

European Union Copyright Protection for AI-Generated Works

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Abstract

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The dissertation has been inspected for plagiarism using the Turnitin Originality Check system in accordance with the standard quality assurance system of the University.

This thesis assesses the copyright protection of AI-generated works in the European Union. AI-generated work means a work of art that is generated independently by an AI system that relies on machine learning and artificial neural network technology in functioning. The human input in the creation process of an AI-generated work is non-existent. Today, the AI-generated works can be found in almost every copyrightable medium, such as in the field of music, art and literature.

The aim of this thesis is two-fold. The aim of the first part of this thesis is to analyze whether the AI-generated works are currently protected under the European Union copyright law. In order to answer this question, the case law of the Court of Justice of the European Union in the field is analyzed. The aim of the second part of this thesis is to assess whether the AI-generated works should be protected and if the answer is yes, who should be allocated the rights and by which legal tool.

The questions analyzed in this thesis are significant as the importance of AI-generated works in our society is constantly increasing. If the AI-generated works are not protected and the protection regime remain unclear, this will have a negative impact on investments. Consequently, the number of valuable works would decrease in the society.

This thesis focuses on the European Union copyright law and follows the traditional legal dogmatic approach. In addition, *de lege ferenda* approach is adopted in the second part of this thesis.

The conclusion of this thesis is that the AI-generated works are not currently protected under the European Union copyright law. This conclusion is mainly based on the finding that the AI-generated works are not regarded original work of authorship established by the case law of the Court of Justice of the European Union. It is further concluded that the current legislative environment, in which the valuable AI-generated works fall within the public domain should be avoided. It is proposed that the authorship in the AI-generated works would be allocated to the user of the AI-system. For this purpose, it is suggested that EU would adopt the US based work-for-hire doctrine, under which the AI system would be regarded as a creative “employee” of the user.

Subject matters:

Information society, copyright law, intellectual property law, EU law, artificial intelligence

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ABBREVIATIONS

AI	Artificial intelligence
Art	Article
CDPA	UK Copyright, Design and Patents Act 1988
CJEU	Court of Justice of the European Union
EC	European Community
EEC	European Economic Community
EIRP	European Intellectual Property Review
EU	European Union
IP	Intellectual Property
UNESCO	United Nations Education, Scientific and Cultural Organization
WIPO	World Intellectual Property Organization
WTO	World Trade Organization

1 INTRODUCTION

1.1 Background

Technological changes have placed tensions on the scope and application of the European Union (“EU”) copyright law over the decades. The PC revolution in the 1980’s caused a permanent shift in consumer attitudes and practices concerning the reproduction of copyrighted works. The Internet revolution in the 1990’s had the same effect with respect to the distribution of those works.¹ Currently, the EU copyright law is facing the third computer-enabled technological shift: the rapid advance in artificial intelligence (“AI”) is calling into question some of the fundamental assumptions upon which intellectual property (“IP”) law rests.²

AI has become a hot topic in recent years. In 1996, IBM’s computer called “Deep Blue” made international headlines by defeating world chess champion Garry Kasparov in Philadelphia.³ Five years later, in 2011, IBM’s AI called “Watson” became the champion of the game show “Jeopardy!”.⁴ Most recently, in 2016, Google’s AI called “AlphaGo” defeated a human champion of “Go”, the 2500-year-old Chinese strategy game that is much more complex than chess.⁵ From the point of view of this thesis, even more interesting is the progress made by AI in the creative field. The advance in

¹ Peter Groves, *Copyright and design law – a Question of Balance*. Graham & Trotman, London (1991), p. 1-2. In the 1990’s, the rise of personal computers forced copyright law to accommodate software and computer databases and consequently, the Software Directive 91/250/EC and the Database directive 96/9/EC were issued.

² Timothy Butler, ‘Can a Computer be an Author? Copyright Aspects of Artificial Intelligence’ (1982) 4 Cinn/Ent Law Journal 707-747, p. 747.

³ Weber, Bruce ‘Swift and Slashing, Computer Topples Kasparov’ N.Y. Times, 12 May 1997. Available at <www.nytimes.com/1997/05/12/nyregion/Swift-and-slashing-coputer-topples-kasparov.html>, accessed on 30 June 2018.

⁴ Markoff, John ‘Computer Wins ‘Jeopardy!’: Trivial, It’s Not’ N.Y. Times, 16 February 2011. Available at <www.nytimes.com/2011/02/17/science/17jeopardy-watson.html>, accessed on 15 July 2018.

⁵ McAfree, Andrew & Brynjolfsson, Eric ‘Where Computers Defeat Humans, and Where They Can’t’ N.Y. Times, 16 March 2016. Available at <www.nytimes.com/2016/03/16/opinion/where-computer-defeat-humans-and-where-they-cant.html>, accessed on 10 June 2018.

AI has made machine-generation of artistic works reality. Today, AI is able to generate various type of art, such as music⁶, literature⁷ and paintings⁸.

Use of technological tools in the creation of art as such is not a new phenomenon. Various computer programs and AI systems have been used as a tool for creating art by human authors for a relatively long time.⁹ Using AI as a tool for creating a work of art rises no issue regarding copyright as the EU copyright law is technology neutral.¹⁰ Technology neutrality means that the copyright protection is not only extended to the traditional artistic and literary works, but also works produced by using various new technologies, such as computers, robots and AI systems.¹¹ Thus, similar as an artist uses a pen to draw, the artist can use technological tool to create a work. For instance, Microsoft Word can be used to write an essay and digital camera can be used to take a photo.¹²

However, today's AI systems are not used merely as tools for human authors. The modern AI systems, relying on machine learning and neural network technology, are able to generate artistic works independently, mimicking human intelligence. The works generated independently by modern AI-systems, with no human input in the creation process, are referred as "AI-generated works" in this thesis. For instance, an UK based company "JukeDeck" uses neural network technology to produce music for commercial

⁶ For instance, Google's AI called "WaveNet" is able to generate music by analyzing the given set of classical music. Van Den Oord, Aaron et al. 'Wavenet: A generative Model for Raw Audio' ArXiv, 9 September 2016. Available at <<https://arxiv.org/pdf/1609.03499.pdf>>, accessed on 1 October 2018.

⁷ For instance, a short-form novel generated by AI made it through the first round of screening for a national literary prize in Japan called the Nikkei Hoshi Shinichi Literary Award. See Japan Times 2016.

⁸ E-David was a robot that competed alongside 25 other artistic robots in the robot art competition. The Guardian 2016: 'Vincent van Bot: the robots turning their hand to art' 19 April 2016. Available at <www.theguardian.com/artanddesign/2016/apr/19/robot-art-competition-e-david-cloudpainter-bitpainter>, accessed on 9 August 2018.

⁹ Already in 1974, the US Congress established the National Commission on New Technological Uses of Copyrighted Works (CONTU). It was set the task of studying, among other topical technology issues such as issue of authorship of computer-generated works. In its final report, CONTU stated that a computer cannot be the author of works created through its use, and that the user of the program is the author. See the CONTU Report 1978. In the US, using AI as a tool was discussed in the Commission 1988 Green Paper, in which it was stated that a human being can use a computer program as a tool for creating a work of art and this should not arise any issue regarding copyrights. Commission, 'Copyright and the Challenge of Technology – Copyright Issues Requiring Immediate Action' COM (88) 172 final, 7 June 1988. (Green Paper 1988), p. 197, 5.6.25 & 5.6.26.

¹⁰ European Parliament, 'European Parliament Resolution of 16 February 2017 with Recommendations to the Commission on Civil Law Rules on Robotics' 2015/2103 (INL), p. 9.

¹¹ Pirkko-Liisa Haarmann, *Immateriaalioikeus* (Talentum, Helsinki 2014), p. 47.

¹² Anne Fitzgerald & Tim Seidenspinner, 'Copyright and Consumer-Generated Materials – Is It Time to Reboot the Discussion About Authorship?' (2013) 3 Victoria University Law and Justice Journal, 47-64, p. 51.

purposes. The company provides AI-generated music for its clients for various purposes, such as background music in videos or business events.¹³ Moreover, an auction house Christie's is preparing to auction off its first AI-generated artwork that has been generated by an AI system relying on artificial neural network technology. The painting is expected to go for a figure between 8.000 and 11.500 dollars.¹⁴

Another well-known example of AI-generation is the Project Next Rembrandt. In April 2016, the Project Next Rembrandt unveiled a painting created by an AI algorithm that mimics the subject matter and style of the famous Dutch artist almost indistinguishably. In the project, the AI algorithm was trained on 346 Rembrandt's paintings, after which it was asked to generate a new painting that should look like "Caucasian male, with facial hair, between 20-40 years old, wearing dark clothing with a collar, wearing a hat and facing to the right". The machine selected common features in the data set and generated a "typical" Rembrandt portrait than was novel and unique.¹⁵

What is new is that human input is missing in the creation process of these new type of AI-generated art works. Hence, AI-generated works impose challenges for copyright law, as copyright law has traditionally protected only the works created by human beings. Currently, the EU copyright regulation says nothing about the protection of AI-generated works, where human author in the creation process cannot be established. Hence, when AI systems generate work of art independently, the question of whether these type of new art works are protected under the EU copyright arises.

Copyright is a type of IP right that grants the creator of original work exclusive rights to determine whether, and under what conditions, the work may be used by others. The creator can use the work for commercial purposes, such as to sell, distribute or license rights to the work.¹⁶ Thus, one might think why the copyright protection of AI-generated works is even worth to discuss as after all, the intuition suggests that AI systems do not need copyright protection, as they are only machines, with no feelings or

¹³ Jukedeck.com/about. Available at <www.jukedeck.com/about>, accessed on 5 October 2018.

¹⁴ The algorithm was fed with a data set of 15 000 portraits painted between the 14th century to the 20th, after which the algorithm made a new image based on the set. See <www.christies.com/features/a-collaboration-between-two-artists-one-human-one-a-machine>, accessed on 3 October 2018.

¹⁵ The Project Next Rembrandt. Available at <www.nextrembrandt.com/>, accessed on 10 July 2018.

¹⁶ Justine Pila & Paul Torremans, *European Intellectual Property Law* (Oxford University Press, 2016) p. 243.

need for monetary reward. However, this thesis will argue against this intuitive assumption and claim that an adequate protection regime should be established for the AI-generated works similarly than for the works generated by humans. Even though AI systems do not need protection, there are humans behind the machines that need to be incentivized.

The EU aims to be the most advanced society what is comes to AI in the future. The announcement of the European Commission published on 25 April 2018 regarding the series of measures to put AI to use in the EU and boost its competitiveness states:

“Just as the steam engine and electricity did in the past, AI is transforming our world. It presents new challenges that Europe should meet together in order for AI to succeed and work for everyone. We need to invest at least €20 billion by the end of 2020. The Commission is playing its part: today, we are giving a boost to researchers so that they can develop the next generation of AI technologies and applications, and to companies, so that they can embrace and incorporate them.”¹⁷

In order to EU reach its goal, the legislative environment regarding the AI-generation needs to be clarified. Unclear legislative environment has negative impact on investments and hence, the development of the society.

This need to clarify legal implications of advancements in AI have been already addressed in the level of EU. In January 2017, the Committee on Legal Affairs of European Parliament published a report with Recommendation to the Commission on Civil Law Rules on Robotics, stating:

“Robotics and AI have become one of the most prominent technological trends of our century. The fast increase of their use and development brings new and difficult challenges to our society. The road from the industrial sector to the civil society environment obliges a different approach on these technologies, as

¹⁷ Commission, ‘Artificial Intelligence: Commission outlines a European approach to boost investment and set ethical guidelines’. Press release, Brussels, 25 April 2018. Available at <http://europa.eu/rapid/press-release_IP-18-3362_en.htm>, accessed on 20 September 2018.

robots and AI would increase their interaction with humans in very diverse fields.”¹⁸

Copyright protection of AI-generated works forms one of these new and difficult challenges that needs to be solved. Today, both individual artists¹⁹ and technology companies²⁰ are using AI systems in the creation of various type of art works. Copyright protection is crucial for the development of art and dissemination of artistic works in the society – the same principle apply in the AI-generated works.

Today, more and more valuable art works are generated by AI systems and the market is eager to move these type of art works. If the copyright legislation remains unclear in respect of the AI-generated works, the artists have no incentive to generate work of art by using advanced AI systems and consequently have the companies incentive to invest in AI technology and generation of these new valuable AI systems. This in turn will have a negative impact on the creation and dissemination of valuable art works in the EU. Hence, in order to the EU maintain its competitiveness in the global market, the copyright legislation regarding AI-generated works needs to be clarified.²¹ The central objective of this thesis is to establish that the protection regime for AI-generated works is needed as well as propose a new model to be used in order to protect the works generated by AI.

¹⁸ European Parliament Resolution of 16 February 2017 with Recommendations to the Commission on Civil Law Rules on Robotics. 2015/2103 (INL), p. 27.

¹⁹ For example, Munich-based Mario Klingemann uses trained AI algorithm for production of paintings that are melting, many eyed grotesques that are often compared to the works of Francis Bacon. Gaskin, Sam, ‘When Art Created by Artificial Intelligence Sells, Who Gets Paid?’, 17 September 2018. Available at <www.artsy.net/article/artsy-editorial-art-created-artificial-intelligence-sells-paid>, accessed on 27 September 2018.

²⁰ Especially large multinationals, such as Facebook, Apple and IBM have recently invested heavily on AI technology.

²¹ This issue regarding the lack of protection of AI-generated works has already been recognized at the EU level. In the resolution of 16 February 2017, the Members of European Parliament calls upon the Commission to address whether and how the current IP legislation should be altered to accommodate the advancement in AI. European Parliament, ‘European Parliament Resolution of 16 February 2017 with Recommendations to the Commission on Civil Law Rules on Robotics’ 2015/2103 (INL), p. 9.

1.2 Research questions and limitations

The first main research question of this thesis is ‘are the AI-generated works eligible for protection under the current EU copyright regulation?’ Currently, the EU copyright regulation says either nothing about the protection of these type of AI-generated works, where human author cannot be established. According to the EU legislation, the copyright vests initially in the author or authors of the relevant protected work. However, EU copyright law does not define the term author and the question is whether a machine can be regarded as an author. In order to provide the answer to the first research question, it needs to be looked into the originality requirement established by the Court of Justice of the European Union (CJEU) that is the fundamental requirement for copyright protection in the EU.

It will be claimed that only human beings can be regarded as authors under the current EU copyright law and hence, the AI-generated works are not currently eligible for protection. In order to a work to be protected, sufficient human input needs to be established in the creation process. Hence, the follow-up question for the first research question is ‘what is the sufficient human input in the creation process in order to a work to be protected under current EU copyright regulation?’ In order to answer this question, the case law of the CJEU will be analysed.

Further, as the AI-generated works with no sufficient human input involved in the creation process are currently in the public domain, the second main research question of this thesis is ‘should the AI-generated works be protected?’ The theoretical justifications of copyright, the value for the protection for the society as well as practical considerations will be analysed in order to answer this question. It will be claimed that the AI-generated works, being indistinguishable from the work generated by humans, are at least as valuable for the society as the work created by humans and hence, the production of such works should be guaranteed by providing adequate copyright protection.

Further, it will be analysed for whom and how the rights in these works should be vested. Hence, the follow-up question for the second research question is ‘who should be the owner of copyrights in the AI-generated works and how should the ownership be vested?’ The following ownership allocation alternatives are discussed: The AI system,

the programmer and the user. It will be resulted that the ownership should be allocated to the user of the AI system.

