal implications, we will conduct semi-structured interviews with a number of musicians, law experts, and IT specialists. The interviewees are

4

Pedro Osuna[1], Ana Linares[2], Jesús Alarcón[3], José López-Montes[4], Juho Pohjonen[5] and Pablo Fernández Carballo-Calero[6].

These dialogues are intended to offer diverse perspectives, elucidating the implications and possible adaptations required within each field. Musicians provide the artistic and industry-specific lens, law experts navigate the legal labyrinth that the burgeoning field of AI presents, while IT experts give an inside look into the workings and potential of the technology itself.

These qualitative data will be critically analyzed and interpreted in light of current theories and concepts in the fields of intellectual property law, film scoring, and artificial intelligence. We expect the combination of these methodologies to provide a comprehensive and deep understanding of the landscape in which AI is being introduced, and the challenges and opportunities it brings to the film scoring industry.

---

[1] Film scoring composer who stands out for his work in "Argentina, 1985" (Golden Globe winner and Oscar nominee) and productions such as "James Bond: Time to Die", "Lightyear" and "Thor: Love and Thunder". Interview contacted via Zoom.

[2] Composer and scholarship student at Berklee University, she has collaborated on international film projects with Pedro Osuna and Vanessa Garde, including as assistant composer on "Argentina, 1985". Interview contacted via Zoom.

[3] Film scoring composer who has worked on numerous internationally renowned projects with composers such as Pedro Osuna, Carlos M. Jara or A. R. Rahman. Interview contacted via Zoom.

[4] Composer and professor of music technology at the Conservatory of Granada, currently focuses his research on the application of artificial intelligence in musical composition. Interview contacted via Zoom.

[5] Internationally renowned pianist. He is the developer of MyPianist, an AI application for musical accompaniment. Interview contacted via Zoom.

[6] Professor of Commercial Law at the University of Vigo and Academic Advisor at Hoyng Rokh Monegier's Madrid office. Interview contacted via email.

CHAPTER 1: TECHNOLOGICAL BACKGROUND AND LATEST ADVANCES

The economic growth and development of our society has been estimated and predicted throughout history by means of different models. From the models designed by Malthus[7] to those that valued the exponential growth experienced in the 20th century[8], the panorama has changed radically. If we look back at the growth of the last 70 years of our history and try to predict the next 80 years at the same rate of development, our society will be 4.8 times richer by 2050 and 34 times richer by 2100[9].

Already in the 1950s it was estimated that technological development would converge at a point, a specific moment that came to be called "singularity"[10]. It is believed that, if such a point is reached, it would be related to an intelligence explosion, which would probably be connected to the development of Artificial General Intelligence (AGI) [11].

This concept is undoubtedly the Holy Grail of our times, but we do not know exactly how close we are to achieving it. Estimates of 10 years ago indicated that it could be reached with a 75% probability, 30 years after Human Level Machine Intelligence (HLMI) is reached, which could

---

[7] Thomas R. Malthus, An Essay on the Principle of Population (J. Johnson 1st ed. 1798).

[8] Angus Maddison, Statistics of World Population, GDP and Per Capita GDP 1-2008 AD (2010).

[9] Nick Bostrom, Superintelligence: Paths, Dangers, Strategies (Oxford University Press, 2014).

[10] "One conversation centered on the ever accelerating progress of technology and changes in the mode of human life, which gives the appearance of approaching some essential singularity in the history of the race beyond which human affairs, as we know them, could not continue". S. Ulam, "John von Neumann 1903–1957," Bull. Am. Math. Soc. 64 (3.P2) 1-49 (May 1958), page 5.

[11] "Let an ultraintelligent machine be defined as a machine that can far surpass all the intellectual activities of any man however clever. Since the design of machines is one of these intellectual activities, an ultraintelligent machine could design even better machines; there would then unquestionably be an "intelligence explosion," and the intelligence of man would be left far behind. Thus the first ultraintelligent machine is the last invention that man need ever make, provided that the machine is docile enough to tell us how to keep it under control". Irving John Good, "Speculations Concerning the First Ultraintelligent Machine," in Advances in Computers, vol. 6 (Franz L. Alt & Morris Rubinoff eds., Elsevier 1966) 31-88, page 33.

be reached by 2075 with a 90% probability[12]. However, it is currently believed that HLMI could come much sooner than expected[13].

In the meantime, AI has moved beyond an experimental phase to become an omnipresent part of everyday life. Through a surprisingly rapid process of adaptation, these models are being integrated into virtually every facet of our lives. It is now deeply embedded in a multitude of systems and processes, powering sophisticated chess-playing algorithms[14], enabling autonomous vehicles[15], facilitating facial and speech recognition[16], translating languages[17], etc.

Two critical factors have contributed to the recent proliferation of AI tools: the improvement and diversification of machine-learning models and the availability of large training datasets[18]. There is no common doctrine that agrees with the definition of Artificial Intelligence[19]. However, there is consensus that there is a common element, which is big data[20]. AI relies heavily on "big data", a term that signifies the convergence of volume, velocity, and variety of information[21]. For AI, the greater the amount, speed, and diversity of data, the more refined the AI model becomes[22].

---

[12] Nick Bostrom, Superintelligence: Paths, Dangers, Strategies (Oxford University Press, 2014).

[13] Tristan Bove, "CEO of Google's DeepMind says we could be 'just a few years' from A.I. that has human-level intelligence," Fortune (May 3, 2023), https://fortune.com/2023/05/03/google-deepmind-ceo-agi-artificial-intelligence/ (last visited May 29, 2023).

[14] Garry Kasparov, "The Day That I Sensed a New Kind of Intelligence," Time (1996), https://content.time.com/time/subscriber/article/0,33009,984305,00.html (last visited May 29, 2023).

[15] Jude Chukwudozie, "Artificial Intelligence (AI) and Autonomous Vehicles," IoT For All (2022), https://www.iotforall.com/artificial-intelligence-and-autonomous-vehicles#:~:text=Autonomous%20vehicles%20have%20neural%20networks,decisions%20while%20on%20the%20road (last visited May 29, 2023).

[16] Thomas Smith, "The AI That Knows Your Face — From Your Voice," Medium (2019), https://medium.com/swlh/the-ai-that-knows-your-face-from-your-voice-90772b352f2a (last visited May 29, 2023).

[17] https://www.deepl.com/translator.

[18] Andres Guadamuz, A Scanner Darkly: Copyright Infringement in Artificial Intelligence Inputs and Outputs (2023).

[19] Stuart Russell & Peter Norvig, Artificial Intelligence: A Modern Approach 1-5 (3d ed. 2010).

[20] Andres Guadamuz, A Scanner Darkly: Copyright Infringement in Artificial Intelligence Inputs and Outputs (2023).

[21] Ibid.

[22] Ibid.

The process of data collection, the type of data collected, its storage, and its accessibility are all crucial elements of the AI landscape. A substantial portion of data collection happens privately, conducted by companies for internal usage. For instance, platforms like Facebook amass vast amounts of user information, which are then leveraged for advertising purposes. Though some companies may choose to make a portion of their data public[23], the general trend leans towards retaining control over the majority of collected data[24].

These notions of reference to big data are relevant in the context of this research because of how they relate to AI content creation. Although these models are intended to mimic and even surpass human reasoning, their design of operation has its limits in terms of what we consider to be intelligent processing[25]. Nevertheless, once they are formed, they will need tons of information with which to work and reach the results and conclusions for which they were designed. It is here, as we will see in following chapters, where the great majority of problems occur (as far as the creative process of AIs is concerned).

For all these reasons, big data is one of the keys to the development of AI. The big battle of the moment revolves around it, and large corporations are the ones that, for obvious reasons, hold most of the information. This can be a huge problem because it will be giving monopolistic control to these large companies such as Microsoft, Google, Amazon, Meta, Huawei or Apple[26].

Nowadays, governments are stepping up their intervention in an attempt to control this situation, but it is not the only concern in mind. Going back to the beginning of this section,

---

[23] https://www.aicrowd.com/challenges/spotify-million-playlist-dataset-challenge#summary (last visited May 30, 2023).

[24] Andres Guadamuz, A Scanner Darkly: Copyright Infringement in Artificial Intelligence Inputs and Outputs (2023).

[25] Tim W. Dornis, "Artificial Intelligence and Innovation: The End of Patent Law as We Know It," 23 Yale J.L. & Tech. (Fall 2020).

[26] Enrico Bonadio, Luke McDonagh & Plamen Dinev, "Artificial intelligence as inventor: exploring the consequences for patent law," I.P.Q. 2021, 1, 48-66.

we made a brief comment on the growth and development models of our society throughout history. We mentioned that the exponential growth to which we have been subjected since the beginning of the 20th century may have converged with a singularity that probably has to do with intelligence explosion. The question that would then follow would be how these models are expected to develop in the times to come. This is a key question, as the future of our society will depend on it. One of the debates of the moment is whether we are currently prepared to face the hypothetical development of AGI and all that will be achieved along the way.

According to the OpenAI CEO's predictions[27], we will experience an explosion of the AI-based industry, which could soon lead to the creation of a large number of one-man startups worth $1B (the famous unicorns). Altman is convinced that AI is the most enabling technology the world has ever seen.

Mentioning the figure of OpenAI's CEO during these times almost sets a precedent, because the pace that the company he leads is setting shows the clues we need to intuit what the near future of AI will be like. OpenAI and under the tutelage of Microsoft after its multibillion dollar investment[28], have led so strongly that they have ended up forcing the request for a truce by the rest of the companies[29]. They are right, although on the other hand, there are experts who indicate that we could be facing a situation similar to that of the atomic bomb, whose development could not be interrupted or slowed down at the time[30]. That is why governments have begun to act in a much more forceful way (one of the clearest examples is the ban of

---

[27] Statements made on May 22, 2023 at a conference held at IE University (Madrid).
[28] https://blogs.microsoft.com/blog/2023/01/23/microsoftandopenaiextendpartnership/ (last visited May 30, 2023).
[29] https://futureoflife.org/open-letter/pause-giant-ai-experiments/. In March 2023, this open letter, signed and led by leading figures in the AI world, is published (last visited May 30, 2023). They present the first public statement against the rapid advance of the technology, asking for a 6-month truce in the training of the large models (clear allusion to OpenAI's LLM).
[30] Kamya Pandey, "Interview: US Scientist Stephen Thaler Talks About AI Sentience, Copyright Infringement And Regulation," Medianama, available at: https://www.medianama.com/2023/05/223-interview-us-scientist-stephen-thaler-ai-sentience/ (last visited May 30, 2023).

9

ChatGPT in Italy. Other countries are considering whether to opt for the same measures)[31], being aware that the outcome we will experience in the near future will depend on their action. In this regard, the series of hearings that the U.S. government has convened, including one with the CEO of OpenAI, have been relevant[32].

Despite all the fervor surrounding this current new trend, it is virtually impossible to predict how the next evolutionary steps will come. As mentioned above, AIs are intended to simulate and mimic human brain connections. However, the way these models have been designed is at a great distance from what we can consider as human intelligence. This is why we are faced with a handicap, and that is that it is possible that each way of developing a model may find its limit, so that, even if a model in question offers great advances, it could run into a dead end. In other words, the development of AI is not a linear development, but presents an evolution in leaps, which can be quantitative or qualitative. We may encounter quantitative leaps, which can produce great advances, but which may run up against limits; this is where qualitative leaps are relevant[33]. This is exemplified by Sam Altman's statements, which indicate that we must reinvent the way in which models such as ChatGPT4 are conceived, because scaling them even further is a waste of resources that is hardly conceivable[34].

---

[31] Shiona McCallum, "ChatGPT banned in Italy over privacy concerns," BBC News (2023), available at: https://www.bbc.com/news/technology-65139406 (last visited June 16, 2023); Reuters, "Spain asks EU data protection board to discuss OpenAI's ChatGPT," Reuters (2023), available at: https://www.reuters.com/technology/spains-data-regulator-asks-eu-data-protection-committee-evaluate-chatgpt-issues-2023-04-11/ (last visited June 16, 2023).

[32] CBS News, "OpenAI CEO Sam Altman testifies at Senate artificial intelligence hearing | full video" (May 16, 2023), YouTube video, available at: https://www.youtube.com/watch?v=TO0J2Yw7usM (last visited May 30, 2023).

[33] Ignacio Rejon Linares, Interview with José Lopez-Montes (May 15, 2023), conducted via Zoom.

[34] Will Knight, "OpenAI's CEO Says the Age of Giant AI Models Is Already Over," Wired, available at: https://www.wired.com/story/openai-ceo-sam-altman-the-age-of-giant-ai-models-is-already-over/ (last visited 2023)

Next, we will break down the film scoring industry in order to understand how it works and how AI can impact it. An introduction to this industry will help us to better understand how it can adapt to the changes that are imminent and how we can act to accommodate them.

CHAPTER 2: FILM SCORING

a. Breakdown of the industry

Film scoring moves huge amounts of capital. It should be borne in mind that, as a rule, 2% of the total budget is allocated to this department in the case of a major production. In the case of short films, the budget increases to 10-15% of the total. All of this will vary, of course, depending on aspects such as the composer's cache, the negotiations prior to the project or the type of film (a comedy is not the same as a musical)[35]. Even so, we can get an estimated idea of the value that this industry promotes on an economic level, as the annual revenue of the global film industry as of 2022 was $77 billion[36].

When we talk about film scoring, we apply a much broader term than the two words themselves indicate. It does not only cover musical works composed for a film, but also for series or TV[37]. But in this research we will not apply the term film scoring only with this terminological scope, but we will extend it to other industries that, although they are not strictly considered film scoring, they have great similarities in their processes that will make us include them in these pages as equals. We are talking about industries such as video games or trailer scoring.

It is true that there are substantial differences between video games and trailer scoring on the one hand, and film scoring on the other. For obvious reasons, the first two are two young industries that come from the second one and, therefore, have based all their development on the standards that Film Scoring has been developing throughout its years of history[38], without prejudice to the bifurcations that each one has been designing for itself, according to internal

---

[35] Ignacio Rejon Linares, Interview with Antonio Jesús Molina Alarcón (May 22, 2023), conducted via Zoom.
[36] Barry Elad, "Film Industry Statistics – By The Distributor, Running Time, Demographic, Box Office Revenue," Enterprise Apps Today, available at: https://www.enterpriseappstoday.com/stats/film-industry-statistics.html (last visited May 30, 2023).
[37] Ignacio Rejon Linares, Interview with Antonio Jesús Molina Alarcón (May 22, 2023), conducted via Zoom.
[38] Ibid.

demands and needs. For example, the video games scoring industry does not work in such a linear way as film scoring, but implements the idea of adaptive music, which, as its name suggests, adapts to each moment of the video game, taking into account how the player moves forward (or backward) through the platforms, maps or worlds[39]. On the other hand, the trailer scoring industry works with techniques and libraries, which are predetermined in most cases. In fact, the high-level industry standard is that the main composer of a film scoring project derives the competition almost entirely from a company that reuses the music of the main project in a minimal way (in some cases, not even that). Thus, music is composed for the trailer that overwhelmingly uses canons and stereotypes in order to fit as much as possible to the images proposed in the sequence and capture the viewer's attention[40]. Being aware of the substantial differences (among others) between both industries, when we talk about film scoring at a compositional level, we will include all of them under the umbrella of the latter.