Moreover, it will be looked into the legislations of other jurisprudences in order to find a feasible solution for this ownership allocation in practice. It will be suggested that in order to allocate the ownership to the user, the work-for-hire doctrine under which the authorship in the AI-generated work would be directly vested to the user of the AI system should be issued at the EU level.

AI and robotics in general include increasing number of issues in the field of IP law. This thesis is limited to the copyright regulation in the EU and does not include other fields of European IP rights. In this thesis, it is assumed that copyright regulation would serve the best framework for protection of AI-generated works and therefore, the possibilities to apply other protection regimes such as patent protection, trade secrets or licensing agreements will be not discussed. For further references, Ryan Abbott²² has discussed the patentability of AI-generated works and Sam Ricketson²³ has discussed the possibility in applying the database protection in respect of AI-generated works. Additionally, the considerations regarding potential “sui generis” protection for the AI-generated works will be not discussed in this thesis. Applicability of sui generis protection for AI-generated works has been discussed for instance by Synodinou.²⁴

The thesis will focus on the current and the near-future level of AI and will not take into consideration science fiction concepts such as an artificial super intelligence, which is even smarter than humans are in practically every field, including scientific creativity, general wisdom and social skills. Currently, this type of AI can currently be recognized only from science fiction, in robots such as “Ex Machina” and hence, it remains

²² Ryan Abbott, ‘I think, Therefore I Invent: Creative Computers and the Future of Patent Law’ (2016) 57 Boston College Law Rev, 1079-1126.

²³ Sam Ricketson, ‘Reflections on Authorship and the Meaning of a “Work” In Australian and Singapore Copyright Law’ (2012) 24 Singapore Academy of Law Journal, 820-851.

²⁴ Tatiana Eleni Synodinou, ‘AI Intelligence: Criteria for Protection’ (2018), available at <<https://europeancopyrightsocietydotorg.files.wordpress.com/2018/06/synodinou-ai-and-ownership.pdf>>, accessed on 20 October 2018.

hypothetical.²⁵ The thesis will not include the philosophical discussion about personhood of AI either.

Moreover, the infringement issue is another highly interesting and important topic related to AI-generation that would require further academic research. This issue arises as AI systems relying on machine learning and neural network technology uses large amount of data that may contain also copyrighted materials in the generation of works. However, due to the limited pages of the thesis, the infringement issue will not be analysed further but mentioned only in the sideline debate. Several scholars, such as Grimmelmann²⁶ and Sobel²⁷ have written about this topic.

1.3 Research method and sources

The method of the thesis is legal dogmatic method. The aim of the legal dogmatic method is to interpret and systematize the substance of existing law. Further, the legal dogmatic research intends to provide justifications for interpretation of the existing law.²⁸ Especially, as regard as the first main research question, namely ‘are the AI-generated works eligible for protection under the current EU copyright regulation?’, and its follow-up question, namely ‘what is the sufficient human input in the creation process in order to a work to be protected under current EU copyright regulation?’, the aim is to derive answer by interpreting the current legislation and case law.

As regard as the second main research question, namely ‘should the AI-generated works be protected?’ and its follow-up question, namely ‘who should be the owner of copyrights in the AI-generated works and how would the ownership be vested?’, de lege ferenda analysis is carried out. The de lege ferenda analysis seeks to propose legislative

²⁵ The consensus among the researcher is that AI equal to human intelligence will exist in the 2024 at the earliest. See e.g. Gonçalo Carriço, ‘The EU and Artificial Intelligence: A Human-Centered Perspective (2018) 17(1) European View, 29–36, p. 30.

²⁶ See James Grimmelmann, ‘Copyright for Literate Robots’ (2016) 101 Iowa Law Review, 658-681.

²⁷ See Benjamin Sobel, ‘Artificial Intelligence’s Fair Use Crisis’ (2017) Columbia Journal of Law and Arts, 1-50.

²⁸ Aulis Aarnio, *Luentoja lainopillisen tutkimuksen teoriasta* (Helsingin yliopiston oikeustieteellisen tiedekunnan julkaisu 2011), p. 104-105, 109.

improvements and considers how the law should be.²⁹ Hence, the second part of this thesis provides *de lege ferenda* interpretation and proposal for legislative revision with respect to the EU copyright regulation for AI-generated works. Moreover, legal history of copyright law will be looked into at some extent in order to understand the originality requirement and the human author requirement in the EU.

As the thesis primarily concerns with the EU copyright regulation, the main legal sources are EU copyright directives and the case law of the CJEU. In addition, international treaties as well as EU level official papers are used as source material. Moreover, the legal provisions and national courts' case law from other jurisprudences are examined in order to broaden the understanding on the topic as well examine how the issues under analysis have been solved in other jurisprudences. However, even though the thesis includes some comparative aspects, not full comparative analysis is carried out.

Moreover, the academic articles form an essential part of source material in this thesis. However, as there is not much academic writings related to topic available in the light EU regulation yet, the majority of academic writings analyzed in this thesis are from common law tradition. Hence, the differences in the legal traditions between common law and civil law countries needs to be carefully kept in mind. Moreover, Internet sources are used as source material at some extent. As it is a question of relatively new phenomenon, both academic and internet sources form a relatively important part of the source material. For the same reason, traditional printed literature does not play a significant role as source material of this thesis.

1.4 Structure

This thesis is divided into six chapters. The first chapter provides necessary background information in order to follow the analysis of this thesis. The core development as well as relevance of the topic are presented. Moreover, the research questions and limitations of the thesis are discussed, as well as the research methods applied and source material

²⁹ Tieteen termipankki 18.10.2018: Oikeustiede: oikeustieteellinen tutkimus. Available at < [www.tieteentermipankki.fi/wiki/Oikeustiede:oikeustieteellinen tutkimus.>](http://www.tieteentermipankki.fi/wiki/Oikeustiede:oikeustieteellinen_tutkimus.>), accessed on 17 September 2018.

used to support author's claims are presented. In the end of the first chapter, the structure of the thesis is shortly gone through in order to provide a general overview of the thesis to the reader.

The second chapter of this thesis provides the reader to introduction to the AI. First, the definitions and the history of AI are discussed. Second, the key concepts, namely the weak and soft AI are explained, as in order to follow the analysis of this thesis it is crucial to understand what type of AI is under analysis. Third, in order to provide to the reader a better understanding of the significance of the AI in our society, especially in the field of art, various practical examples in respect of what AI is capable of doing today in the field of creativity and art are provided.

The third chapter provides the overview of the current legal framework of EU copyright. First, the legislative framework of copyright within the EU is presented at the extent that is necessary in respect of the analysis of this thesis. Hence, international treaties as well as directives are presented. Second, the copyright law justifications, namely the personhood theory, reward theory and incentive theory and their significance in the EU copyright framework are discussed. Moreover, the difference between civil law and common law traditions are shortly presented as this is important in order to follow the argumentation of the thesis. Third, requirements for copyright protection in the EU are presented, as one of these requirements, namely the originality requirement is in the core of the analysis in this thesis.

The fourth chapter is the first main chapter of this thesis, in which the first research question and its follow-up question are analysed. First, this chapter aims to provide the answer to the question 'are the AI-generated works eligible for protection under the current EU copyright regulation?'. The EU case law of originality, justifications of copyright protection as well as historical consideration will be analysed in order to provide the answer for this question. Second, it will be looked into 'what is the sufficient human input in the creation process in order to a work to be protected under current EU copyright regulation?', by looking into CJEU case law.

The fifth chapter focuses on the analysis of the second main research question, namely 'should the AI-generated works be protected?' and its follow-up question 'who should be the owner of copyrights in the AI-generated works and how should the ownership be

vested?’ The question ‘should the AI-generated works be protected?’ is analysed in the light of copyright law justifications, in the light of societal benefit as well as in the light of practical considerations. As it will be found that the AI-generated works should be protected, it is discussed to whom of the following alternatives the rights should be allocated: the AI system, the programmer or the user. Moreover, it will be discussed how in practice the ownership allocation could be made. The work-for-hire doctrine is suggested as a solution in order to vest the ownership to the user. Both the positive sides and the challenges regarding the application of the doctrine are discussed.

The sixth chapter summarizes the results of the thesis and presents the conclusions drawn from the research.

2 WHAT IS AI?

2.1 A short history of AI

Yet today, there is no common definition of AI. Today’s dictionary definitions often focus on AI being a subfield of computer science that deals with the simulation of rational and human like behavior in computer based on statistical analysis. For example, the Oxford Living Dictionary gives the following definition: “the theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.”³⁰

Even though the comprehensive agreement of the definition of AI has not been obtained, Nilsson has provided a definition accepted by the most of the academic scholars:

³⁰ English Oxford Dictionaries: Definition of Artificial Intelligence. Available at <https://en.oxforddictionaries.com/definition/artificial_intelligence>, accessed on 6 July 2018.

“AI is that activity devoted to making machines intelligent, and intelligence is that quality that enables an entity to function appropriately and with foresight in its environment.”³¹

In this thesis, AI refers also to artificial intelligent agents, AI systems that incorporate said simulation.

AI is a relatively new phenomenon. Alan Turing laid down the foundation for AI research in 1950. Turing investigated whether a machine is capable of thinking and doing intelligent things, such as playing Chess.³² In the next decades, heavy investments in the research and development of AI technologies took place. However, by the 1980’s, the interest in AI technologies had significantly dropped and the funding dried as the field had not managed to achieve the practical success stories that had been promised.³³

The creation of AI programs boomed only after 1980’s, when algorithms were adopted to commercial use in the Internet search engines and online shops. In the last decades, AI research has certainly reached the success that was forecasted in the 1950’s. The rise of Internet has provided the large amount of data that is needed to train the AI systems and development more reliable hardware have made robots easier to build.³⁴

Today, AI has secured a more prominent position as a driver of innovations and economic growth in our society. Different surveys have revealed that 62 % of enterprises will apply AI by 2018 and the market of AI will grow from 8 billion dollars in 2016 to more than 47 billion dollars in 2020.³⁵ AI enables the development of commercial technologies that have a substantial impact on everyday life. Especially the major technological companies, such as IBM, Facebook, Apple and Amazon invest heavily in the research, development and commercialization of AI application. For instance, ‘Siri’, a voice-activated computer developed by Apple helps people to find

³¹ John Nils Nilsson, *The Quest for Artificial Intelligence: A History of Ideas and Achievements* (Stanford University Press 2010), p. 13

³² Alan Turing, *Computing Machinery and Intelligence* (1950) 59 (236) *Lix Mind*, New Series, 433-460. Available at <www.csee.umbc.edu/courses/471/papers/turing.pdf>, accessed on 5 September 2018.

³³ Peter Stone, ‘Artificial Intelligence and Life in 2030, One Hundred Year Study on Artificial Intelligence: Report of the 2015-2016 Study Panel’ (2016) Stanford University, p. 51.

³⁴ *Ibid.*

³⁵ Gil Press: *Top 10 Hot Artificial Intelligence (AI) Technologies*, 3 January 2017. Available at <www.forbes.com/sites/gilpress/2017/01/23/top-10-hotartificial-intelligence-ai-technologies/#568b43851928>, accessed on 7 August 2018.

information and gives directions. Moreover, ‘Alexa’, a smart home hub developed by Amazon helps people to shop, schedule appointments and set alarms whereas ‘Tesla’, a smart self-driving car can soon be a better driver than a human.

As the pace of digital advanced technology continues to accelerate and AI achieves digital tools that formerly were thought impossible, many field are beginning to feel pressure.³⁶ The importance of AI has been recognized also at the level of EU. In the resolution of 16 February 2017, the European Parliament expressed the expected impact of AI to the Commission:

“Humankind stands on the threshold of an era whenever more sophisticated robots, bots, androids and other manifestations of AI seem to be poised to unleash a new industrial revolution, which is likely to leave no stratum of society untouched.”³⁷

The foundation for AI research was laid down less than 70 years ago. The development in the field of AI technology has been very fast and it is likely that it will only accelerate. Our current law has not been issued at this technological development in mind hence, it is crucial to start focus how we want to face the emergence in the AI technology in the field of law.

2.2 Weak and strong AI

For the purposes of this thesis, it is important to make distinction between the works generated on the one hand by so-called “weak AI” and on the other hand by so-called “strong AI”. While early AI, namely “weak AI”, was merely able to create programs

³⁶ For example in auto industry, the advanced robots are replacing humans in more and more aspects of the production. Shlomit Yanisky-Ravid, ‘Generating Rembrandt: Artificial Intelligence, Copyright, And Accountability in the 3D Era – The Human-Like Authors Are Already Here – A New Model’ (2017) *Mich. St. Law Review*, 659-726, p. 725.

³⁷ European Parliament, ‘European Parliament Resolution of 16 February 2017 with Recommendations to the Commission on Civil Law Rules on Robotics’ 2015/2103 (INL), p. 1.

tailored to the narrow function required, the newly emerged “strong AI” fosters innovative thinking and logical reasoning abilities within the machine itself.³⁸

As regard as “weak AI”, the machine is programmed to act human, entailing that a programmer has direct control over the output of the system. The “weak AI” systems are not fully autonomous and therefore, not truly “intelligent” or human like.³⁹ There is no issue of copyright protection of works generated by “weak AI”, as a sufficient human involvement in the creation process can be established. The machine is not able to act truly independently, making “creative choices” by itself. For instance, Harold Cohen’s software called “Aaron” is probably one of the best-known example of the early efforts of computer generation by “weak AI” system. The user of “Aaron” is able to create visual and unique art by running the program, with no other user-input than pressing a button.⁴⁰ However, this early attempt of art generation algorithms relies heavily on the input of the programmer, who determines the desirable predetermined output of the program by programming certain code.

However, this thesis focuses on the copyright protection of works generated by “strong AI” systems. These works are referred as “AI-generated works”. “Strong AI” aims to get a machine to “think” for itself. Randomness and a sense of autonomy are built into the “strong AI” systems, causing the human connection to the output to be much more distant. The development of “strong AI” is the reason why AI has emerged as a profound influence on society’s development. The “strong AI” systems have the potentiality to be enormously useful in many areas of society and it is predicted that

³⁸ In addition to the division between the “weak AI” and “strong AI”, the following three categories of AI are often referred in the academic literature: artificial narrow intelligence, artificial general intelligence and artificial super intelligence. The artificial narrow intelligence is similar to “weak AI”; the artificial general intelligence refers to an AI that is as smart as a human and able to perform any intellectual task as we do with the capacity to understand and reason about its environment; and the artificial super intelligence refers to a machine that is smarter than a human in practically every field, including scientific creativity, general wisdom and social skills. Yanisky-Ravid (n 36), p. 675.

³⁹ Erica Palmerini, ‘Regulating Emerging Robotics Technologies in Europe: Robotics Facing Law and Ethics’ (2014) European Commission CORDIS Projects and Results Regulating Emerging Robotic Technologies in Europe: Robotics facing Law and Ethics. Available at <www.robolaw.eu/RoboLaw_files/documents/robolaw_d6.2_guidelinesregulatingrobotics_20140922.pdf>, accessed on 10 September 2018, p. 168.