If we compare academic or even scholastic composition with film scoring, we will find big differences. In fact, film scoring usually faces fierce criticism from the more traditional sectors, which always try to remind us of the supposed impersonality and lack of soul in compositions related to this gender, due to the way it is structured in its way of production.

In order to understand where this criticism comes from, we have to accept the fact that cinema in general, although often recognized as the seventh art, is a business and is therefore dominated by thousands of factors that have to be taken into account in the decision making process of every project.

The first thing to consider is the time and budget available for each project. This will greatly condition what the composer can do. The compositional activity is often reduced to a

---

[39] Ibid.
[40] Ignacio Rejon Linares, Interview with Pedro Osuna (March 10, 2023), conducted via Zoom.

countdown, as the chain in this department starts here, but ends with the recording of the score, production and mixing.

On the other hand, composers have to deal with the directors, who are often not musicians, which sometimes leads to debates between the teams[41]. That is why the composer has to be not only an artist, but also a translator of the director's wishes, to transform them into the appropriate use of certain notes, rhythms or sounds with respect to the scene in question.

This is why burdening the composer with all these factors in an exclusive manner is not very feasible or efficient. As a solution (and not only for the music department in a project, but for the rest of the departments involved), all these responsibilities and tasks will be divided and distributed in teams whose individuals will be highly specialized in specific tasks, and whose workflow will be supervised and led by the figure of the main composer. You only have to look at the credits of any big budget project to see what we are referring to.

There are currently two types of approaches to tackle this type of project[42]. On the one hand, the creation of large teams, whose degree of specialization and division of labor is enormous, similar to how the organizational chart of a large company works. The composer Hans Zimmer applies this method.

On the other hand, there are composers with a more "conventional" vision, who continue the school of the great fathers of the genre (such as John William, who to this day still composes with paper and pencil). These composers divide their work into small committees in which the workload is greater, but everything is reduced to several specialists who support the composer

---

[41] Ignacio Rejon Linares, Interview with Ana Linares (March 22, 2023), conducted via Zoom. During the interview Ana comments that AI, in the near future, even if it composes at an acceptable level, will not be able to compete against human innovation. She talks about a specific case that occurred in one of her last projects, in which the director requested a particular type of music for a specific scene, but the music department proposed a totally different alternative, which was the one that finally settled. These types of situations will be hardly compatible with autonomous AI.

[42] Ignacio Rejon Linares, Interview with Pedro Osuna (March 10, 2023), conducted via Zoom.

in his creative activity. Composers such as Michael Giacchino or Pedro Osuna follow this trend.

The major difference between these two approaches is the size of the teams supporting the principal composer, and hence the workload and degree of specialization of each individual. But both have in common that the composer will not work alone. Of course this will all depend on the scale of the project, but trying to frame our research to the industry at its top level, it is virtually impossible to imagine a composer performing without a group of highly skilled assistants to lighten the composer's workload, so that the composer can focus on the compositional activity as much as possible[43].

But, although this is one of the main reasons why film scoring faces harsh criticism from the more traditional sectors, this system is by no means new. This can be seen in the old masters of painting such as Rubens who, once he had established himself as a painter, opened a studio where his apprentices took charge of certain generic elements of the painting, while he took charge of the most important details, those which would give the final painting the specific style for which Rubens was renowned (this has led current researchers to doubt the authorship of some paintings currently attributed to Rubens. Although this problem, extrapolated to today's compositional teams, is not a complication). Rubens could thus increase his rate of production, always making sure that the quality of the works met his standards[44]. The same is true in the Film Scoring industry, for as Pedro Osuna mentions, "I don't know why an architect can have a team and a composer cannot"[45].

---

[43] Ignacio Rejon Linares, Interview with Antonio Jesús Molina Alarcón (May 22, 2023), conducted via Zoom.
[44] Rubens Huis, "The Studio," Rubenshuis, available at: https://rubenshuis.be/en/page/studio-0# (last visited May 30, 2023).
[45] Ignacio Rejon Linares, Interview with Pedro Osuna (March 10, 2023), conducted via Zoom.

Clarification - Composition/Division of teams[46]. An example of the roles generally integrated in the music department are:

- Music consultant

- Music editor

- Score engineering

- Recording engineering

- Music business affairs

- Digital recordist

- Musicians (instrumentalists, vocalists, conductors, etc.)

- Music preparation

- Music production

- Music arranger

- Music clearance

- Music orchestrators

- Music transcriptions

- Music contractor

All this without taking into account that each role is carried out by numerous professionals, even taking into account hierarchies ranging from assistants, technicians, supervisors, managers, etc. And, of course, the professionals required specifically for a particular project (thus, for Soul (Jon Batiste)[47], jazz specialists were needed, while for Dune (Hans Zimmer)[48], sound or synth designers played a fundamental role in the success of the soundtrack).

---

[46] This list is compiled by comparing the public credits of several blockbusters, including Titanic, Soul, Inception, Interstellar, Dune, The Lion King, Marvel movies, among others. information available at: https://www.imdb.com.
[47] https://www.imdb.com/title/tt2948372/fullcredits/?ref_=tt_cl_sm (last visited May 30, 2023).
[48] https://www.imdb.com/title/tt1160419/fullcredits/?ref_=tt_cl_sm (last visited May 30, 2023).

In a similar way to the film scoring industry (strictly speaking), the video games or trailer music composition industry works, although with a particularity: if we look at the public credits, the composer's support teams are much smaller than in the traditional film scoring industry (even the main composer can be mentioned as the only one). However, this is not because this is actually the case, but because it is more of a contractual issue, in which these teams are integrated into the companies that develop the final work and, therefore, do not reveal more than the main composers[49]. This is why we can say that the concept of composer support teams, based on diversification and specialization, applies equally well in these fields.

b. Zoom in: brief state of the art of AI applied to music generation

As we have seen in the previous chapter, machine learning models applied to the field of sound generation are not as advanced as LLM or image generation models. Currently, the model leading the development of AIs focused on the field of music is MusicLM, which outperforms the two models that, until January 2023, were leading this field (Mubert[50] & Riffusion[51])[52].

MusicLM is a model developed by Google specialized in " generate long and coherent music at 24 kHz, for text descriptions of significant complexity" [53]. The model was announced in January 2023, but was not open to the public until May 2023. At the time of writing, it has been possible to apply for the use of the model, which has not yet been granted. Therefore, it could only be tested through the samples provided on the website itself, together with the information provided in the research paper itself.

---

[49] Ignacio Rejon Linares, Interview with Antonio Jesús Molina Alarcón (May 22, 2023), conducted via Zoom.
[50] https://mubert.com.
[51] https://www.riffusion.com.
[52] Andrea Agostinelli et al., "MusicLM: Generating Music From Text," arXiv:2301.11325 (2023).
[53] Ibid. Page 2

To give us a brief idea of what this means, we should be aware that the standard of the music industry conceives high quality audio or resolution from 48 kHz[54]. In fact, in Japan in 2014 this concept was delimited above 96 kHz[55]. MusicLM generates high fidelity audio at a resolution of 24 kHz, so it obviously falls well below what we conceive today as high quality audio or resolution.

It is clear that in terms of audio quality, there is still a long way to go before this type of model can approach an audio generation that competes with that generated by humans through analog or digital recording processes. The other aspect of relevance is the content itself that the model creates from the text descriptions provided by the prompts.

MusicLM surpasses the Mubert and Riffusion models, which were leading the field until Google launched theirs. MusicLM not only generates better quality and respect for the caption, but also adds the concepts of whistling and humming, which were not supported by the previous models[56]. In the following table of contents, you can see the metrics comparing the three models. A relevant detail that indicates the great qualitative leap of the new model developed by Google is that "is capable of generating high-quality music comparable to Mubert, which relies on pre-recorded sounds prepared by musicians and sound designers"[57].

---

[54] RIAA, "High Resolution Audio Initiative Gets Major Boost with New 'Hi-Res MUSIC' Logo and Branding Materials for Digital Retailers," RIAA (2015), available at: https://www.riaa.com/high-resolution-audio-initiative-gets-major-boost-with-new-hi-res-music-logo-and-branding-materials-for-digital-retailers/ (last visited May 30, 2023).

[55] Japan Audio Society, "Definition of Hi-Res Audio (Announced on June 12th 2014)," Japan Audio Society (Updated 2022), available at: https://www.jas-audio.or.jp/english/hi-res-logo-en (last visited May 30, 2023).

[56] Andrea Agostinelli et al., "MusicLM: Generating Music From Text," arXiv:2301.11325 (2023).

[57] Ibid. Page 7

Table 1. Evaluation of generated samples using captions from the MusicCaps dataset. Models are compared in terms of audio quality, by means of Fréchet Audio Distance (FAD), and faithfulness to the text description, using Kullback–Leibler Divergence (KLD) and MuLan Cycle Consistency (MCC), and counts of wins in pairwise human listening tests (Wins).

MODEL	$FAD_{TRILL} \downarrow$	$FAD_{VGG} \downarrow$	KLD $\downarrow$	MCC $\uparrow$	WINS $\uparrow$
RIFFUSION	0.76	13.4	1.19	0.34	158
MUBERT	0.45	9.6	1.58	0.32	97
MUSICLM	0.44	4.0	1.01	0.51	312
MUSICCAPS	-	-	-	-	472

Image 1. Andrea Agostinelli et al. (2023).

As mentioned above, at the time of writing, it has not been possible to test the model with its public version. We have only been able to listen to the samples provided on their website, analyzing the audio with the text provided.

c. Future impact of AI on film scoring

Critically, and analyzing MusicLM's audio samples out of context, its results are far from human-generated music. The audio quality is very low and, the longer the generated audio is, the more chaotic the final result is. Nevertheless, there are details of excellent quality, such as the simulation of the human voice, being even able to generate text, albeit randomly. As for how the generated audio matches the text description, we must be much more positive, because although there are some samples that do not clearly show what a human could understand from the text description provided, MusicLM performs especially well, providing surprisingly good versions of descriptions that entailed a high level of understanding.

19

Overall, a model like this is not ready to tackle the film scoring industry at its highest level, so we will have to focus on other key aspects where AI will play a relevant role.

The key factor to be drawn from this brief analysis of the film scoring industry that has been made, is the fact that it operates by means of teams that support the composers and try to lighten their workload. The creative exercise thus becomes the main focus of the main artist through the delegation of highly specialized tasks, many of them of a highly technical nature. We are talking about all the professionals who performed assistance tasks, copyists, score preparation, the cues[58] in the different music software (Sibelius, Cubase, Pro Tools), etc.

The point is that all these activities are based on easily identifiable, measurable and therefore replicable actions. Thus, this detail becomes a fundamental factor in anticipating the impact that AI will have on the industry. In the same way that a programmer can greatly increase his productivity using tools such as Copilot[59], or consultants with the help of ChatGPT[60], a composer could make use of software that optimizes these tasks. And not only of a mechanical nature (such as transcription or score preparation), but even more technical aspects such as the orchestration itself. "Perhaps there will be more and more music supervisors and less and less composers. It is a possible thing with this kind of technology that more and more people will meet with the directors or producers of the show to define the sound. And once the particular sound is defined, AI can be applied"[61].

---

[58] A cue is "any piece of music that has a start and en ending. Some cues reside within a single scene while some others can span across multiple scenes. Sometimes a cue crosses with the consequent cue, we refer to such such scenario as *segue*." Giovanni Rotondo, "Film Scoring Vocabulary," Film Scoring Tips (2018), available at: https://filmscoringtips.com/film-scoring-vocabulary/ (last visited May 30, 2023).

[59] Eirini Kalliamvakou, "Research: quantifying GitHub Copilot's impact on developer productivity and happiness," GitHub Blog (2018), available at: https://github.blog/2022-09-07-research-quantifying-github-copilots-impact-on-developer-productivity-and-happiness/?utm_source=substack&utm_medium=email (last visited May 30, 2023).

[60] Shakked Not & Whitney Zhang, "Experimental Evidence on the Productivity Effects of Generative Artificial Intelligence" (2023).

[61] Ignacio Rejon Linares, Interview with Pedro Osuna (March 10, 2023), conducted via Zoom.

"I would replace my assistants with an AI [...]. As technology advances, we're going to need fewer and fewer technical jobs. Then, most humans are going to be creative and artistic, which is what will be left for us. The rest will be done by AI [...]. Maybe these jobs will undergo a transition from operation to design"[62].

This is why, in the introduction to our research, we commented on the idea that the film scoring industry is highly sensitive to the changes that are taking place, as a large part of the composer's support tasks may be replaced by an AI in the not too distant future.

From a more technical point of view, the qualitative leap that will make the difference will come when a properly trained AI is developed that is capable of reliably transforming audio to MIDI[63]. It is true that currently the Steinberg company has implemented in its Cubase[64] and Dorico[65] software programs an AI that attempts to solve this conversion. And, although this is a great advance, it always requires a great deal of human supervision to correct and polish the result that these programs offer. Currently, many of the problems faced by composers' assistants are related to this task, which, if solved, would make this type of work completely obsolete. The fact that an audio recording can be automatically and reliably transformed into MIDI format would make composers dispense with their assistants' equipment immediately[66].

As for the video game industry, it works in a similar way as film scoring does in this regard. This is not the case of trailer scoring, which, as mentioned above, offers compositions that adapt perfectly to the image of the trailer itself but without having anything to do with the music of the original project. On rare occasions we can distinguish melodic lines reminiscent of the original project, this situation occurring in cases where the music has a particularly

[62] Ibid.
[63] Ignacio Rejon Linares, Interview with Antonio Jesús Molina Alarcón (May 22, 2023), conducted via Zoom.
[64] https://www.steinberg.net/cubase/
[65] https://www.steinberg.net/dorico/
[66] Ignacio Rejon Linares, Interview with Antonio Jesús Molina Alarcón (May 22, 2023), conducted via Zoom.

relevant legacy. Examples of this are the sagas whose music is easily identifiable such as the Disney remakes (Mulan, The Lion King, The Jungle Book, etc.), Pirates of the Caribbean, Indiana Jones, etc.[67] In these projects they have chosen to add certain melodies that the target audience can recognize, mixed with the typical components characteristic of the industry. Despite this, and even with their exceptional context, they are still works that use the same stylistic and compositional resources as the vast majority of trailers composed for the big projects of the film scoring industry.

The point is that all these stylistic and compositional resources are easily identifiable and therefore replicable. This is why it is widely believed that if a sufficiently advanced autonomous AI is developed, which does not require a high degree of creativity, but rather the opposite, it will be able to imminently replace an industry such as the trailer scoring industry[68].

The application of AI in the film scoring industry, in the terms that are being exposed, will not present *a priori* legal problems related to the authorship of their creations, since it will be managed more as an assistant or tool that facilitates and streamlines the creative process, rather than as a creative element itself. On the other hand, in the trailer scoring industry, we will face this problem, as we will potentially find an AI that composes from certain human prompts or that can even act completely autonomously. Let's imagine, for example, what could happen to this industry the moment a model like MusicLM works competently. This will open up the debates that currently exist in this field, which we will address in later sections.

---

[67] These conclusions are the result of the analysis carried out after comparing the music of the aforementioned trailers with the original scores of each feature film. These original scores were obtained in the context of a professional relationship covered by an NDA.