⁴⁰ Samples of works created by “Aaron” and a copy of “Aaron” program may be downloaded from Kurzweil Cyberart Technologies. See <www.kurzweilcyberart.com>, accessed on 4 October 2018.

these systems will do more and more work that humans cannot or want to do in the future.⁴¹

The “strong AI” systems rely on machine learning. Machine learning is a subgroup of AI that illustrates the idea of autonomously acting computers without being programmed explicitly for each scenario.⁴² First, system relying on machine learning receives training data. After receiving the training data, the learning algorithm analyzes similarities and differences of this data based on statistical symbols. After analyzing the data, the learning algorithm is able to create a work that shares a closeness to the training data but still is novel. Hence, machine learning allows AI systems to act independently and human like, allowing them to make autonomous and “creative” decisions.⁴³

The modern machine learning relies on artificial neural network technology. The artificial neural networks attempt to mimic the structure of biological neural networks like human brain. A system relying on artificial neural network technology absorbs and distributes the information processing capacity to groups of receptors that operate like neurons. The receptors find and create connections and similarities within the processed data.⁴⁴ For example, Google Translate is an example of a system that employs artificial neural network technology in functioning. Google Translate “learns” from experience and improves its algorithm through artificial neural networks that are trained but not programmed with specific procedural algorithms.⁴⁵

In the field of art, another example of a “strong AI” system that relies on artificial neural network technology is Google’s visualization tool “Deep Dream”. “Deep Dream”

⁴¹ The use of AI in medical industry and the emergence of care robots provide an example how use of AI helps people and increase the quality of life. Currently, the expected ageing of the population over the next 50 years raises considerable concerns for EU. There are 80 million people in Europe suffering a mild to severe disability and requiring measures to tackle physical, legal and social obstacles in their daily lives. Advance in research and development in personal care robots is predicted to tackle these challenges. Palmerini (n 39), p. 168.

⁴² See Machine Learning Department, Garnegie Mellon University. Available at <www.ml.cmu.edu/>, accessed on 10 October 2018.

⁴³ Yanisky-Ravid (n 36), p. 677.

⁴⁴ Ibid, p. 675.

⁴⁵ Gideon, Lewis-Kraus: ‘The Great A.I. Awakening’ New York Times Magazine, 14 December 2016. Available at <www.nytimes.com/2016/12/14/magazine/the-great-ai-awakening.html>, accessed on 8 October 2018.

uses artificial neural networks to create unique, rare and disorganized images.⁴⁶ By adopting machine learning mathematical methods, “Deep Dream” transforms a pre-existing image, mimics human intelligence in functioning and makes decisions how to transform the input based on an algorithm. What is novel in artificial neural network system is that the algorithm choose what to enlarge in the image modification in order to make the result unpredictable and novel. As a result, new images that do not bear resemblance to the originals are produced. Most importantly, they are not the result of creative decisions by the programmers, but rather they are produced by the algorithm itself. The researcher explains:

“Instead of exactly prescribing which feature we want the network to amplify, we can let the network make that decision. In this case, we simply feed the network an arbitrary image or photo and let the network analyze the picture. We then pick a layer and ask the network to enhance whatever it detected. Each layer of the network deals with features at a different level of abstraction, so the complexity of features we generate depends on which layer we choose to enhance.”⁴⁷

The UK based company JukeDeck, an example mentioned in the introduction of this thesis, produces music by using artificial neural network technology and provides this AI-generated music pieces to its customer for various purposes, such as background music in business events and games. AI systems relying on artificial neural networks produce music by learning from examples of classical music pieces and generate a full musical composition in response without human input.⁴⁸

Moreover, AI-generated newspaper articles have become reality.⁴⁹ For example, a software “Quill” generates newspaper articles by analyzing data, identifying relevant facts and using natural language generation to assemble a narrative that is indistinguishable from a human-written one. The user of “Quill” only enter the required

⁴⁶ A collection of Deep Dream images can be found: <<http://deepdreamgenerator.com/gallery/public/best-dreams>>, accessed on 1 October 2018.

⁴⁷ Andres Guadamuz, ‘Do Androids Dream of Electric Copyright? Comparative Analysis of Originality in Artificial Intelligence Generated Works’ (2017) 2 *Intellectual property Quarterly*, 169-186, p. 172.

⁴⁸ [Jukedeck.com/about](http://jukedeck.com/about). Available at <www.jukedeck.com/about>, accessed on 5 October 2018.

⁴⁹ It has been estimated that in 15 years 90 % of news will be written by computers. Robert C Denicola, ‘Ex Machina: Copyright Protection for Computer Generated Works’ (2016) 69 *Rutgers University Law Review*, 251-288, p. 259.

subject of the article and press the button.⁵⁰ In an effort to increase the efficiency of news researching and to better personalizing access to news, researches have recently undertaken to create a great number of AI systems that have the ability to summarize the news that they gather and generate the news even faster and more efficiently.⁵¹

Additionally, the market is eager to move the visual AI-generated works, such as paintings. A London based artist Memo Akten was among the first artists to sell an AI artwork, at the price of 8.000 dollars at an auction hosted in San Francisco in 2016.⁵² Moreover, as already mentioned in the introduction of this thesis, the Christie's auction house will auction off its first AI-generated artwork on October 2018. The algorithm was fed with a data set of 15 000 portraits painted between the 14th century to the 20th, after which the algorithm made a new image based on the set. The painting is expected to go for a figure between 8.000 and 11.500 dollars.⁵³

These are just few examples of AI-generation today. "Strong AI" systems are able to produce works of art in almost every copyrightable medium. Taken into account the current technological development, it is likely that the number of AI-generated works will only increase in the future.

3 EU COPYRIGHT REGULATION

3.1 Legislative framework

Copyright law is international field of law. The most important international agreement in the field of copyright is the Berne Convention from year 1886.⁵⁴ By 2018, in total of

⁵⁰ Denicola (n 49), p. 258.

⁵¹ S.N. Cheong Balavijendran & A.K. Mustapha, 'Enhancing News Reading Experience through Personalization of News Content and Service Using Artificial Intelligence Agents' (2003) 4 ICEIS 404.

⁵² Gaskin (n 19).

⁵³ The algorithm was fed with a data set of 15 000 portraits painted between the 14th century to the 20th, after which the algorithm made a new image based on the set. Available at <www.christies.com/features/a-collaboration-between-two-artists-one-human-one-a-machine>, accessed on 25 October 2018.

⁵⁴ Kristiina Harenko & Valteri Niiranen & Pekka Tarkela. *Tekijänoikeus* (Talentum, Helsinki, 2016), p. 13.

176 states were parties to the Berne Convention.⁵⁵ The other important conventions in the field of IP law are the Rome Convention, TRIPS agreement and World Intellectual Property Organization (WIPO) Internet Treaties, namely the WIPO Copyright Treaty (WCT) and the WIPO Performance and Phonograms Treaty (WPPT).⁵⁶

Within the EU, the Copyright law is fragmented field of law: there is no common EU copyright.⁵⁷ The copyright and related right are protected under the national laws of individual Member States. However, the regulatory framework of copyright and related rights has been harmonized through 11 directives.⁵⁸ The ultimate goal of harmonization in the EU level is to ensure the free movement of copyrightable works within the internal market.⁵⁹

Many of the EU directives reflect Member States' obligations under the Berne Convention and the Rome Convention, as well as the obligations under the TRIPS Agreement and the WIPO Internet Treaties, WCT and WPPT. Therefore, even though the copyright regulation within the EU is national, as result of the harmonization, the copyright legislations of the Member States do not differ significantly from each others.⁶⁰

The most important EU directives in the analysis of this thesis are the Information Society Directive 2001/29/EC⁶¹, the Software Directive 2009/24/EC⁶², the Database

⁵⁵ WIPO Administered Treaties, Contracting Parties, Berne Convention. Available at <www.wipo.int/treaties/en/ShowResults.jsp?treaty_id=15>, accessed on 25 August 2018.

⁵⁶ Pila & Torremans (n 16), p. 247.

⁵⁷ Compare for example to the European trademark law where there is a common 'European Union trademark'. Within the EU, trademark can be registered at national level or at EU level. Harenko & Niiranen & Tarkela (n 54), p. 14.

⁵⁸ In addition to the directives, there are two EU regulations related to copyrights: the regulation on the cross-border exchange between the Union and third countries of accessible format copies of certain works and other subject matter protected by copyright and related rights for the benefit of persons who are blind, visually impaired or otherwise print-disabled; and the regulation on cross-border portability of online content services in the internal market.

⁵⁹ Commission, 'The EU Copyright Legislation', last update on 1 June 2018. Available at <<https://ec.europa.eu/digital-single-market/en/eu-copyright-legislation>>, accessed on 6 August 2018.

⁶⁰ Ibid.

⁶¹ Directive 2001/29/EC of the European Parliament and of the Council of 22 May 2001 on the harmonization of certain aspects of copyright and related rights in the information society, [2011], OJ L 167/10. ("Infosoc Directive 2001/29/EC")

⁶² Council Directive 91/250/EEC of 14 May 1991 on the legal protection of computer programs, [1991], OJ L 122/42; republished as Directive 2009/24/EC of the European Parliament and of the Council of 23 April 2009 on the legal protection of computer programs, [2009] OJ L/16. ("Software Directive 91/250/EC")

Directive 96/9/EC⁶³ and the Term Directive 2006/116/EC⁶⁴. These directives are shortly presented in the following.

The Information Society Directive 2001/29/EC (“Infosoc Directive”) is one of the most important directive in the field of copyright law in the EU. The Infosoc Directive 2001/29/EC establishes the basic obligations of Member States with respect of the copyright and related rights, building on the obligations imposed by the Berne Convention and the Rome Convention, and implementing the further requirements of the WIPO Internet treaties. It can be stated that the Infosoc Directive 2001/29/EC represents the closest thing that currently exists to a complete European copyright and related rights code.⁶⁵

The Software Directive 2009/24/EC provides protection regime for computer programs. Software is protected as ‘literary works’ under the Software Directive 91/250/EC. The objective of the Software Directive 2009/24/EC is to harmonize Member States' legislation regarding the protection of computer programs in order to create a legal environment that will afford a degree of security against unauthorized reproduction of such programs.⁶⁶ Hence, under the Software Directive 91/250/EC, the programmer of the underlying software of AI system is granted with the protection in respect of the program itself.

The Database Directive 96/9/EC harmonizes copyright law applicable to the structure and arrangement of the contents of databases (“original” databases). Moreover, it creates an exclusive “sui generis” right for database producers, valid for 15 years, to protect their investment of time, money and effort, irrespective of whether the database is in itself innovative (“non-original” databases). Hence, on the contrary of European Copyright tradition that has been traditionally regarded moral right and human centric, the Database directive 96/9/EC has been clearly drafted in commercial interests in mind.

⁶³ Directive 96/9/EC of the European Parliament and of the Council of 11 March 1996 on the legal protection of databases, [1996] OJ L 77/20. (“Database Directive 96/9/EC”)

⁶⁴ Directive 2006/116/EC of the European Parliament and of the Council of 12 December 2006 on the term of protection of copyright and certain related rights, [2006], OJ L 372/12; originally published as Council Directive 93/98/EEC of 29 October 1993 harmonizing the term of protection of copyright and certain related rights, [1993] OJ L 290/9. (“Term Directive 2006/116/EC”)

⁶⁵ Pila & Torremans (n 16), p. 247.

⁶⁶ Software Directive 91/250/EC, preamble 13.

The Term Directive 2006/116/EC harmonizes the terms of protection of copyright and related rights. The Directive establishes a total harmonization of the period of protection for each type of work and each related right in the Member States. The term of protection established by the Term Directive 2006/116/EC is 70 years after the death of the author for works and 50 years after the event setting the time running for related rights. Furthermore, it deals with other issues, such as the protection of previously unpublished works, of critical and scientific publications and of photographic works.⁶⁷

In addition, the following copyright directives exist in the EU: Directive 2014/26/EU on Management of Copyrights and Related Rights; Directive 2012/28/EU on Orphan Works; Directive 2006/115/EC on Rental and Lending Rights; Directive 93/83/EEC on Satellite and Cable; Directive 2001/84/EC on Resale Rights; Directive 87/54/EC on Protection of Semi-Conductor Topographies; and Directive 2004/48/EC on Enforcement. However, these directives are not relevant in the scope of the discussion in the thesis and hence, are not discussed further.

In addition to EU directives, the case law of CJEU plays a significant role in interpretation, harmonization and enforcement of EU law. In the last years, the CJEU has developed a substantive body of case law interpreting the provisions of the directives. This has significantly contributed to the consistent application of the copyright rules across the EU.⁶⁸ For instance the notion of ‘originality’ that is important in the analysis of this thesis, has been established through case law rather than directives.

There is no specific legislation or case law regarding AI-generated works in the EU. The EU Commission addressed the challenges posed by computer creation in the 1988 Green Paper. The Commission stated that the basis of all copyright protection is the exercise of sufficient skill and labor, and, therefore, the Commission inclined to the view that it is the user of the AI system who is entitled to the protection and the AI

⁶⁷ Commission, ‘The EU Single Market, Copyright and Neighboring Rights, EU legislation.’ Last update 5 April 2018. Available at <http://ec.europa.eu/internal_market/copyright/acquis/index_en.htm>, accessed on 9 August 2018.

⁶⁸ Commission, ‘The EU Copyright Legislation’, last update on 1 June 2018. Available at <<https://ec.europa.eu/digital-single-market/en/eu-copyright-legislation>>, accessed on 6 August 2018.

system is only as a tool.⁶⁹ This statement is however outdated and does not apply to the “strong AI” systems as such.

3.2 Purpose of copyright

Copyrights are limited-term exclusionary rights that subsist automatically in authorial works such as poems, paintings, writings and musical.⁷⁰ The roots of copyrights can be tracked already to the classical Roman period, where the idea of authorial property was recognized. According to the Roman law principle of “accession”, if a person painted a picture on another person’s canvas, he or she thereby acquired ownership of the canvas. Hence, from the earliest time an act of authorship has been recognized in the Europe as capable of supporting property rights.⁷¹

The world’s first civil and common law copyright enactment, the English Statute of Anne, was introduced in 1709. The purpose of Statute of Anne was to encourage the writing of books that would be useful to society and to prevent unauthorized copying. The Statute of Anne reflects the Lockean idea of individualized property rights and the birth of the two-fold role of copyright as both the incentive for creativity and access to free works.⁷²

Although the Statute of Anne was first meant to be primarily a booksellers’ bill and only secondarily an authors’ bill, the discourse of possessive individualism and original genius merged and as a result the idea of “romantic authorship” was emerged. Slowly the idea of “romantic authorship” became the center of the copyright system all around the Europe.⁷³ By the 1880’s, all European states had introduced legislation recognizing and protecting the rights of author.⁷⁴ Over times, various subject matters such as sound

⁶⁹ Green Paper 1988, p. 197.

⁷⁰ Pila & Torremans (n 16), p. 243.

⁷¹ The idea of authorial works as objects of both personal and property rights was apparent already in the Middle Ages, when the famous Cathach of Columba case was heard, resulting in the world’s first reported copyright judgement. Pila & Torremans (n 16), p. 9.

⁷² Ibid, p. 13.

⁷³ Christopher May & Susan Sell, *Intellectual Property Rights: A Critical History* (Lynne Rienner Publisher 2006), p. 95.

⁷⁴ Ibid, p. 14.

recordings, films, broadcasts, videos and computer programs have left the marks in the copyright law.⁷⁵

Today, the purpose of copyright protection is to ensure that the authors of the works receive recognition, payment and protection for their works. Today, the EU Copyright tradition is dualistic and includes two type of rights: economic rights and moral rights. The economic rights include the author's exclusive right to impose the work on any use that may have financial significance, such as reproduction of copies, performance to the public, preparation of derivative works, displaying the work directly to the public, and distributing copies. As any other property, these rights can be transferred to another person or entity, through sale or licensing arrangements. The moral rights include the right to claim authorship of the work and the right to object to any derogatory action in relation to the work.⁷⁶ Moral rights are not transferable but vest always to the original author of the work.⁷⁷

Historically, European countries, most of them belonging to civil law tradition, have put a lot of value for moral rights of the author. The philosophical position that authorship embodies rights of personhood can be seen from the French “droit d’auteur” degree of the 1790’s:

“The most sacred, the most legitimate, the most unassailable, and...the most personal of all properties, is the work of which is the fruit of the writer’s thoughts.”

As a comparison, the common law approach to copyright, represented for instance in the US and UK, has traditionally been more utilitarian and emphasizes the economic rights of the author.⁷⁸ The common law policies are based on a comparison of costs and

⁷⁵ Hector MacQueen & Charlotte Waelde & Laurie Graeme, *Contemporary Intellectual Property: Law and Policy* (Oxford University Press 2007), p. 34.

⁷⁶ Commission, ‘Strategy, Digital Single Market, Policies, Copyright’. Last update 17 July 2018. Available at <<https://ec.europa.eu/digital-single-market/en/copyright>>, accessed on 9 August 2018.

⁷⁷ Robert A Jacobs, ‘Work-For-Hire and the Moral Right Dilemma in the European Community: A U.S. Perspective’ (1993) 29 *Boston College International and Comparative Law Review*, 29-79, p. 49.

⁷⁸ In the US, the moral rights in copyrights are not even codified.

benefits, and the primary emphasis of copyright policies in on the advancement of public welfare.⁷⁹

However, the harmonization of international laws has created a melding of these two approaches and today, it can be said that also the EU copyright regulation relies to a greater extent on economic justifications.⁸⁰ Incentives to create, to invest in creativity, and to disseminate works for the general benefit of society has become an important justification for copyright protection also in the EU.⁸¹

3.3 Justifications for protection

Copyrights are exclusive rights: the existence of copyright in a particular work restricts the use that can be made of the work. Balancing the rights and interests of copyright authors and right holders with the rights and interests of third parties and the public has always been at the heart of IP law.⁸² One could ask why to grant copyright at all? Why we cannot release new works directly to the public domain and let everyone enjoy the fruits of intellectual creations? The justifications for IP seek to answer these questions.⁸³ There are several theories justifying the IP protection presented in the academic literature. The personhood theory, rewarding theory and incentive theory are discussed in the following as these theories are the most prominent in the light of the EU copyright regulation.⁸⁴

According to personhood theory, intellectual products are seen as manifestation of their creators' personality. This theory emphasizes the right of individuals to protection of their personhood and personal autonomy. Through the process of creation, a person

⁷⁹ B Zorina Khan, 'An Economic History of Copyright in Europe and the United States' (2008) EH.Net Encyclopedia, edited by Robert Whaples.

⁸⁰ For example recently issued EU directives, namely the Database Directive 96/9/EC and the Software Directive 91/250/EC rely on heavily on economical argumentation.

⁸¹ Jane Ginsburg, 'People Not Machines: Authorship and What It Means in Berne Convention' (2018) 49 IIC, 131-135, p. 134.

⁸² Pila & Torremans (n 16), p. 244. This rationale is stated for instance in the preamble to the WIPO Copyright Treaty 1996 and in the preamble 14 of the Infosoc Directive 2001/29/EC.

⁸³ Lionel Bently & Brad Sherman, *Intellectual Property Law*. (2nd edition, Oxford University Press 2004), p. 33.

⁸⁴ There are also other theories of IP that explain the European system such as theory of unjust enrichment/unfair competition and theory of pluralism. See more Pila & Torremans (n 16), p. 90-93 & 97-98.

comes to occupy the product that he or she creates as an extension of himself. This theory of IP has particular value for EU copyright law, and it is reflected in author's moral right regime. For example, within the EU law, copyright is granted automatically, with no need for application or registration, in and only in authorial works, defined as works that express an author's own intellectual creation and bear the personal mark.⁸⁵

According to the reward theory, the property rights are granted because the creators of intellectual products deserve them. According to this theory, the copyright is considered as legal articulation of thankfulness to the author for doing something more for the whole society than needed.⁸⁶ It is regarded that those who invest resources, such as energy, money and time for creating intellectual products have certain financial or personal need to be rewarded on their investment. Reward theory regards that this need accordingly fulfilled by the recognition of property rights in respect of the products created.

The reward theory finds backing in the notions of self-ownership stated by John Locke. According to Locke's theory, individuals have natural rights of ownership in respect of their bodies. This right in turn reaches through to the products they create in existence of their labour. Based on this theory, when a person takes some materials that is available in the pool of commonly owned resource, such as an idea, and mixes it with his or her labour to make a product, the person receives a natural right as regard as that product.⁸⁷

The reward theory finds also direct expression in EU Copyright regulation. According to the recital 10 of the Infosoc Directive 2001/29/EC:

“If authors or performs are to continue their creative and artistic work, they have to receive an appropriate reward for the use of their work, as much producers in order to be able to finance this work. The investment required to produce products such as phonograms, films or multimedia products, and services such as on demand services, is considerable. Adequate legal protection of intellectual

⁸⁵ Pila & Torremans (n 16), p. 87.

⁸⁶ Bently & Sherman (n 83), p. 33.

⁸⁷ Pila & Torremans (n 16), p. 88.

property rights is necessary in order to guarantee the availability of such a reward and provide the opportunity for satisfactory returns on this investment.”

The incentive theory represents the utilitarian approach for IP. Incentive theory proposes that the production and public dissemination of cultural objects such as books, music and art is an important and valuable activity for the society and this in such is the reasonable justification for the protection.⁸⁸ The argument commonly made is that the grant of proprietary rights in respect of authorial works incentivizes investments in the creations and dissemination of those works.⁸⁹ Thus, the incentive theory is based on the idea of what is good for the society as whole: the copyright is regarded benefitting the larger society and economy.⁹⁰ In EU Copyright regulation, this argument finds direct expression in the recital 4 of the Infosoc Directive 2001/29/EC:

“A harmonized legal framework on copyright and related rights, through increased legal certainty and whole providing for a high level of protection of intellectual property, will foster substantial in creativity and innovation, including network infrastructure, and lean in turn to growth and increased competitiveness of European industry, both in the area of content provisions and information technology and more generally across a wide range of industrial and cultural sectors. This will safeguard employment and encourage new jobs creations.”

Incentive theory proposes that without copyright protection, the production and dissemination of cultural objects would not take place at an optimal level. The production of the artistic works is often very costly and once they are published, they are ready to be copied. Consequently, without any protection, the competitors could easily reproduce the works without recouping the expense of its initial production.⁹¹

To conclude, the personhood theory, reward theory and incentive theory together form the underlying rationale in the today’s EU copyright framework. However, as previously explained, the European states have traditionally justified copyright

⁸⁸ Bently & Sherman (n 83), p. 35.

⁸⁹ Pila & Torresman (n 16), p. 94.

⁹⁰ Bently & Sherman (n 83), p. 35.

⁹¹ Ibid.

protection on the basis of justifications that have a strong link to the moral rights, namely the personhood and reward theory, and only in the recent years the importance of the incentive arguments has emerged.⁹²

3.4 Requirements for protection

In order to qualify for copyright protection under the EU copyright regulation, the work has to fulfil certain requirements. First, the work in question has to fall within a specific copyright-protected subject matter. The Berne Convention implies that in order to a work to be protected, it needs to be a production in the literary, scientific or artistic domain.⁹³ Further, in order to qualify for protection, the work needs to be presented in fixed form: ideas, inventions and knowledge cannot be protected by copyrights.⁹⁴ The work can be protected in its various forms meaning that for example, a written work may be presented both in oral and written form, obtaining protection in both forms.⁹⁵

The definition of copyright-protected subject matter has been traditionally interpreted broadly.⁹⁶ As can be seen from the examples presented in the chapter 2.2., the AI systems are capable of producing various type of artistic works such as paintings, books and music that arguable fulfil the requirement of the copyright-protected subject matter. Moreover, dealing specifically with the computer-generated works, clarification can be found in the CJEU case *BSA*⁹⁷. In the *BSA*, the CJEU was asked to determine if a computer graphical interface was a work in accordance to the definition set out in the EU copyright law. The court stated that “a graphical user interface can, as a work, be protected by copyright if it is the author’s own intellectual creation.”⁹⁸ Thus, as the requirement of the copyright-protected subject matter is not likely to prevent AI-generated works from copyright protection, this requirement is not analyzed further.

⁹² Ginsburg (n 81), p. 135.

⁹³ Art 2 of the Berne Convention.

⁹⁴ Art 9(2) of the TRIPS Agreement.

⁹⁵ Haarmann (n 11), p. 51.

⁹⁶ Pila & Torremans (n 16), p. 271.

⁹⁷ Case C-393/09 *Bezpečnostní softwarová asociace – Svaz softwarové ochrany (BSA) v Ministry of Culture of the Czech Republic* [2010] ECR I-13971. (*BSA*)

⁹⁸ *BSA* (98), p. 46.

Second, in order to a work being subject to copyright protection, the requirement of originality needs to be met. The requirement of originality is a very strong prerequisite for the protection. However, no copyright directive exists that uniformly defines the requirement of originality for all type of copyright-protected subject matters. The requirement of originality is referred only in three copyright directives: the Art 1(3) of the Software Directive 91/250/EC, the Art 3(1) of the Database Directive 96/9/EC and the Art 6 of the Term Directive 2006/116/EC. All three directives constitute that in order to a work being eligible for protection, the work must be the “author’s own intellectual creation”.⁹⁹

Legislature being limited, the threshold of originality has been established through the case law of the CJEU. The threshold of originality was first time established in the landmark case *Infopaq*¹⁰⁰. *Infopaq* achieved a full harmonization of the originality in the EU level and today, the originality has the same meaning no matter what is the subject matter of the protection. The CJEU decisions in *BSA*, *Murphy*¹⁰¹, *Painer*¹⁰² and *Football Dataco*¹⁰³ have further clarified and enriched the EU meaning of originality.

In *Infopaq*, it was concerned whether Infopaq, a company that by means of data capture process drew up summaries of articles from Danish newspapers and sent them by e-mail to its customers, was obliged to obtain consent from the right holders of the articles before reproduction them in part. It was stated by the CJEU that in order to a work being protected, the work shall be original in the sense that it is the “author’s own intellectual creation”.¹⁰⁴ Moreover, the CJEU interestingly gave significant importance to the intellectual act of selection and arrangement of text snippets when evaluating the originality of the work. The CJEU held in *Infopaq*:

⁹⁹ Based on the similarities in wording in the three directives, it can be interpreted that EU legislator meant for originality to have a common interpretation for these categories of works.

¹⁰⁰ Case C-5/08 *Infopaq International A/S v Danske Dagblades Forening* [2009] ECR I-6569. (*Infopaq*)

¹⁰¹ Joined Cases C-403/08 and C-429/08 *Football Association Premier League v. QC Leisure and Karen Murphy v. Media Production Services Ltd*, [2011] ECR I-9083, ECLI:EU:C:2011:631. (*Murphy*)

¹⁰² Case 145/10 *Eva-Maria Painer v. Standard VerlagsGmbH and others*, [2011] ECLI:EU:C:2011:798. (*Painer*)

¹⁰³ Case 604/10 *Football Dataco Ltd et al v. Yahoo! UK Ltd et al.*, [2012] ECLI:EU:C:2012:115. (*Football Dataco*)

¹⁰⁴ *Infopaq* (n 100), paragraph 8.

“Regarding the elements of such works covered by the protection, it should be observed that they consist of words which, considered in isolation, are not as such intellectual creation of the author who employs them. It is only through the choice, sequence and combination of those words that the author may express his creativity in an original manner and achieve a result which is an intellectual creation.”¹⁰⁵

In the *Infopaq*, it was therefore regarded that the originators of the newspaper articles had exercised a chain of creative choices that made the text original in essence that they were the “author’s own intellectual creation”.

In the already mentioned case *BSA*, the CJEU faced a question of whether a graphic user interface can be protected by copyright as an expression of the software itself. The CJEU ruled that the Software Directive 91/250/EC grants protection to certain parts of software but not the graphical user interface. However, the CJEU further stated that graphical user interface can be protected in its own right if it is an original work, namely the “author’s own intellectual creation”.¹⁰⁶ In *BSA*, “the specific arrangement or configuration of all the components which form part of the graphic user interface” were named as possibly original, but not those parts that are determined by their technical function only.¹⁰⁷ Hence, the CJEU concluded that merely following the requirement of technical function, an author cannot achieve “intellectual creation”, since his creativity is not possible to be expressed in an original manner.¹⁰⁸

In *Murphy*, the CJEU considered whether copyright could be claimed in sport event, namely a football game. It was stated negatively that football games and other sport events are so constrained by the rules that their rule-based nature leave “no creative freedom to the author” and hence, are not eligible for copyright protection.¹⁰⁹ Further, the CJEU stated that a creation is to be considered as an intellectual, and hence original, if it is the result of the “author’s creative freedom”. By adopting such definition of

¹⁰⁵ *Infopaq* (n 100), paragraph 45.

¹⁰⁶ *BSA* (n 98), paragraph 46.

¹⁰⁷ *Ibid*, paragraphs 48-49.

¹⁰⁸ *Ibid*, paragraph 50.

¹⁰⁹ *Murphy* (n 101), paragraph 98.

originality, the court thus added something to the concept of originality established in *Infopaq*.¹¹⁰

In *Painer*, it was evaluated whether a photo-fit based on a photograph can be published without the right holder's consent. The CJEU sought clarification whether the requirement of originality for photos in Art 6 of the Term Directive 2006/116/EC includes portraits. The CJEU again held that a work, namely a photograph, is eligible for protection if it is the "author's own intellectual creation". Moreover, the CJEU ruled that the work is the "author's own intellectual creation" if the author was able to "express his creative abilities in the production of the work by making free and creative choices". The CJEU stated that the author can make free and creative choices in several ways and at various points in the production. By making these creative choices, such as choosing the background, pose and the lightning, "the author of a portrait photograph can stamp the work created with his "personal touch"". ¹¹¹

In *Football Dataco*, the originality requirement was further clarified by offering a throughout explanation of the meaning of originality within the Database Directive 96/9/EC.¹¹² In *Football Dataco*, the CJEU dealt with a question of originality of fixture list of matches to be played in the English and Scottish football leagues in a year. In this case, the CJEU held that "the criterion of originality is satisfied when, through the selection or arrangement of the data which it contains, the author expresses his creative ability in an original manner by making free and creative choices...and thus stamps his "personal touch"". The CJEU clarified further that "by contract, that criterion is not satisfied when the setting up of the database is dictated by technical considerations, rules or constraints which leave no room for creative freedom."¹¹³

Based on the case law established by the CJEU, it can be concluded that a work can be protected if such work is original in essence that it is the "author's own intellectual creation". Moreover, the work can be considered as the "author's own intellectual creation" if the author makes "free and creative choices", expresses a "personal touch"

¹¹⁰ Eleanora Rosati, 'Judge-Made EU Copyright Harmonisation. The Case of Originality' (2012) European University Institute, p. 143.

¹¹¹ *Painer* (n 102), paragraphs 88-91.

¹¹² Rosati (n 110), p. 168.

¹¹³ *Football Dataco* (n 104), paragraphs 38-40.

while the process leaves the room for “creative freedom”.¹¹⁴ In the following chapter, it will be evaluated whether the AI-generated works meet the originality requirement and hence, are eligible for protection.