[68] This statement has been supported by the 5 interviewees (whose field of expertise is music).

22

i. Low/medium budget projects

What has been analyzed so far is applicable to the high level film scoring industry, which consists of large budgets. These capitals offer the possibility of working through large teams, as mentioned so far, which speed up the work of the composers, since they are unable to cope with a workload of such proportions, in such a short time. This is why AI will play a fundamental role in streamlining this workload, which, even if it eliminates essential figures such as composers' assistants, music transcribers, score preparers, etc., will increase the efficiency of the process and, consequently, greatly reduce its costs.

What we have not mentioned so far is the possible fact of the replacement of the composer by an AI, as the current state of the art is not advanced enough to make this happen. The most advanced model to date (at the time of writing) is MusicLM, which offers results never seen before in the timeline of AI development, but critically, they are not at all comparable to what a human composer in the high-end film scoring industry could create. The technology will have to advance considerably if we want to see an AI capable of supplanting the work of these composers in a completely autonomous manner. Medium- and low-budget projects, which, although of less economic relevance, outnumber those at the top of the pyramid.

In these projects not only the budget is reduced. We are talking about short films, medium-length films, indie video games or any type of work in which the creative team, as a general rule, is small and in which the music department can be reduced to the figure of the composer, the music producer and an assistant at most[69].

Normally who cover these projects are emerging composers, who gain experience through them, in order to make their music heard and accessible to a wider audience. Obviously, the

---

[69] Ignacio Rejon Linares, Interview with Antonio Jesús Molina Alarcón (May 22, 2023), conducted via Zoom.

ambition of these audiovisual projects is much lower than that of big budget projects, obtaining, as a general rule, a result in accordance with the investment. Therefore, and connecting this idea with the application of artificial intelligences, the necessary quality threshold that these models must reach in order to be taken into account for their hypothetical inclusion in the market, will be much lower than what is required at the highest levels of the industry[70]. The mere fact of raising this eventual scenario should lead to a reconsideration of numerous circumstances that will be imminently affected. Thus, as previously discussed in reference to the trailer scoring case, the question of authorship of the work itself created by AI would come to light.

Although we treat this possible situation as something hypothetical, it is no further from a very possible outcome of the reality we are currently living. This could lead to the situation where human composers, in the field of medium and low budget projects, could be replaced by the figure of an AI, which would simply act under the orders of the project director himself.

---

[70] Ibid.

CHAPTER 3: INTELLECTUAL PROPERTY AND AI

a. An anthropocentric approach

i. Legal grounds

Until now, anthropocentrism has determined much of the foundations of our society. A key proof of this is the way legal systems are drafted. In them, practically every precept is developed around the human figure as an individual or as a collective (societies, administrations, etc.), but on rare occasions we can find a principle that does not have its origin, object or purpose linked to the human figure.

This will be much more accentuated when we refer to activities whose nature has always been human, as in the case of creative development[71].

In the specific case of the creative and inventive field, the legal bases that support it have the same common denominator. Thus, the most relevant patent offices (IP5) declared that an inventor, in order to be considered as such, must be human[72]; a view that the domestic courts have been applying over the years[73].

In the US, for example, although the term "inventor" is not constitutionally developed literally, there is case law that interprets this text and extends it to the human figure exclusively[74]. Similarly, in Europe the EPC does not explicitly state in article 60 that an inventor must be

---

[71] As Dornis says, "the act of intellectual creation as the essence of the concept of "invention" remains reserved for humans." Tim W. Dornis, "Artificial Intelligence and Innovation: The End of Patent Law as We Know It," 23 Yale J.L. & Tech. (Fall 2020) p. 116.

[72] IP5, "Report from the IP5 expert round table on artificial intelligence" (2018), available at: https://www.fiveipoffices.org/sites/default/files/attachments/5e2c753c-54ff-4c38-861c-9c7b896b2d44/IP5+roundtable+on+AI_report_22052019.pdf (last visited June 11, 2023).

[73] See Thaler v Commissioner of Patents [2021] FCA 879

[74] Diamond v. Chakrabarty, 447 U.S. 303, 309 (1980). In this case the court applies a teleological interpretation of the law: "Congress intended statutory subject matter to include anything under the sun that is made by man".

human, [75] although it was through the rejection of two patent applications (designed by the AI DABUS system) where the Legal Board of Appeal clarified in a clear statement that the inventor designated in the patent application must be a human[76].

Although we are aware of the great differences that separate the field of inventiveness (normally protected by patents) and that of the creation of artistic works (protected by copyright), both have the same origin. In this respect, and although this research is oriented towards the second of these fields, it has been considered necessary to compare their legal bases, since they have grown through the idea that it is the human intellect that is the reason from which art and inventiveness originate. It is this approach that has helped to build the whole system that our society enjoys today.

The anthropocentric view applied to the field of patents is equally extrapolated to the field of artistic creation of works, which are protected by copyright. Thus, although the Berne Convention does not specify that an inventor must be human, numerous courts across different jurisdictions have rejected the idea of granting authorship of an artistic work to a non-human figure. From the case in which US courts rejected the authorship of a photograph taken by an animal[77], the foundations were already being laid that would continue to be applied in the years to come.

This model that protects artists and inventors is designed in a specific way that offers a balance between the protection of the work or invention itself and the access to it. This balance was determined on the basis of estimates of the effort and resources used by human beings invested in the creative or inventive process and the expectations of remuneration for having achieved

---

[75] European Patent Convention, 1973 (17th ed. November 2020). [IS THIS CORRECT?].
[76] EPC, Legal Board of Appeal, "Press Communiqué on decisions J 8/20 and J 9/20 of the Legal Board of Appeal" (2021), available at: https://www.epo.org/law-practice/case-law-appeals/communications/2021/20211221.html (last visited June 11, 2023).
[77] See Naruto v. Slater - 888 F.3d 418 (9th Cir. 2018).

those results[78]. Through international treaties or regional conventions, among other legal instruments, a reward system is created to incentivize creation and invention, with the clear aim of strengthening the development of our society[79]. The point is that with the irruption of AIs, the concept of development has changed radically, as these models reinvent the way in which a human being can be able to invent or create an artistic work, significantly increasing the rate at which they were conceived and, therefore, decreasing the effort and resources invested. This is the core idea that completely challenges the anthropocentric system on which we are currently based.

Taking into account the different perspectives that civil law and common law may have, we can also draw some key points from this. The French approach, for example, stipulates in its Intellectual Property Code that copyright protection is granted to "authors of works of the spirit"[80], implicitly linking authorship to the human mind. By interpreting authorship in this way, the French legal system underlines the premise of human-centered creativity and, by extension, the predictability of the outcome of a creative process. On the other hand, the UK approach, embodied in the Copyright, Designs and Patents Act 1988, similarly requires a work to be "original" in order to be protected, which has been judicially interpreted as requiring the "exercise of independent skill and judgement"[81]. This also hints at the existence of a human creator capable of exercising such skill and judgement, which again highlights the

---

[78] Adam Moore & Ken Himma, "Intellectual Property," in The Stanford Encyclopedia of Philosophy (Fall 2022 Edition), ed. Edward N. Zalta & Uri Nodelman, URL: https://plato.stanford.edu/archives/fall2022/entries/intellectual-property/.

[79] As an explanatory note, although it is true that the patent system carries a much heavier economic development component than the copyright system, this does not in any way exclude the idea that artistic creations cannot create economic value. "There are some works that are so costly to create even in the digital world that they are unlikely to be made without effective IP protection. Big-budget movies and video games cost hundreds of millions of dollars to make. No amount of creative fire will drive someone who doesn't have hundreds of millions of dollars to make Peter Jackson's Lord of the Rings trilogy". Mark A. Lemley, "IP in a World Without Scarcity," 90 N.Y.U. L. Rev. 460, 496 (2015).