4 ARE AI-GENERATED WORKS PROTECTED UNDER CURRENT EU COPYRIGHT LAW?

4.1 Copyright protection of AI-generated works

Whereas AI has been used as a tool for creation of art works by human authors for a long time, AI technology is constantly moving further into the realm of AI-generated works, where AI is not only assisting in creation process but generating works relatively autonomously. As it can be seen from the examples presented in the chapter 2.2., AI produces music, writes news stories and generates paintings by relying on artificial neural networks that have “taught themselves” to combine rules of literary, musical or artistic assembly after being “trained” on a database of pre-existing works. Examples such as photos generated by Google's visualization tool "Deep Dream", music generated by the company “JukeDeck” and the AI-generated painting sold in the Christie’s auction house present all new challenges for EU copyright law.

In this type of AI creation, the role of the user of the AI system is reduced to relatively minor acts, such as merely causing the output to be generated by pressing the button of the AI system, training the algorithm or providing the input data to the AI system. All these type of acts can be regarded assisting in the nature whereas the AI system is independently responsible for the actual creation of the work. In the case of AI-generation, the creative choices made by the AI system are akin to random or unpredictable from a human perspective, as they depend on the system and not on the humans behind it.¹¹⁵ In the absence of any human intervention relating to the

¹¹⁴ Rosati (n 110), p. 187.

¹¹⁵ Massimo Maggiore, ‘Artificial Intelligence, Computer-Generated Works, and Dispersed Authorship: Spectres that are Haunting Copyright’ (2017) *Maschietto Maggiore Besseghini*, 18 September 2017. Available at <www.mmlex.it/en/artificial-intelligence-computer-generated-works-and-dispersed-authorship-spectres-that-are-haunting-copyright/>, accessed on 22 September 2018, p. 2.

creativity of the output, the question is whether the output independently generated by the AI qualifies for copyright protection as an original work.

As the copyright-protected subject matter is similar to a work generated by a human, it could be argued that it should have the same status as a work created by a human regardless of the method of production. This argumentation can be supported by the principle of non-discrimination in EU copyright law. The principle of non-discrimination refers to the right of an author to raise a claim when treated in a less favorable way than other authors in the same position.¹¹⁶ Based on this principle of copyright law, it could be claimed that it needs to be applied also to the copyright-protected subject matter. Hence, based on this argumentation, an AI-generated work that is indistinguishable from a work made by a human should receive protection if the work would have been protected if a human created it. However, this analogue does not yet find any support in jurisprudence or other legal sources, and therefore cannot be given any weight in the analysis of current law.¹¹⁷

In order to establish whether an AI-generated work can be protected under the current law, one must look into the originality requirement that is a fundamental requirement for copyright protection within the EU. Further, even though the original work may claim copyright protection, the originality cannot be understood without the reference to the author. The copyright vests initially in the author or authors of the relevant protected work. This is consistent with the provision of Art 3(1) of Berne Convention, according to which:

“The countries of the Union, being equally animated by the desire to protect, as affective and uniform a manner as possible, the rights of authors in their literary and artistic works.”

Moreover, the Art 2 of the Infosoc Directive 2001/29/EC introduces the notion of an author for which all Member States must provide exclusive rights to authorize or prohibit direct or indirect, temporary or permanent, reproduction by any means and in

¹¹⁶ Irini Stamatoudi & Paul Torremans, *EU Copyright Law: A Commentary* (Elgar Commentaries 2014), p. 23.

¹¹⁷ University of Bergen. EU Copyright Protection of Works Generated by Artificial Intelligence Systems. Faculty of Law, 1 June 2017, p. 21.

any work, in whole or in part. However, neither EU nor international instruments contain a general definition of the “author”.¹¹⁸ It has not been explicitly determined that the author needs to be a human being and hence, the interesting question whether an AI system can claim authorship for a work arises.

In the absence of definition of the “author”, when analyzing the legal status of AI-generated works under current law, the originality requirement is in the core of the analyze.¹¹⁹ Can an AI-generated work be an original work of authorship meant in the CJEU case law? From the case law of originality, it can be seen that the notion of the “author’s own intellectual creation” is determined based on the process leading up to the work of art rather than the characteristics of the final output. Namely, it needs to be evaluated whether the process is a creative as such and whether the author expresses his or her creativity in an original manner. It can be seen that original has nothing to do with uniqueness or quality, but originality in the EU copyright law means creativity expressed through intellectual process of free creative choices meaning that these choices cannot be constricted by technical requirement or rules.¹²⁰ Hence, the main assumption about the creativity of the author is clear – there has to be an unrestricted space where intellectual choices and decisions can be made by the author.¹²¹

As AI technology is getting more and more advantageous, there are people claiming that AI systems can be truly creative. This type of argumentation is based on the assumption that AI systems are able to do unexpected things and deviate from rules if their code incorporates elements of randomness, such as is the case of AI relying on artificial neural network technology. These scholars define creativity simply as a set of traits or behavior and hence argue that creative acts can be carried out by machines.¹²² For instance, Professor Yanisky-Ravid states that AI systems can autonomously generate creative works, glorifying that “AI systems are creative, unpredictable, independent,

¹¹⁸ Pila & Torresman (n 16), p. 293.

¹¹⁹ Guadamuz (n 47), p. 176.

¹²⁰ See e.g. BSA (98) and Murphy (n 101).

¹²¹ As it was indicated by the CJEU in Painer (n 102), the actual choices exercises by the creator and the final output are not that relevant since there was significant creative freedom the author could have exploited. Aurelija Lukoševičienė, ‘On Author, Copyright and Originality: Does the Unified EU Originality Standard Correspond to the Digital Reality in Wikipedia’ (2017) 11 Masaryk University Journal of Law and Technology, 215-242, p. 221.

¹²² Annemarie Bridy, ‘The Evolution of Authorship: Work Made by Code’ (2016) 39 Columbia Journal of Law and Arts, 395-401, p. 398.

autonomous, rational, evolving, capable of data collection, communicative, efficient, accurate, and have free choice among alternatives.”¹²³

However, the CJEU has consistently formulated the threshold requirement for authorship in terms of mind and intellect. Mind and intellect is something that only human beings have. It can be seen from the CJEU case law of originality that in order to a work being creative, and hence original, one must be able to establish the existence of a consciousness of the production of it.¹²⁴ Thus, simply by making AI systems to do things that we associate with creativity cannot be regarded to be enough. The machine still cannot be regarded consciousness and hence, truly creative. For instance, Carriço has stated, the creativity encompasses intentions, emotions, aesthetic judgements, values, personal consciousness and moral sense—things that an algorithm, the basis of an AI system, cannot master.¹²⁵

Even though the AI relying on machine learning and neural network technology is able to generate unpredictable output, its functioning is still tied to the predetermined materials and the human actor behind the machine. AI systems do not after all make conscious choices by themselves, but they do what human beings have planned them to do. No matter how sophisticated the AI systems would be, without humans behind the machines they would not generate anything. For instance, engineer Charles Babbage has argued that “computers do not originate anything, they just follow orders”.¹²⁶ Hence, the room for actual creative freedom is limited. This strongly suggests that AI-generated works are not eligible for copyright protection in the EU.

Further, in *Football Dataco*, the CJEU introduced something that refers to the relationship of the author with the final work, namely the “personal touch” requirement.¹²⁷ Hence, from the CJEU case law, the requirement of originality needs to be understood meaning that an original work must reflect the author’s personality, which clearly means that a human author is necessary for a copyright work to exist. As

¹²³ Yanisky-Ravid (n 36), p. 659.

¹²⁴ Annemarie Bridy, ‘Coding Creativity: Copyright and the Artificial Intelligent Author’ (2012) 5 *Stanford Technology Law Review*, 1-28, p. 9.

¹²⁵ Carriço (n 25), p. 34.

¹²⁶ Babbage, Computer History Museum, “The Babbage Engine”. Available at <www.computerhistory.org/babbage/engines/ [<https://perma.cc/GC7G-9SU9>]>, accessed on 5 October 2018.

¹²⁷ *Football Dataco* (n 104), paragraphs 38-40.

the AI system has no personhood, it cannot be regarded leaving a “personal touch” to a work or any other way expressing his or her personality. This further supports the claim that an AI system cannot be regarded as author and hence, AI-generated works are not protectable under the current EU law.

This conclusion is in line with the EU copyright framework in general. Even though not explicitly stated in the legislation or case law, the human author is nevertheless a strong assumption driven historical considerations. Historically, the need for authors being humans is a longstanding assumption in copyright laws of the Member States. In the European tradition, the originality requirement has traditionally regarded to refer to the personal, individual input of the author. The idea of authorship has been connected with a strong belief that creative work is “the work of the mind”, an expression of author’s personality, belonging to creator.¹²⁸ Due to the strong emphasis of “romantic author” figure in the European tradition, the rights have been allocated only to humans.

Moreover, even though the Berne Convention does not explicitly define the term “authorship”, by looking at the text of the Berne Convention, a strong argument for the requirement that an author needs to be a natural person can be made.¹²⁹ First, the proposition is supported by the fact that there is a minimal requirement for the protection of moral rights, and according moral rights to an AI system does not make sense.¹³⁰ Moreover, the Art 7(1) of the Berne Convention¹³¹ determines the term of copyright protection on the basis of the death of the author:

“The term of protection granted by this Convention shall be the life of the author and fifty years after his death.”

¹²⁸ Rosati (n 110), p. 73.

¹²⁹ Professor Ricketson acknowledged that the Berne Convention did not define authorship, but contended “there was nonetheless a basic agreement between the contracting states as to the meaning of the term, and, because of this, it was thought unnecessary to define it. It seems only logical to interpret ‘authors’ and ‘authorship’ for the purposes of the Convention as pertaining to the persons who created such works”. Moreover, surveying the Berne Convention text, Ricketson found that the “leitmotiv” of human authorship undergirded most of the Articles of the Convention. See Sam Ricketson, ‘People or Machine: The Berne Convention and the Changing Concept of Authorship’ (1991) 16 Colum. VLA Journal of Law and Arts, 1-25.

¹³⁰ Art 6bis of the Berne Convention.

¹³¹ Similarly, a reference to the “death of the author” can be found from the Art 1 of the Term Directive 2006/116/EC: “The rights of an author of a literary or artistic work within the meaning of Article 2 of the Berne Convention shall run for the life of the author and for 70 years after his death...”

The reference made to the “death of the author” clearly refers to the lawmaker’s purpose to determine the author as a human being. As an AI is not something capable of dying, it cannot be considered as the author of a work either.¹³²

In addition, the underlying rationale for EU copyright protection suggest that AI would not be capable for being an author and vesting copyrights. The personhood theory emphasizes the rights of individuals to protect their personhood and is based upon the idea that intellectual products can be said to owe their existence to one or more individual creators.¹³³ As AI has not personhood, the personhood theory is not applicable justification for protection. Moreover, the copyright protection is justified by reward theory, according to which it is important to secure reward for the author of the work. This rationale does not apply in respect of AI as an AI system is not something conscious that would copyrights or even understand if copyrights would be granted to it. Incentive theory is applicable justification to regard an AI system as an author either. Unlike humans, AI systems do not need incentives to create artworks.¹³⁴

No witnesses can be found from the other jurisdictions either that authorship would be awarded to AI systems, or someone else than humans. In the US case *Naruto v. Slater*¹³⁵, it was ruled that a photograph taken by a monkey cannot be awarded copyright protection as only a human being can be granted copyrights under the current US copyright regime.¹³⁶ Even though it was a question of animal authorship and not specifically the machine authorship, it can be resulted in that the US court holds the idea that copyright authorship can be awarded only a legal person. Therefore, by analogy, it can be inferred how the court would resolve the question of machine authorship – it

¹³² Ralph D Clifford, ‘Intellectual Property in the Era of the Creative Computer Program: Will the True Creator Please Stand Up’ (1996) 71 Tul. Law Review, p. 1683.

¹³³ Pila & Torremans (n 16), p. 81.

¹³⁴ Pamela Samuelson, ‘Allocating Ownership Rights in Computer Generated Works’ (1985) 47 U. Pitt. L. Rev., 1185-1228, p. 1199. See also Butler (n 2), p. 741-742.

¹³⁵ *Naruto v. David John Slater et al.*, [2016] No. 3:2015cv04324 – Document 45 (N.D. Cal. 2016), US Court of Appeals Ninth Circuit. (*Naruto*). The case has been widely recognized also in the media. See e.g. Abby, Phillip, ‘If a monkey takes a selfie in the forest, who owns the copyright? No one, says Wikimedia.’ *The Washington Post*, 6 August 2014. Available at <www.washingtonpost.com/gdpr-consent/?destination=%2fnews%2fthe-intersect%2fwp%2f2014%2f08%2f06%2fif-a-monkey-takes-a-selfie-in-the-forest-who-owns-the-copyright-no-one-sayswikimedia%2f%3f&utm_term=.225f376fa308>, accessed on 15 August 2018.

¹³⁶ Burstyn (n 201), p. 281.

would not be likely to be accepted.¹³⁷ The similar case has not been tried in the CJEU, but analogue how the courts would interpret the question in the future can be found from the case law of other jurisdictions especially taken into account the significance of US tradition in the field of copyright law.¹³⁸

Although there is a large number of academic writings regarding the copyright protection of AI-generated works under the US copyright act, there is not much academic writing on copyright to AI-generated works under the EU copyright law yet. However, Handig has claimed that the expression “author’s own intellectual creation” formulates that a human author is necessary in order to a work being protected under copyright.¹³⁹ In addition, Rosati discusses about copyright protection of AI-generated computer programs in the EU and states that the human intellectual effort needs to be performed in the generation of the computer program in order to protect the program under copyright.¹⁴⁰

Based on the CJEU case law, historical considerations, theoretical justifications, case law from other jurisdictions as well as academic writings regarding the topic, it can be concluded that the copyright cannot be claimed to the AI-generated works under current EU legislation if the human author cannot be established. The lack of human input in the creation process of AI-generated works suggests that the works cannot be protected currently. Even though the work itself would be considered exceptionally artistic, it is the creation process rather than output that is under the consideration.

¹³⁷ Actually, in response to *Naruto v. Slater*, the US Copyright Office updated the section on the “human authorship” requirement in the Third Edition of its Compendium, stating that “to qualify as a work of ‘authorship’ a work must be created by a human being” and “works that do not satisfy this requirement are not copyrightable.” US Copyright Office, ‘The Compendium II of Copyright Practices’, 1998, supra note 6, Art 313.2.

¹³⁸ Moreover, the issue of copyright protection for computer-generated materials has arisen in recent cases in Australia. See cases *IceTV Pty Ltd v. Nine Network Australia Pty Ltd* [2009], 239 CLR 458. (“IceTV”), *Telstra Corporation Limited v. Phone Directories Company Pty Ltd* [2010], 194 FCR 142. (“Phone Directories”) and *Acohs Pty v. Ucorp Pty Ltd* [2010] 86 IPR 492, affd [2012] 201 FCR 173 (Acohs). All the cases seriously diminished copyright protection in computer-generated materials. See Jani McCutcheon, ‘Curing the Authorless Void: Protecting Computer-Generated Works Following IceTV and Phone Directories’ (2013) Vol 37:46 *Melbourne University Law Review*, 46-102.

¹³⁹ Christian Handig, ‘The Copyright Term “Work”: European harmonization at an Unknown Level’ (2009) 40 *International Review of Industrial Property and Copyright Law*, 665-685, p. 665.

¹⁴⁰ Rosati (n 110), p. 70.

4.2 What is sufficient human input?

As stated previously in this thesis, the EU copyright law being technology neutral, the use of AI as a tool does not impose challenges in respect of copyright protection. Hence, if a human uses AI as a tool for creating a work, the human user can claim protection for the work. On the other hand, it has been concluded that if an AI system generates a work independently, with no human input, the work is not eligible for the protection under the current copyright law. This is the case of modern AI tools, such as Google's "Deep Dream", where the algorithm relies on machine learning and neural network technology in the production of art works.

However, even though the AI system carries out the actual production process independently, there are still human beings behind the machine and giving some input to the production process, at least indirectly. For instance, humans can select the input materials provided to the AI system, take decisions regarding the commercialization of the works or write the underlying algorithm. Following in this thesis, it will be analyzed what would be sufficient human input in order to claim protection under the current EU copyright regime.

First, it can be seen from the case law of CJEU that the threshold of originality has been set relatively low. It can be formulated from the CJEU jurisprudence that in order to reach the required level of originality it suffices that an author makes some free and creative choices and therewith put his or her personal stamp in the work.¹⁴¹ Hence, even if an AI system plays an important role in the creation process, the minimal human contribution can make it possible to claim a protection for the work.

As the CJEU stated in *Painer*, the author can make free and creative choices in several ways, at various phases in the production.¹⁴² Hence, in case of the AI generation, the human can make the creative choices for instance only in the output or input phase of the production, and not through the whole production. For instance, it is can happen that an AI system creates independently works but a human participate in selection of the

¹⁴¹ T Margoni, 'The Harmonisation of EU Copyright Law: The Originality Standard' (2016) SSRN Electronical Journal, 1-32., p. 15.

¹⁴² *Painer* (n 102), paragraphs 88-91.

final work. In the *Infopaq* case, the court indicated that the act of selection can be an intellectual act relevant to the legal evaluation:

“...It is only through the choice, sequence and combination...that the author may express his creativity in an original manner and achieve a result which is an intellectual creation.”¹⁴³

Thus, if an AI system creates a bunch of works from which the human selects which one is worth for further distribution, it might be enough in order to claim the protection. For instance, today’s music industry provides example of the mixture of AI generation and human selection. The AI systems are still unable to evaluate the value of the music generated and humans often listen through the generated pieces in order to evaluate which of the pieces are worth to distribution and which are not to be preserved.¹⁴⁴

Another example can be found from the automated journalism where AI generates news articles. Today, it is common to find AI-generated news especially in the field of sport, financial news or other stories based on statistics and numerical figures. For example, the software “Quill” that was presented previously in this thesis is an example of AI that generates news articles independently, relying on machine learning. The user of “Quill” only needs to press the button of the system.¹⁴⁵ However, even though the sophisticated AI systems produce news articles autonomously, they still often make errors. Hence, humans need to read the articles through and select the articles that can be published and reject the biased ones.¹⁴⁶ From the justifications of *Infopaq*, it could be argued that this type of selection of the final work generated by AI would contribute enough in order to claim copyright for human.

¹⁴³ *Infopaq* (n 100), paragraph 45.

¹⁴⁴ University of Bergen. EU Copyright Protection of works generated by artificial intelligence systems. Faculty of Law, 1 June 2017, p. 19.

¹⁴⁵ Denicola (n 49), p. 258.

¹⁴⁶ Without a careful human selection, bad things can happen. For instance, the Los Angeles Times, published an AI-generated article according to which a 6.8 magnitude earthquake had hit the Pacific Ocean about ten miles from Santa Barbara. The information was nearly a century out of date and related to an earthquake which hit Santa Barbara in 1925. The paper suffered a major embarrassment. McIntyre, Christina, ‘Robo-Journalism: computer-generated stories may be inevitable, but it’s not all bad news’ 21 December 2017. Available at <<https://theconversation.com/robo-journalism-computer-generated-stories-may-be-inevitable-but-its-not-all-bad-news-89473>>, accessed on 19 October 2018.

Moreover, humans often select the input material that is provided to the AI system. If a human being carefully selects specific input data to be provided to the AI system with the intention that the system will create a work of a certain nature could be enough to satisfy the originality requirement, even though the creation itself was performed by the AI.¹⁴⁷ However, in this case, the sufficient creativity and personality in the selection of input materials needs to be established. For instance, an UK based artist Anna Ridler uses neural network technology in the art production using only her own sketches and photography as a training sets. According to Ridler, “it is this construction of a database—what to include, what not to include, that becomes a creative act and very much part of the piece.”¹⁴⁸ In this type of selection, the artist can probably claim the copyright based on the creative acts made in the selection.

However, it is likely that not all selection processes can fulfil the threshold of originality requirement. Especially technology companies that produce AI art for commercial purposes rely on large amount of public domain data to train their algorithm and do not make any specific selection among data. For instance, Google scanned millions of publicly available books in order to develop and train a chat robot. This cannot be regarded warranting sufficient originality in selection.¹⁴⁹ Another example is the Project Next Rembrandt, where the team behind the machine simply mined all the publicly available paintings of the dead author and provided them to the AI system. The team did not contribute the materials anyhow or make any precise selection among the paintings and hence, it cannot be regarded that the selection made by the team can be regarded original enough.

In addition to the selection, another possible source of originality in AI-generated works could be in the intellectual contributions of human being in building the underlying learning algorithm.¹⁵⁰ The programmer after all is the author of the author of the work.¹⁵¹ Without programmer’s creativity in building the learning algorithm, the work

¹⁴⁷ Katharine Stephens & Toby Bond, ‘Artificial Intelligence, Navigating the IP Challenges’ (2018) July PLC Magazine, 39-45, p. 43.

¹⁴⁸ Gaskin (n 19).

¹⁴⁹ It is worth to note that there was an 11-year legal battle regarding this as it was appealed that Google infringed the copyrights in the scanned books. However, Google won the copyright battle over the books under the fair use doctrine in the US. BBC News: Google win copyright battle over books. BBC News, 18 April 2016. Available at <www.bbc.com/news/technology-36072243>, accessed on 19 October 2018.

¹⁵⁰ Stephens & Bond (n 147), p. 44.

¹⁵¹ Bridy (n 124), p. 21.

would not have never brought into existence. For instance, Davis states that the programmer should be seen as the author as “human action is inevitably at the core of the creative process” that leads to the production of such works.¹⁵² Especially, if the work produced by the AI program is excellent quality, it would be fair to award the programmer at least part of the excellence, as creating excellent program is intellectually demanding, time-consuming and expensive.¹⁵³

The solution of regarding programmer as an author of the work generated by the program that he or she has coded has also recognized in the recommendation of WIPO and UNESCO.¹⁵⁴ The recommendation states that the programmer could be recognized as a co-author if the programmer contributed to the work such a creative elements without which the resulting work would not be entitled to copyright protection.¹⁵⁵ However, the recommendation does not mention the possibility that the programmer could be the sole author of the AI-generated work.

In the UK case law, the programmer has been regarded as the author of the AI-generated work. The UK High Court’s case *Nova Productions Ltd v Mazooma Games Ltd* involved electronic pool games in which the individual frames displayed on screen when the game was played were considered computer-generated artistic works. The court found that the author of the works was the programmer who “devised the appearance of the various elements of the game and the rules and logic by which each frame is generated and who wrote the relevant program.” From this juridical ruling, it can be interpreted that at least in the cases where the programmer takes the most significant parts of the creativity process, the programmer could be held as an author. However, it should be noted that the case was tried in the UK court and no similar rulings are held by the CJEU.

As mentioned previously in this thesis, the program might have claim over the works generated by “weak AI” systems, where AI relies on heavily on the rule based algorithm and the result is predetermined by the programmer though the code. However, in respect

¹⁵² Randall Davis, ‘Intellectual Property and Software: The Assumptions are Broken’ (1991) 101 WIPO Worldwide Symposium on the Intellectual Property Aspects of Artificial Intelligence, 1-20, p. 101.

¹⁵³ Samuelson (n 134), p. 1205-1207.

¹⁵⁴ UNESCO and WIPO, ‘Recommendation for Settlement of Copyright Problems Arising from the Use of Computer Systems for Access to or the Creation of Works’, 13 August 1982.

¹⁵⁵ Ibid, section 16.

of the “strong AI” systems, relying on machine learning and neural networks, I argue that the programmer may be entitled to the copyright of the AI program, but may not have rights for future products created by the AI system. After all, the programmer creates only the potentiality for the work, not the actuality.¹⁵⁶ The “creativity” of an AI system is not creativity of the programmer; the causal link is not close enough to justify authorship of the programmer. What the output produced by a moderns AI program is not predictable by the programmer.¹⁵⁷

For instance, in the case of Google’s “Deep Dream”, the creativity of the programmer during the coding process is not likely to be sufficient as the “Deep Dream” acts totally by its own.¹⁵⁸ As Bridy has stated, by awarding rights to a person who merely creates a potentiality but not the actuality would be a significant break from traditional copyright and something very important about the nature of these works would be missed.¹⁵⁹

The fact that the program can develop at the hand of the user makes the nexus between the work generated by the program and the programmer even further.¹⁶⁰ Today, AI system constantly develops as a result of new input and new results.¹⁶¹ Hence, even though it would be tempting to collapse the distance between the programmer and the output of the learning algorithm created by the programmer, this approach would be analytically loose, ignoring both the machine origin of AI-generated works and their relationship to human authorship and creativity.¹⁶²

To conclude, based on the CJEU jurisprudence, it can be claimed that even a minimal human input at some phase of the creation process can be sufficient in order to claim for the protection. Based on the case law of the CJEU, it can be argued that in the case where AI generates the work but the human involves in the selection process, the sufficient human involvement may exists. The selection can take place either in the input or output phase of the AI-generation. If the AI system generates a great number of

¹⁵⁶ Samuelson (n 134), p. 1208-09.

¹⁵⁷ Yanisky-Ravid (n 36), p. 649.

¹⁵⁸ Mordvintsev, A. Inceptionism: Going Deeper into Neural Network. Google Blog, 17 June 2015. Available at <<https://research.googleblog.com/2015/07/deepdream-code-example-for-visualizing.html>>, accessed on 5 September 2018.

¹⁵⁹ Bridy (n 124), p. 22.

¹⁶⁰ Samuelson (n 134), p. 1209.

¹⁶¹ Yanisky-Ravid (n 36), p. 649.

¹⁶² Bridy (n 124), p. 25.

works from which the human selects which of the works is worth for further distribution, this may warrant originality. Further, if a human carefully selects specific input data to be provided to the AI system, with the intention that it will create a work of a certain nature, this could be enough to satisfy the originality requirement, even though the creation itself was performed by the AI.¹⁶³ The programmer may be entitled to the copyright of the AI program, but have no rights for future products created by AI as the “creativity” of an AI system is not creativity of the programmer. The programmer causes only the potentiality, not the actuality of the work and hence, causal link is not close enough to justify authorship of the programmer.

The more autonomous the creation, implicating the least human intervention, the more difficult it is to claim protection for the work under the current EU copyright system. If the act of the human is limited to pressing a button of the AI systems or entering “compose” into a music generation program, the contribution of a human user does not warrant sufficient originality necessary for protection.¹⁶⁴ If there is neither the human selection, the AI-generated work is not likely to be protected.¹⁶⁵

However, even if the selection made by a human being might be regarded enough to claim copyright in the light of CJEU jurisprudence, this seems to be a grey area. In practice, a case-by-case analysis needs to be carried out in order to conclude whether sufficient level of human involvement can be established or not. An investigation to the creative process, not the final work, is required in order to be able to establish whether the work is eligible for protection. However, the differentiation between the AI system that is used as a supportive tool for human user and the AI system that autonomously creates work is blurred and this increases the complexity of the analysis. As the technology continues to develop, it will be more and more difficult to distinguish AI-generated works from the work generated entirely by humans.¹⁶⁶

Moreover, as the current copyright regulation was not originally written with taking into account the AI considerations, it seems to be unclear whether the current legislative

¹⁶³ Stephens & Bond (n 148), p. 43.

¹⁶⁴ Denicola (n 49), p. 269.

¹⁶⁵ Example of AI-generation and selection can be found from IBM’s AI called “Watson”. “Watson” generates independently millions of ideas out of quintillions of possibilities, and then predicts which ones are best. IBM Watson, What is Watson. Available at <www.ibm.com/smarterplanet/us/en/ibmwatson/what-is-watson>, accessed on 10 October 2018.

¹⁶⁶ Denicola (n 49), p. 270.

environment, where AI-generated works fall within the public domain is the one the legislator find most suitable today. I claim that it is not. The Resolution of the European Parliament declares as follows:

“...Existing legal regimes and doctrines can be readily applicable to robotics, although some aspects appear to call for specific consideration...”¹⁶⁷

European Parliament therefore states that even though the current legal rules can be applied also in the AI generation, there is some aspects that needs to be further considered. Based on the analysis presented in this thesis so far, this seems to be true: the current copyright regime is applicable when an AI system is used as a tool for human creator or even when a human behind the machine contribute the creation at least somehow, such as by making selection. However, the increasing number of AI-generated works with no human input in the creation process is appearing to the market, such as painting generated in the Project Next Rembrandt, the music produces by JukeDeck or the painting generated by artist Memo Akten’s AI system. I propose that these type of creations require “special considerations”.

5 SHOULD AI-GENERATED WORKS BE PROTECTED AND IF YES, WHO SHOULD BE THE OWNER AND HOW?

5.1 Should AI-generated works be protected?

5.1.1 Theoretical justifications

As explained previously in this thesis, copyrights are exclusive rights: the existence of copyright in a particular work restricts the uses that can be made of the work. For example, if one purchases a book from a bookstore, in principle, he or she cannot legally copy the book. Thus, copyright always inhibits the people’s ability to communicate and share information. Hence, when establishing whether the AI-

¹⁶⁷ European Parliament, ‘European Parliament Resolution of 16 February 2017 with Recommendations to the Commission on Civil Law Rules on Robotics’ 2015/2103 (INL), p. 9.

generated works should be protected, it needs to be carefully considered whether there is any legitimate justifications for granting the protection for these new type of works and what is the value of protecting the AI-generated works in the first place.

First, it needs to be evaluated whether the justifications behind the copyright system allow or demand the copyright protection of AI-generated works.¹⁶⁸ In the chapter 3.3 of this thesis, the following justifications in the EU copyright law have been presented: personhood theory, reward theory and incentive theory. In the following, it will be evaluated whether copyright protection for AI-generated works is justified in the light of these justifications.

According to the personhood theory, individuals have right for protection of their personhood and personal autonomy. Through the process of creation, a person comes to occupy the product he or she creates as an extension of himself. According to this theory, AI-generated works cannot be considered property to be protected by copyright as AI has not personhood from which the product could be extension of. Hence, the personhood theory cannot be used to justify the protection of the AI-generated works.¹⁶⁹

According to the reward theory, which is related theory to the personhood theory, those who invest time, money and energy to create intellectual products have special financial or personal need for the protection because of their investments. The reward theory is supported by the Labor theory of John Locke. According to Locke, individuals have natural rights of ownership in respect of their bodies, which rights reach through to the products they create in existence of their labour. This theory considers that as labor creates value, the man who has given birth to a thing should also enjoy it. However, this theory regards that only labor of human beings can make property. Hence, AI-generated works cannot be considered property to be protected under this theory either.¹⁷⁰

¹⁶⁸ The author of this thesis sees that protecting the AI-generated works under the copyright doctrine, as “original work of authorship” is the most suitable protection solution. Also, other protection alternatives have been discussed in the literary. For instance, McCutcheon discussed the following two alternatives: protection of computer-generated material as a new protected “subject matter”; and completely novel “sui generis” legislation. See McCutcheon (n 138), 78-99.