[80] French Intellectual Property Code, Article L112-1.

[81] Infopaq International A/S v Danske Dagblades Forening [2009] EUECJ C-5/08.

anthropocentric approach of intellectual property law. In this way, both the French and the UK systems reinforce the challenge posed by AI in the context of intellectual property law.

In the realm of copyright, an original work is characterized not by its novelty, but by the demonstration of a 'modicum of creativity' derived from the author's intellectual effort[82]. The concept of predictability is inherent in this relationship, as the creative process is typically thought to be an intentional and conscious act by the human author, therefore lending a degree of foreseeability to the outcome. The unpredictability in AI creations challenges this traditional understanding of authorship and originality, by diluting the direct influence and foreseeability of the human creator on the final product[83].

One of the most recent rejections was issued by the United States Copyright Office in February 2023, which does not contemplate that the human being who generated the prompt that would give rise to the final result can be considered the author under certain circumstances[84]. This particular case reviews the claim of authorship of a series of images created through the AI Midjourney on behalf of the artist Kris Kashtanova, which are dismissed on the basis of lack of predictability. This is the result of using an AI such as Midjourney, which does not offer as much certainty or predictability in the final result as the prompts used with other similar AIs that do offer a greater prompt-result connection. Although both the author and Midjourney's own representatives celebrated in their statements the negative spectrum of the resolution (i.e., the work can be protected in the event that the author takes more control of the result) [85], in my opinion this argument presents certain inconsistencies from a legal point of view, since it has

---

[82] Feist Publ'ns, Inc. v. Rural Tel. Serv. Co., 499 U.S. 340 (1991).
[83] S. Ricketson & J.C. Ginsburg, International Copyright and Neighbouring Rights: The Berne Convention and Beyond (2d ed., Oxford Univ. Press 2005).
[84] United States Copyright Office, Re: Zarya of the Dawn (Registration # VAu001480196) (2023), available at: https://fingfx.thomsonreuters.com/gfx/legaldocs/klpygnkyrpg/AI%20COPYRIGHT%20decision.pdf (last visited June 11, 2023).
[85] Blake Brittain, "AI-created images lose U.S. copyrights in test for new technology" (2023), available at: https://www.reuters.com/legal/ai-created-images-lose-us-copyrights-test-new-technology-2023-02-22/ (last visited June 11, 2023).

been well recognized throughout history that, both in the sector of the creation of artistic works (copyright) and in the sector of invention (patents) [86], unpredictability has been the main cause that has given rise to numerous creations in both fields. Restricting the granting of authorship under this argument therefore highlights once again the confusion that the courts are suffering today.

This is a key idea because, although we are currently experiencing a paradigm shift that has no precedent comparable to its magnitude, it is clear that legal systems are not prepared for the changes that are taking place. This is because the foundations of our legal systems are provided with this anthropocentric vision that defines and designs them and which is not capable of offering solutions to the new technological advances.

Throughout our history, the tool that has been used to combat the well-known lag of the law with respect to society has been the interpretation of the law by the courts when these gaps occurred. Perhaps the common law jurisdictions did so more markedly than the civil law jurisdictions, but both used this tool to alleviate the negative effects that new circumstances not contemplated in the law could have on society. By means of different interpretations of the law (even *contra legem*), it has been possible to make up for these gaps.

In recent years, this has been the strategy followed in the face of the problems presented by advances in the field of artificial intelligence. It is true that, depending on the jurisdiction in which we find ourselves, the same case can be resolved in totally different ways by different courts, but in recent issues raised in the technological field, the common denominator has been total confusion, as we mentioned above.

---

[86] Daria Kim, "'AI-Generated Inventions': Time to Get the Record Straight?", GRUR International 69(5), 2020, 443-456 (doi: 10.1093/grurint/ikaa061).

One of the reasons for this is due to the anthropocentric nature of the foundations of our legal system. Therefore, the way to remedy this situation would be to modify these foundations. Renouncing all or part of these principles in a meditated and consensual manner would undoubtedly bring new solutions capable of adapting much better to the new technological demands. Although, for obvious reasons, such a shift would have an unprecedented social, economic and philosophical impact (among others).

It is clear that enshrining a change of this magnitude would not be achieved overnight, so testing how flexible the current foundations of our legal systems can be can help determine the next steps in a much more reliable way. We are now at a point where AIs are not used by a specific niche of experts, but have reached the mass public. This means that all these models are being tested by the general public, by society, and the real impact they can have on a large scale without causing major damage[87], almost like a sandbox, is being analyzed.

ii. Need for a change of paradigm: possible solutions

As mentioned in previous sections, the technical development of AIs, once it has reached the level we are at now, cannot conceive of stopping or even going backwards. Therefore, we must assume as a premise that new models will become more and more advanced and sophisticated. This fact will confront us with the idea that this system of retribution for creation based on the resources invested in the creation of a particular work or invention will be completely meaningless. Of course, the solution does not lie in banning the use of these technologies, as we will quickly find ourselves with a society that would hide their use[88].

---

[87] AI models whose use is open to the public (such as ChatGPT, MusicLM, etc.), usually have warning and disclaimer clauses because they are still in experimental phases where it is recognized that these models will frequently make mistakes.

[88] Enrico Bonadio, Luke McDonagh & Plamen Dinev, "Artificial intelligence as inventor: exploring the consequences for patent law," I.P.Q. 2021, 1, 48-66.

On the other hand, another issue of relevance is the question of ownership. In fact, if we review the previous sections, everything revolves around the idea of whether an AI can be considered the author, but in opinions such as Hughes', this question is absolutely irrelevant, since what is really relevant in practice is who is in charge of the ownership[89]. Much of the current debate revolves around the granting of authorship, both in contested cases before the courts and at the legislative level. And of course, in a world where one of the main objectives is the development of our society, addressing the recognition of who owns the rights to a given creation is a key issue.

There are different views in favor of transferring ownership of AI-generated works into the public domain. On the one hand, those that indicate that when an AI is completely autonomous, there is no reason to grant any kind of legal protection[90]. On the other hand, those who tend to shy away from the anthropocentric perspective, since offering such incentives to creation is only designed by and for humans, which makes no sense when it comes to AIs[91]. Another approach that supports this view is linked to what we mentioned in previous sections, in reference to large corporations. Companies such as Apple, Meta, Microsoft, Google, etc. have positioned themselves as undisputed leaders in this sector, which would imply that, in the case of transferring the ownership of the outcomes generated by AIs, these would have an absolute monopoly both in the creation of artistic works and in the generation of patents[92].

---

[89] Rose Hughes, "EPO refuses 'AI inventor' applications in short order - AI Inventor team intend to appeal" (2019), available at: https://ipkitten.blogspot.com/2019/12/epo-refuses-ai-inventor-applications-in.html (last visited June 12, 2023).

[90] Michael McLaughlin, "Computer-Generated Inventions," SSRN, available at: http://dx.doi.org/10.2139/ssrn.3097822 (last visited June 12, 2023); Chartered Institute of Patent Attorneys, "Patenting inventions created using an AI system" (2020), available at: https://cms.law/en/media/local/cms-cmno/files/publications/publications/patenting-inventions-created-using-an-ai-system (last visited June 12, 2023).

[91] Dr. Shlomit Yanisky Ravid & Xiaoqiong (Jackie) Liu, "When Artificial Intelligence Systems Produce Inventions: An Alternative Model for Patent Law at the 3A Era," 39 Cardozo L. Rev. 2215 (2017).

[92] Ryan Abbott, "I Think, Therefore I Invent: Creative Computers and the Future of Patent Law," (2016), available at: http://dx.doi.org/10.2139/ssrn.2727884; Enrico Bonadio, Luke McDonagh & Plamen Dinev, "Artificial intelligence as inventor: exploring the consequences for patent law," I.P.Q. 2021, 1, 48-66.