¹⁶⁹ Reto M Hilty, ‘European Copyright, Quo Vadis? Impact of Artificial Intelligence on Copyright Issues: Criteria for Protection. Brussels, European Copyright Society’ May 25, 2018. Available at <https://europeancopyrightsocietydotorg.files.wordpress.com/2018/06/hilty_ai_2018-05-24.>, p. 2.

¹⁷⁰ Yanisky-Ravid (n 36), p. 707.

According to the incentive theory, the purpose of copyright is to promote the creation of works for the benefit of the public. Copyright is a tool to motivate the creative activity of authors by giving them exclusive rights and control over the works they generate. It is true that the AI systems themselves do not need to be encouraged to generate works and hence, it seems that this theory is not applicable either. However, there are still human beings behind the machines that need incentive. The copyright protection is needed to promote the use and development of these AI systems. Without copyright protection, the users have no incentive to produce art by using AI technology and the developers of the AI systems have no incentive to invest in development of these systems.¹⁷¹ Granting the copyright protection to AI-generated works would encourage talented people and well-funded companies to invest in new technologies and use of these technologies.¹⁷² Hilty¹⁷³ and Synodinou¹⁷⁴, both independently, have argued that it is the economic rationale, namely, the investment protection, which is the most applicable justification to recognize legal protection for AI-generated works.

If the AI-generated works are not granted protection, the commercial impact will be negative. Companies in various industries such as music, literature, and gaming are making use of AI in the production of works. Moreover, individual artists that earn their daily living produce art by the help of AI systems. If the AI-generated works are not protected the works can be reproduced by any competing companies or artists. This would create negative economic impact suffered by the original creator of the AI works. Financial incentive may be particularly important for the development of creative machines because producing such software is resource intensive.¹⁷⁵ If the protection is not granted, this would lead to the decline in valuable creations in the society.¹⁷⁶

It can be concluded that the AI-generated works challenge the theoretical justifications of the copyright law as most of the theoretical justifications rely on human beings creating the works. The personhood theory or reward theory provide little support in protection of AI-generated works. However, incentive theory can be applied in

¹⁷¹ Ibid, p. 701.

¹⁷² Annina Huttunen & Anna Ronkainen. Translation Technology and Copyright (2012) 3 Nordisk Immateriellt Rättskydd, 330–344, p. 335.

¹⁷³ Hilty (n 170), p. 3.

¹⁷⁴ Synodinou (n 24), p. 11.

¹⁷⁵ Abbott (n 22), p. 1104.

¹⁷⁶ Hristov Kalin, 'Artificial Intelligence and the Copyright Dilemma' (2017) 57 The Journal of the Franklin Pierce for Intellectual Property, 431-454, p. 438.

justifying the protection of AI-generated works as even though the author-in-fact, namely the AI system does not need incentive, there are human beings behind the machine who need to be incentivized.

5.1.2 Value for protection for the society

In addition to the need to establish that IP does in fact create the relevant incentive, it needs to be established whether the society benefits from the incentive it creates.¹⁷⁷ If it can be demonstrated that AI-generated works benefit the society at least equally to human generated works, the protection should be granted. I claim that they do. Increasingly large number of works produced today by AI are indistinguishable in substance and value from works created by humans. The current stance where the AI-generated works with no sufficient human input are not protected is ultimately counter-productive and tenuous distinction.¹⁷⁸

Several studies and real life examples have shown that various AI systems have positive impacts in the society, economy and communities. For instance, self-driving cars, health care diagnostics and targeted treatment that rely on AI increase the quality of people's lives.¹⁷⁹ Various artistic works generated by AI, such as news articles, music, paintings and books increase the quality of people's life too. The information theory of copyrights presented by Fromer states that what makes expressive works valuable to the society is that they make a contribution in at least one of two principle ways: by using that expression to communicate knowledge – be it systematic, factual or cultural – and by conveying expression that is enjoyable in and of itself.¹⁸⁰

Modern AI systems are able to generate expressive works that make the contributions for the society in both two ways. First, AI is able to generate expressions that communicate knowledge. For example, news articles generated by AI communicate systematic, factual and cultural knowledge that increase the knowledge in the society by

¹⁷⁷ Pila & Torremans (n 16), p. 95.

¹⁷⁸ Denicola (n 49), p. 251.

¹⁷⁹ Stone (n 33), p. 2-4.

¹⁸⁰ Jeanne C Fromer, 'An Information Theory of Copyright Law' (2014) 64:71 Emory Law Journal, 71-128, p. 71.

educating and cultivating people.¹⁸¹ Today, it can be claimed that AI reporters are able to share better, more interesting and accurate information than human reporters as the AI systems are capable to generate unbiased articles from the topics that majority of the people find interesting. For example, an algorithm owned by a software company “Knowherenews”¹⁸² generates news articles by first choosing the subject for the story based on what is popular on the Internet and then, looks at more than a thousand news sources to gather details on this subject. The algorithm then writes its own impartial version of the story based on the data gathered. As the news articles generated do not include the human reporters’ personal opinions, people will achieve “bias-free” news that include more objective and accurate information.¹⁸³

Additionally, the ability of AI to generate literature, such as books, poems and other writings can help in education. The low quality of education in much of the developing world is no a secret and for a long time, the solution for the lack of educative materials has been in research. The most recent Annual Status of Education Report, produced by the Indian NGO Pratham, highlights the fact that more than half of grade five students can read only at grade two level. One of the reasons is the lack of educational materials.¹⁸⁴ As AI systems are able to generate literature ever faster and cheaper way than humans, this could provide a solution for the problem of lack of educational material in the future.

In addition, the Fromer’s information theory states that if the expression is enjoyable in and of itself, it is valuable for the society and should be protected.¹⁸⁵ Examples of enjoyable AI-generated works include paintings, photos and music. The robotic art is as stunning and visually impressive than human generated art. This can be seen from the fact that market is eager to move artwork generated by AI. For example, the artistic robot “E-David” generates portraits that range from 100 dollars to 2.000 dollars. There

¹⁸¹ Ibid, p. 86.

¹⁸² See: <www.knowherenews.com>, accessed on 21 October 2018.

¹⁸³ Houser, Kristin: ‘A New AI “Journalist” Is Rewriting the News to Remove Bias’ The Futurism, 6 April 2018. Available at <<https://futurism.com/ai-journalist-media-bias-news-knowhere>>, accessed on 18 October 2018.

¹⁸⁴ The Indian NGO Pratham: Annual Status of Education Report. Available at <www.asercentre.org/education/India/status/p/143.html>, accessed on 3 October 2018.

¹⁸⁵ Fromer (n 181), p. 89.

was a six-month waiting list for the portraits generated by E-David.¹⁸⁶ Particularly atypical art collectors purchase AI-generated works, such as scientists, video game makers, and researchers in computer vision and AI.¹⁸⁷ Moreover, the music generated by JukeDeck and photos generated by Google's "Deep Dream" seem to be valued in the society as there is a demand for these type of services.

The AI-generated works contain intelligence equivalent to the works created by humans. AI systems generate new artistic works by collecting input data that already include the human tendencies and preferences. For instance, in the Project Next Rembrandt, the algorithm made use of valuable portraits painted by the old master that are highly valued among the people. Moreover, the AI music generators utilize the compositions of great composers, such as Mozart, Bach and Beethoven.¹⁸⁸ Analogically, the AI-generated works satisfy people's demand just as works created by human beings as they are generated based on the works that have been originally generated by human beings. Thus, if the AI-generated works can provide people what they demand for, protecting the AI-generated works by copyright and enhancing the creation of the AI-generated works serve the society's interest.¹⁸⁹ New technologies should, and they cannot mean new artificial values.¹⁹⁰ If the AI-generated works benefit the society equally to human generated works, the AI-generated works should be protected.¹⁹¹

As the AI systems become constantly more sophisticated, so will the quality and quantity of the AI-generated works produced. This promises great benefits in the fields of science, technology, and medicine, but in the creative realm too. Thus, while there still will arguable be human artists, musicians and writers engaging in creative process, a large part of tasks may be done by machines in the future. Commercially-viable AI

¹⁸⁶ The Guardian 2016: 'Vincent van Bot: the robots turning their hand to art' 19 April 2016. Available at <www.theguardian.com/artanddesign/2016/apr/19/robot-art-competition-e-david-cloudpainter-bitpainter>, accessed on 9 August 2018.

¹⁸⁷ Gaskin (n 19).

¹⁸⁸ Kalegasi, Bartu: 'A New AI Can Write Music as Well as a Human Composer' The Futurism, 9 of March 2017. Available at <<https://futurism.com/a-new-ai-can-write-music-as-well-as-a-human-composer>>, accessed on 16 October 2018.

¹⁸⁹ Yamamoto Takashi B, 'AI Created Works and Copyright' (2018) 48 (1) Patents & Licensing, 1-16, p. 1.

¹⁹⁰ Commission, 'Strategy, Digital Single Market, Policies, Copyright'. Last update 17 July 2018. Available at <<https://ec.europa.eu/digital-single-market/en/copyright>>, accessed on 9 August 2018.

¹⁹¹ Takashi (n 189) p. 8.

applications such as “JukeDeck” and Google’s “Deep Dream” produce commercially applicable work faster than cheaper than humans can ever do.

As Maggiore has stated, it cannot be regarded to be rationale in the light of the benefit of the society, on the one hand to set the protection level low for the generations made by humans so that anything in which the human genius can be spotted is protected and on the other hand, not to grant the protection to AI-generated works that may be able to process input information much more accurately and in larger volumes than humans.¹⁹² Without the incentive to produce AI-generated works, these type of works that people need in quantity and quality are not supplied in the market.¹⁹³

5.1.3 Practical considerations

There are also important practical reasons for granting the protection for the AI-generated works. Not protecting the AI-generated works would not be consistent with the historically flexible interpretation of copyright law. Particularly, it would be counter to the principle of technology neutrality that has been fundamental in shaping of copyright law for the digital era.¹⁹⁴ The need to apply legal principles consistently, irrespective of the particular technology involved has been acknowledged explicitly by the European Commission.¹⁹⁵

Moreover, if the AI-generated works are not protected but the human generated are, the enforceability issue would be particularly acute. It is often difficult to prove whether a certain work is generated by an AI system or by a human. It would be difficult for the court to evaluate the origin of each work as it would require technical expertise and detailed information in respect of the production process. This would make the court cases long and expensive procedures.¹⁹⁶

¹⁹² Maggiore (n 115), p. 3.

¹⁹³ Takashi (n 189), p. 7.

¹⁹⁴ Butler (n 2), p. 735.

¹⁹⁵ Commission, ‘The EU Copyright Legislation’, last update on 1 June 2018. Available at <<https://ec.europa.eu/digital-single-market/en/eu-copyright-legislation>>, accessed on 6 August 2018.

¹⁹⁶ Samuelson (n 134), p. 1208.

Further, it can be stated that not protecting AI-generated work is inconsistent political choice taking into account the temper of the time. Currently, both the EU legislator and the CJEU seem to favor maximizing IP protection, especially for high technology innovators.¹⁹⁷ Moreover, in the Europe 2020 initiative, the Commission emphasizes its aim to develop an “innovation union” by improving framework conditions and access to finance for research and innovation to ensure that innovative ideas can be turned into products and services that create growth and jobs.¹⁹⁸ Moreover, the Commission starts work with the Member States in order to have a coordinated plan on AI with the main aim to maximize the impact of investment at the EU, ensuring the global competitiveness of the EU in the AI industry.¹⁹⁹ Taking into account these initiatives, not protecting the AI-generated works would be politically inconsistent.

Moreover, as Burstyn has states, the publication of works should be promoted in its pure form. If the copyright protection is not granted to AI-generated works in pure form, this would incentive either not disseminate the works, alter the works to gain copyright or fabricate the details of the works origin, all of these being negative side effects.²⁰⁰

To conclude, the legislation in the EU should be amended in order to guarantee the protection to AI-generated work. Releasing the AI-generated works in the public domain and denying the incentive to copyright to an increasingly large group of works that are indistinguishable in substance and value from works created by human beings would be a tenuous and ultimately counter-productive distinction. The legislation should be issued at the EU level as without the certain legal rules, there is a risk that Member States start drafting and issuing own national legislation that in turn would harm the functioning of internal market. As stated in the Infosoc Directive 2001/29/EC, preamble 6:

¹⁹⁷ This can be seen in the many other legislations as well, such as tax legislation and patents boxes that are tempting to lurk innovators.

¹⁹⁸ Commission, ‘Europe 2020: A European Strategy for smart, sustainable and inclusive growth.’ COM/2010/2020 final, p. 3.

¹⁹⁹ European Commission (2018) Artificial Intelligence: Commission outlines a European approach to boost investment and set ethical guidelines. Press release, Brussels, 25 April 2018. <http://europa.eu/rapid/press-release_IP-18-3362_en.htm>, accessed on 20 September 2018.

²⁰⁰ See more Neal F Burstyn, ‘Creative Sparks: Works of Nature, Selection and Human Author’ (2015) Columbia Journal of Law & the Arts, 281-310.

“Without harmonization at Community level, legislative activities a national level which in order to respond to the technological challenges might result in significant differences in protection and hereby in restrictions on the free movement of services and products incorporating, or based on, intellectual property, leading to a defragmentation of the internal market and legislative inconsistency.”²⁰¹

In some countries legislative processes in order to protect AI-generated works have already been started, such as in the US and China.²⁰² Moreover, some countries already protect the computer-generated work, such as the UK.²⁰³ The enhancement of the overall competitiveness of the EU economy in relation to its trading partners is an important aspect in the EU copyright policy goals.²⁰⁴ However, without taking any actions regarding the copyright protection of AI-generated works, the EU can lose out to other jurisdictions in the field of AI.

5.2 If yes, who should be the owner?

5.2.1 Ownership issue

Thus far, it has been concluded that the AI-generated works are not protected under the current EU copyright law. Moreover, it has been concluded that the current legislative environment is not favorable but instead, the AI-generated works should be granted the protection similarly than the human created works as they contribute society at least equally. However, if the protection to AI-generated works is granted, it needs to be decided for whom to allocate the ownership rights. The party who is entitled to the rights, can benefit from the AI-generated works commercially, such as through sales or licensing arrangements.

²⁰¹ Infosoc Directive 2001/29/EC, preamble 6.

²⁰² The Japan Times. AI-written novel passes literary prize screening. 22 March 2016. Available at <<http://the-japan-news.com/news/article/0002826970>>, accessed on 25 July 2018.

²⁰³ The CDPA, Art 9(3).

²⁰⁴ Rosati (n 110), p. 78.

Traditionally, the author of the work has been regarded also as the owner of the work. Hence, in the case of AI-generated works, the AI system, being the author-in-fact of the work, would be doctrinally regarded also as the owner of the work. However, as AI system is not currently recognized as a legal person, it cannot hold rights or bear responsibilities either.²⁰⁵ Hence, as it would be arguable challenging to allocate rights to a machine, also other possible ownership alternatives need to be discussed, as there often can be found humans behind the machine too.