The counterpart to these ideas is that if we do not reward (back to the anthropocentric perspective), not the artistic or inventive creation we were talking about, but the development of AI systems that are capable of creating, there would not be sufficient incentives for developers and the creation of AI would be limited[93].

One possible escape route could be found in how large corporations developing AI models are targeting their products. Many of them are offering them or have included in their short and medium-term strategy to offer them as a paid service, in a similar way to SaaS (software as a service). The concept of SaaS and its possible approach applied to AIs would depend on how each company offering its service adapts its EULA.

Currently, a similar example that could be taken as a reference point can be found in the field of video games in which the player is offered a creative component[94]. In this type of video games, conditions are established regarding User Generated Content (UGC). There are a few cases where co-ownership for the end user and the developer/publisher/distributor may exist with broad limits on the discretion of these companies over the UGC with the aim of limiting their liability[95].

I am of the opinion that this possible escape route would be based on this idea, but would be more in favor of the complete relinquishment of ownership of the content in exchange for remuneration from the end user. This would create a balanced situation by offering an attractive incentive to developers, while at the same time, through the granting of ownership to the end user, the continued development of our society is encouraged.

---

[93] "An optimal level of AI production will be achieved only if the developer is given an opportunity to appropriate the value of the combined "product"" Tim W. Dornis, "Artificial Intelligence and Innovation: The End of Patent Law as We Know It," 23 Yale J.L. & Tech. (Fall 2020) p. 137.

[94] Minecraft or Dota 2 as examples.

[95] See https://store.steampowered.com/subscriber_agreement/#7 (last visited 12 June 2023); in the specific case of Minecraft, rather than a co-ownership, what takes place is a subrogation of virtually all economic rights to the created work. https://www.minecraft.net/en-us/eula (last visited 12 June 2023).

Although this concept is optimistically conceived as one of the possible solutions to current problems, we are aware that it presents certain difficulties:

- Firstly, its application would cover AI models whose access is offered to the general public and whose use is massive. It would be implemented in models whose scope of use is more related to the artistic creation of works. Thus, AI systems used for inventive activities, which are more reserved for a niche technological field, are being excluded (although not necessarily absolutely).

- For its correct application, it is assumed that AI systems do not commit any kind of infringement. To this end, it would have to be made clear exactly and transparently how the AI analyses and processes the information to transform it into the final outcome, in addition to working with databases whose content is based on the express consent of the authors whose works are being used to train these systems[96]. There is currently no legislation that specifically covers this circumstance, although it is true that by analogy an extensive interpretation of Article 17 Directive 2019/790 could be made. Currently, the applicability of this provision to AI is indirect at best, as it centers on human-controlled entities. To directly address AI, a more extensive interpretation, amendment, or even a new legislative instrument may be necessary. Such a revision could explicitly stipulate the need for AI systems to transparently demonstrate their information analysis and transformation processes, along with the use of appropriately licensed or consent-obtained databases, thus establishing their non-infringing status under copyright law.

- As a consequence of this second criticism, the fact that the companies developing these models completely renounce ownership in exchange for a consideration may unbalance the localization of risk. Would the end users be the bearers of the risk or would it

---

[96] Andres Guadamuz, A Scanner Darkly: Copyright Infringement in Artificial Intelligence Inputs and Outputs (2023).

continue to be the developing company? In this respect, we will have to wait for the development of legislation intended to cover this problem, such as that proposed within the framework of the European Union.

Another possible alternative is to re-examine the protection afforded to human creation and inventiveness. These are conditioned by our anthropocentric conception, which would lose a great deal of weight due to the irruption of AIs. Thus, some authors suggest limiting these periods of protection to works and inventions created by AIs or even in general[97].

To date, there is no unitary, global and joint response from the different jurisdictions that attempts to address these problems in a concrete manner. Each is engaged in different processes that attempt to address the current situation on the basis of different criteria and methods. Examples of these different approaches can be found in the United Kingdom (which is basing its legislative developments on public consultations carried out by the UKIPO[98]), in the European Union (through the development of the "AI Act". This focused mainly on risk classification and risk location, although recently new issues have been proposed to be addressed in its text[99]) or in the USA (through a round of consultations[100]).

[97] See Erica Fraser, "Computers as Inventors – Legal and Policy Implications of Artificial Intelligence on Patent Law," 13 SCRIPTed 305 (2016); A. Lauber-Rosensberg & S. Hetmank, "The concept of authorship and inventorship under pressure: Does artificial intelligence shift paradigms?", 14 J. Intell. Prop. L. & Prac. 578 (2019).

[98] UK Intellectual Property Office, "Artificial Intelligence and Intellectual Property: copyright and patents: Government response to consultation" (2022), available at:
https://www.gov.uk/government/consultations/artificial-intelligence-and-ip-copyright-and-patents/outcome/artificial-intelligence-and-intellectual-property-copyright-and-patents-government-response-to-consultation#copyright-in-computer-generated-works (last visited June 12, 2023).

[99] European Parliament, "Proposal for a regulation of the European Parliament and of the Council on harmonised rules on Artificial Intelligence (Artificial Intelligence Act) and amending certain Union Legislative Acts" (2023), available at: https://www.europarl.europa.eu/meetdocs/2014_2019/plmrep/COMMITTEES/CJ40/DV/2023/05-11/ConsolidatedCA_IMCOLIBE_AI_ACT_EN.pdf (last visited June 12, 2023).

[100] See CBS News, "OpenAI CEO Sam Altman testifies at Senate artificial intelligence hearing | full video" (May 16, 2023), YouTube video, available at: https://www.youtube.com/watch?v=TO0J2Yw7usM (last visited May 30, 2023).

b. Film scoring: legal implications

Thinking back to the film scoring industry, and the way AI can be implemented there, we commented that at the highest levels, these new models could be included in the reasonably near future as a tool to enable composers to be more productive, taking away much of the equipment that helped them lighten their workload to focus solely on the compositional side of things.

In this specific case, there would be no *a priori* legal issues of relevance that cannot be solved with current legislation. By making use of AI systems as a working tool, whose contribution lacks creative inventiveness, there would be no confrontation with the authorship or ownership of the final outcome. Everything should be framed within the legal margins that are available.

On the other hand, and where there could be problems is in the field of film scoring for medium and low budget projects and in the trailer industry. The concreteness of authorship and, above all, of ownership, will present the great difficulties that these fields may suffer in terms of adapting to the new models.

As we discussed in previous sections, the state of the art of music creation AI models is far from being able to achieve a high-level result that can be fully relied upon. Even so, medium quality results are not that far away from what has been achieved so far, so the inclusion of the use of these AIs for medium to low budget models is more than a reality.

Thus we may find in the relatively near future a film scoring industry in its initial stages that completely replaces the figure of the composer and his team with an artificial intelligence. The outcomes of these hypothetical models would be fully utilized in film projects, so that determining and knowing who is the author and owner of the rights to the work created becomes a fundamental issue.

In the previous section possible solutions have been mentioned as to how this problem could be addressed. Even so, we must urgently resolve certain issues such as granting full transparency to databases and developing regulations that encourage databases to be made up of data whose author has expressly given his or her consent. With these issues resolved, the question of determining authorship and ownership would become much easier to resolve.

In the trailer or additional music industry, among others, a similar situation exists, albeit with certain peculiarities. As already mentioned, these industries are based on companies that work independently of the main composers of the film projects, in which a composer or teams of composers are in charge of each commission. The point is that, as a rule, these composers and their teams are not usually promoted, so the question of authorship would be dissolved in the same way as it is resolved today. However, an AI system capable of generating music for a trailer of a similar standard to those composed for big-budget projects would undoubtedly cause a revolution in the industry, relegating the previous legal issues to the background for as long as these changes take place.

CONCLUSION

37

As traditional views of intellectual property law are challenged, we find ourselves in an era of transition, where the anthropocentric foundation of our societal and legal structures are being reconsidered. As AI continues to dilute the direct influence of human creators, we are forced to explore the elasticity of our legal structures, testing their flexibility as we navigate this new paradigm.

In light of these challenges, it is clear that a unified global response is needed. As AI becomes more integrated into our creative and inventive sectors, it is incumbent on us to reassess our existing models and develop new ones that ensure a balanced, fair, and productive future.

In the face of all these changes, the creative industries must adapt. In the specific case of the film scoring industry, it is evident that there have been no substantial variations in the industry, nor have the legislative changes helped to promote solutions to the future situations that threaten to change the panorama completely. It is therefore essential that this unified response should lay the foundations for a new model by urgently proposing solutions to the issues of authorship and ownership that take into consideration AI as a whole creator which, while presumably not affecting the industry at its top level (as here it would be used more as an assistant tool), could cause a real revolution at its lower-middle levels.

BIBLIOGRAPHY

- Abbott, Ryan, "I Think, Therefore I Invent: Creative Computers and the Future of Patent Law" (2016), available at: http://dx.doi.org/10.2139/ssrn.2727884.

- Agostinelli, Andrea et al., "MusicLM: Generating Music From Text," arXiv:2301.11325 (2023).

- Bonadio, Enrico, Luke McDonagh, and Plamen Dinev, "Artificial intelligence as inventor: exploring the consequences for patent law," I.P.Q. 2021, 1, 48-66.

- Bove, Tristan, "CEO of Google's DeepMind says we could be 'just a few years' from A.I. that has human-level intelligence," Fortune (May 3, 2023), available at: https://fortune.com/2023/05/03/google-deepmind-ceo-agi-artificial-intelligence/.

- Bostrom, Nick, Superintelligence: Paths, Dangers, Strategies (Oxford University Press, 2014).

- Brittain, Blake, "AI-created images lose U.S. copyrights in test for new technology" (2023), available at: https://www.reuters.com/legal/ai-created-images-lose-us-copyrights-test-new-technology-2023-02-22/.

- CBS News, "OpenAI CEO Sam Altman testifies at Senate artificial intelligence hearing | full video" (May 16, 2023), YouTube video, available at: https://www.youtube.com/watch?v=TO0J2Yw7usM.

- Chukwudozie, Jude, "Artificial Intelligence (AI) and Autonomous Vehicles," IoT For All (2022), available at: https://www.iotforall.com/artificial-intelligence-and-autonomous-vehicles.

- Dornis, Tim W., "Artificial Intelligence and Innovation: The End of Patent Law as We Know It," 23 Yale J.L. & Tech. (Fall 2020).

- European Parliament, "Proposal for a regulation of the European Parliament and of the Council on harmonised rules on Artificial Intelligence (Artificial Intelligence Act) and amending certain Union Legislative Acts" (2023), available at: https://www.europarl.europa.eu/meetdocs/2014_2019/plmrep/COMMITTEES/CJ40/DV/2023/05-11/ConsolidatedCA_IMCOLIBE_AI_ACT_EN.pdf.

- European Patent Convention, 1973 (17th ed. November 2020).

- Fraser, Erica, "Computers as Inventors – Legal and Policy Implications of Artificial Intelligence on Patent Law," 13 SCRIPTed 305 (2016).

- Guadamuz, Andres, A Scanner Darkly: Copyright Infringement in Artificial Intelligence Inputs and Outputs (2023).

- Hughes, Rose, "EPO refuses 'AI inventor' applications in short order - AI Inventor team intend to appeal" (2019), available at: https://ipkitten.blogspot.com/2019/12/epo-refuses-ai-inventor-applications-in.html.

- Kalliamvakou, Eirini, "Research: quantifying GitHub Copilot's impact on developer productivity and happiness," GitHub Blog (2018), available at: https://github.blog/2022-09-07-research-quantifying-github-copilots-impact-on-developer-productivity-and-happiness/?utm_source=substack&utm_medium=email.

- Kasparov, Garry, "The Day That I Sensed a New Kind of Intelligence," Time (1996), available at: https://content.time.com/time/subscriber/article/0,33009,984305,00.html.

- Kim, Daria, "'AI-Generated Inventions': Time to Get the Record Straight?", GRUR International 69(5), 2020, 443-456 (doi: 10.1093/grurint/ikaa061).

- Knight, Will, "OpenAI's CEO Says the Age of Giant AI Models Is Already Over," Wired, available at: https://www.wired.com/story/openai-ceo-sam-altman-the-age-of-giant-ai-models-is-already-over/.

- Lauber-Rosensberg, A. and S. Hetmank, "The concept of authorship and inventorship under pressure: Does artificial intelligence shift paradigms?" (2019) 14 Journal of Intellectual Property Law & Practice 578.

- Lemley, Mark A., "IP in a World Without Scarcity," 90 N.Y.U. L. Rev. 460, 496 (2015).

- Maddison, Angus, Statistics of World Population, GDP and Per Capita GDP 1-2008 AD (2010).

- McCallum, Shiona, "ChatGPT banned in Italy over privacy concerns," BBC News (2023), available at: https://www.bbc.com/news/technology-65139406.

- McLaughlin, Michael, "Computer-Generated Inventions," SSRN, available at: http://dx.doi.org/10.2139/ssrn.3097822.

- Moore, Adam and Ken Himma, "Intellectual Property," The Stanford Encyclopedia of Philosophy (Fall 2022 Edition), ed. Edward N. Zalta & Uri Nodelman, URL: https://plato.stanford.edu/archives/fall2022/entries/intellectual-property/.

- Moore, Adam and Ken Himma, "Intellectual Property," 90 N.Y.U. L. REV. 460, 496 (2015).

- Ricketson, S. and J.C. Ginsburg, International Copyright and Neighbouring Rights: The Berne Convention and Beyond (2d ed., Oxford Univ. Press 2005).

- Reuters, "Spain asks EU data protection board to discuss OpenAI's ChatGPT," Reuters (2023), available at: https://www.reuters.com/technology/spains-data-regulator-asks-eu-data-protection-committee-evaluate-chatgpt-issues-2023-04-11/.

- Rejon Linares, Ignacio, Interview with Ana Linares (March 22, 2023), conducted via Zoom.

- Rejon Linares, Ignacio, Interview with José Lopez-Montes (May 15, 2023), conducted via Zoom.

- Rejon Linares, Ignacio, Interview with Juho Pohjonen (April 15, 2023), conducted via Zoom.

- Rejon Linares, Ignacio, Interview with Antonio Jesús Molina Alarcón (May 22, 2023), conducted via Zoom.

- Rejon Linares, Ignacio, Interview with Pablo Fernández Carballo-Calero, conducted via email.

- Rejon Linares, Ignacio, Interview with Pedro Osuna (March 10, 2023), conducted via Zoom.

- Russell, Stuart & Peter Norvig, Artificial Intelligence: A Modern Approach (3d ed. 2010).

- Smith, Thomas, "The AI That Knows Your Face — From Your Voice," Medium (2019), available at: https://medium.com/swlh/the-ai-that-knows-your-face-from-your-voice-90772b352f2a.

- Ulam, S., "John von Neumann 1903–1957," Bull. Am. Math. Soc. 64 (3.P2) 1-49 (May 1958).

- Yanisky Ravid, Shlomit and Xiaoqiong (Jackie) Liu, "When Artificial Intelligence Systems Produce Inventions: An Alternative Model for Patent Law at the 3A Era," 39 Cardozo L. Rev. 2215 (2017).