Establishing the most justified right holder as regard as AI-generated works is particularly difficult as there are often several parties participating in generating process. None of the parties provides sufficient human input in the creation process in the light of EU originality requirement in order to claim the authorship, and hence ownership, but they assist in the creation process somehow. For instance, in the Project Next Rembrandt, the parties that involved in the generating process of the AI-generated portrait were at least the programmers of learning algorithm, input data suppliers, algorithm trainers, feedback suppliers, user of the AI system or the company investing to the research and development of the AI system.²⁰⁶

The following part of this thesis will focus on some of the potential right holders for AI-generated works. The following ownership alternatives will be discussed: the AI system itself, the programmer and the user.

5.2.2 Allocating rights to the AI system

As stated above, the ownership cannot be currently vested to an AI system as the AI system has no legal personhood and hence cannot hold the rights. However, some scholars have adopted the idea that evolution of AI systems leads to the recognition of AI systems as independent legal entities entitled to legal and commercial rights and duties. Accordingly, some have argued that the solution for ownership issue regarding

²⁰⁵ Yanisky-Ravid (n 36), p. 692.

²⁰⁶ Idib.

AI-generated works would be to redefine the term “authorship” to include both human and non-human authors.²⁰⁷

For instance, Abbott has strongly suggested vesting of legal rights for non-human authors and inventors. According to Abbott, vesting inventorship and authorship to non-humans would be an innovative new way to encourage AI growth and development. He states that this could prevent AI-generated works from falling into the public domain and provide the programmers and companies behind these machines some exclusivity to the resulting copyrightable works.²⁰⁸

Moreover, Professor Glenn has states that “Artificial intelligence already exhibits many human characteristics. Given our history of denying rights to certain humans, we should recognize that robots are like people and have human rights”.²⁰⁹ This type of personhood approach establishes that as AI systems have many similar cognitive abilities than humans, they should be similarly recognized as having personhood and rights.²¹⁰

The EU Commission is also discussing the possibility of allocating rights to the robots. The motion for resolution adopted by Parliament calls on the Commission to explore the implications of possible legal solutions for its future legislative instruments such as:

“Creating a specific legal status for robots in the long run, so that at least the most sophisticated autonomous robots could be established as having the status of electronic persons responsible for making good any damage they may cause, and possibly applying electronic personality to cases where robots make autonomous decisions or otherwise interact with third parties independently.”²¹¹

²⁰⁷ For instance, both Davis Colin R. and Abbot Ryan are strong proponents of allocating authorship to machines. See Abbott 2016 (n 22); and Davis R Colin, ‘An Evolutionary Step in Intellectual Property Rights—Artificial Intelligence and Intellectual Property’ (2011) 27 Computer Law & Security Review 601.

²⁰⁸ Abbott (n 22), p. 1098-99.

²⁰⁹ Glenn, Cohen: ‘Should We Grant AI Moral and Legal Personhood?’ Artificial Brain, 24 September 2017. Available at <<http://artificialbrain.xyz/should-we-grant-ai-moral-and-legal-personhood>>, accessed on 15 October 2018.

²¹⁰ Yanisky-Ravid (n 36), p. 686.

²¹¹ European Parliament, ‘European Parliament Resolution of 16 February 2017 with Recommendations to the Commission on Civil Law Rules on Robotics’ 2015/2103 (INL), p. 16.

However, I argue that this theoretical solution is controversial and it would lead to an uncertain future with several legal and practical challenges. The only benefit of machine-authorship is that it follows the logic of current copyright law, according to which the author-in-fact is the owner of the work. Treating AI systems as authors would eliminate the need to complex legal solutions that vest the rights to a party that has not participated in the creative process as such. Still, vesting authorship to an AI system does not make any sense in the light of justifications of copyright, as discussed in the chapter 5.1.1. of this thesis. The purpose of copyright is to encourage creating more works and hence expand knowledge and creative expressions in the society. An AI system does not arguable need such incentive to innovate.²¹²

As the current EU law requires the author to be a human, amending the definition would basically require constitutional revisions in various provisions, which are well established through the history of copyright law. As an example, the term of protection is determined based on the lifetime of author. As AI is not something capable of dying, extending the scope of authorship to include also AI would make the term of protection determined currently by referring to the death of author's life meaningless.²¹³

Even though an AI system would be granted the authorship, AI being unconscious, it cannot think and act like humans. The AI system cannot enforce its right in the court or it cannot enter into sales or licensing arrangements. Hence, it seems to be highly impractical to vest rights to the AI system. In practice, it would be necessary to figure out the party having right to manage the rights allocated to AI system and ensure the right such as claims in case of infringement.²¹⁴

The requirement of consciousness for copyright protection supports the claim that the rights should be allocated to the human being behind the machine. The fact that a human being is something conscious, and an AI system is not, has crucial importance in the evaluation of ownership allocation. Consciousness of the human actor needs to be

²¹² However, some scholars have argued that AI systems might even need incentive. See. e.g. Barfield who has discussed about virtual avatars and argued that they might need copyrights as incentive for creation when they evolve and interact with humans and other avatars. See more Woodrow Barfield, 'Intellectual Property Rights in Virtual Environment: Considering the Rights of Owners, Programmers and Virtual Avatars' (2006) 39 Akron Law Review, 649-700.

²¹³ Gönenç Gürkaynak, 'Questions of Intellectual Property in the Artificial Intelligence Realm' (2017) *Robotic Law Journal*, 1-11, p. 2-3.

²¹⁴ *Ibid*, p. 2.

seen being in the core of the copyright protection and even though the human actor behind the machine would lack the necessary originality, he or she should still be seen the only feasible alternative to hold the rights.

To conclude, the ownership in AI-generated works should not be allocated to the AI-system due to the lack of theoretical justifications and several impracticalities. The ownership should be vested only to humans in the future, as humans are conscious and capable of enforcing the rights.

5.2.3 Allocating rights to the programmer

When considering if it would be justified to allocate the rights to the AI-generated works to the programmer, it can be considered that without the programmer's input building the learning algorithm, the work would not have brought into existence.²¹⁵ Hence, it can be asked whether the programmer should have ownership right also for the work generated by the learning algorithm that he or she has coded.

Brustlyn is a strong proponent of programmer ownership and according to him, the programmer is always the one who makes necessary effort and investments for the creation of the AI-generated works through programming and thus should be vested rights.²¹⁶ Also, Samuelson has suggested that if the AI-generated work is excellent quality, it would be fair to award the programmer at least part of the excellence, as creating excellent program is intellectually challenging, costly and time-consuming.²¹⁷

However, even though the intuition would suggest allocating the ownership to the programmer, as already discussed in the chapter 4.2., the output of the AI system is not predicted by the programmer. The programmer creates only the potentiality for the creation of the output, not the actuality of the output. As Samuelson has stated,

²¹⁵ Bridy (n 124), p. 21.

²¹⁶ Burstyn (n 201), p. 302-308.

²¹⁷ Samuelson (n 134), p. 1205-07.

awarding rights to a person who merely creates the potentiality for, but not the actuality of a work would be a significant break from traditional copyright principle.²¹⁸

There are also several impracticalities tied to awarding rights to the programmer. First, the enforceability problem suggests not vesting the ownership to the programmer. It would be difficult for the programmer to control his rights as the control over the work is typically at the hand of user of the AI system. Without any reporting requirements, the user has a strong interest not to notify the programmer that a work has been created by the AI system.²¹⁹

Second, there can be several programmers participating to the creation process. If multiple people are involved, the authorship of works generated by an AI system could potentially be contentious. All the programmers would be hold as the owner of the AI-generated works. Especially, in the sales or licensing arrangements this would cause problems. If the AI system would be sold or licensed to a third party, a consent of all programmers should be achieved in order to conclude the sales or license agreement. This would increase the transactional costs of the commercial arrangements and diminish the effectiveness of the market.²²⁰

Most importantly, it is fair to claim that the programmer does not need the ownership rights in the AI-generated works as the programmer can protect his or her interest by other ways. The programmer can decide not distributing the learning algorithm and generate as much works as he or she wants.²²¹ However, if the programmer chooses to distribute or licensee the algorithm, the programmer should agree that some of the rights are transferred to the acquirer or licensee. If the ownership would be vested to the programmer, there would be no incentive for the user to apply the purchased or licensed algorithm. The programmer can however bargain with purchaser or licensee for a share of ownership or royalties attributable to work generated by the algorithm.²²²

It is noteworthy that under the Software Directive 91/250/EC, the programmer has the ownership rights in learning algorithm itself. Hence, the programmer is already

²¹⁸ Ibid, p. 1209.

²¹⁹ Denicola (n 49), p. 284.

²²⁰ Samuelson (n 134), p. 1208.

²²¹ Ibid, p. 1207.

²²² Denicola (n 49), p. 284.

provided with the incentive to generate the algorithm. If the rights in the AI-generated works would be allocated to the programmer too, the programmer would be over-rewarded. Over incentivize is not the purpose of the IP system, but the right balance between the access and incentive needs to be sought.

To conclude, the effort and investment made by the programmer in the coding of the learning algorithm may suggest that the rights for works generated by AI should be vested to the programmer. However, even though granting a copyright to a programmer might sound theoretically applicable solution, due to the several impracticalities and lack of justifications, the programmer should not be granted the rights to the output generated by the AI system. The programmer would not be left without rights as he or she would be rewarded under the Software Directive 91/250/EC.

5.2.4 Allocating rights to the user

Even though the user of an AI system has not contributed the AI-generated work creatively and hence, the ownership cannot be vested to the user under the traditional copyright doctrine, it needs to be evaluated whether there are other justification to support the user ownership.

The user is the one who wants the works being generated and instigates its creation by commanding the AI system to run.²²³ Without the user's act, the work would not become into world. This intention to generate a work should be regarded an important factor when evaluating the ownership allocation.²²⁴ The copyright law purpose is to incentive to generation of new works. If the user is not provided rights to the works, he or she has no incentive to employ advanced AI systems in the creation of the works.

Moreover, by vesting the ownership to the user, the necessity of pursuing the distinction between the AI-assisted and AI-generated works would be eliminated.²²⁵ It is likely that if the copyright protection is denied from the user, the user claims that he or she authored the work anyway. Distinguishing the situations in which an AI system is used

²²³ McCutcheon (n 138), p. 68.

²²⁴ Ibid, p. 55.

²²⁵ Denicola (n 49), p. 284.

only as a tool and where the system acts independently is arguable a difficult task to the court. The determination requires detailed inquiry into the nature of interaction between the user and the machine and the sophisticated understanding of the functioning of the algorithm.²²⁶ However, if the ownership is allocated to someone else than the user, this distinction needs to be made and the number of litigation would be likely to increase.

Further, the user is at the best position to bring the work into the marketplace as the user is the most close of the final materialization of the work.²²⁷ Innovations that are kept secret do not benefit the society as much as innovations that are revealed. Those who can increase the supply of works should be vested copyrights. In respect of AI-generated works, the users of the AI systems should be vested with copyright as only they can control the supply of the works.²²⁸ Granting copyright to the user would incentive he or she to bring the work into the public circulation. Vesting the authorship to the user would thus be the most consistent with the general goals of the EU copyright law that is to advance the pace of the innovation.²²⁹ This strongly suggests that the ownership should be vested to the user of the AI system.

Hristov is a strong opponent of user ownership. He has stated that by rewarding the copyright to the user at the expense of the programmer would encourage free-riding as the users would benefit without supplying similar level of effort by themselves.²³⁰ However, the user cannot be regarded free-riding as the user invests in the AI system through purchase of licensing arrangements.²³¹ The user should be rewarded for such an investment by providing copyright protection for works generated as a result of the investment. If the user cannot protect the works generated by the AI system, he or she has paid for, the user would not likely invest in the AI systems. Moreover, a number of AI systems that are today used in the generation of works are open source software. If the programmer makes the decision to launch the software as an open source software, they cannot blame users for free-riding.

²²⁶ The case law from different jurisdictions illustrates the inefficiency of distinguishing computer-assisted works from computer-generated works. See e.g. the Australian case *Telstra Corp. v. Phone Directories Co.* Also, McCutcheon highlights that it would be highly difficult to prove that something is computer-generated rather than computer-assisted as this would require deem technical understanding regarding the generation process and functionalities of different algorithms. McCutcheon (n 138), p. 52.

²²⁷ McCutcheon (n 138), p. 55.

²²⁸ Takashi (n 189), p. 9.

²²⁹ Samuelson (n 134), p. 1227.

²³⁰ Hristov (n 176), p. 445.

²³¹ Samuelson (n 134), p. 1208.

Further, it is notable that through licensing or selling the AI system, also the programmer is rewarded appropriately.²³² By vesting rights to the user would indirectly encourage also developers of AI systems to develop more sophisticated systems as vesting ownership for the user would give users to incentive to go around looking for good AI systems to exploit. This market mechanism would benefit the user and the developers of the AI system both.²³³

Yanisky-Ravid has interestingly argued that we should allocate the rights to the user as in addition to the rights, the user would also bear accountability of the AI system's production. Yanisky-Ravid states that in addition the AI systems having a positive impact on the society, there are several drawbacks to these advanced systems, such as infringements, damage, suffering and the risk of loss in control. Yanisky-Ravid states that the user of the AI system would be in the best position in preventing these negative outcomes stemming from the AI systems and hence, both the right and the responsibilities should be allocated to the user.²³⁴

To conclude, innovation advancement, practical considerations as well as accountability issue support to user ownership.

5.3 How to allocate the ownership: work-for-hire as a solution

So far in thesis, it has been concluded that it is necessary to protect the AI-generated works and further, to allocate the ownership in these works to the user of the AI-system. A feasible solution for ownership allocation to the user can be found in the work-for-hire doctrine in the US Copyright Act.²³⁵ The work-for-hire doctrine is a deemed authorship doctrine that establishes that a specific person or a legal entity, other than the actual creator, is deemed to be the "author" of a particular work.²³⁶ This attributed

²³² Ibid, p. 1203.

²³³ Mark Perry & Thomas Margoni, 'From Music Tracks to Google Maps: Who Owns Computer-Generated Works?' (2010) 26 CLSR, 1-12, p. 9.

²³⁴ Yanisky-Ravid (n 36), p. 70.

²³⁵ Work-for-hire doctrine is known also in some other common law countries, such as UK and Australia. See more about work-for-hire doctrine in these countries. 'Analysis of International Work-for-Hire Laws' (2014) Sutherland A & Brennan LLP, Attorneys at Law. Available at <<https://us.eversheds-sutherland.com/portalresource/lookup/poid/Z1tOI9NPluKPtDNIqLMRV56Pab6TfzcRXncKbDtRr9tObd dEuS3Dr0!/fileUpload.name=/WorkforHireLaws.pdf>>, accessed on 6 October 2018, p. 5-8.

²³⁶ Ricketson (n 23), p. 829.

authorship carries all of the vested rights of the copyright and the original creator of the work retains no residual rights because no rights ever vested in his or her.²³⁷ The section 101 of the US Copyright Act defines a work-for-hire in two parts:

“1) a work prepared by an employee within the scope of his employment or; 2) a work prepared under special order or commission by an independent contractor, provided that the parties have signed an agreement designating the work as one made for hire, and provided that the work falls into one of nine categories enumerated in the statute.”²³⁸

The work-for-hire doctrine presents an existing mechanism for directly vesting ownership of a copyright in a natural or legal person who is not the author-in-fact of the work in question.²³⁹ I suggest that similar approach would be adopted in the EU in allocating the ownership in the AI-generated works to the user. In order to apply the work-for-hire doctrine in the AI-generated works, the terms employee and employer should be reinterpreted in a way that AI system would be referred as to “employee” and the user of the AI system would referred as to “employer”.

The rationale of work-for-hire doctrine is applicable in the relationship between the user and the AI system. The work-for-hire doctrine has been explained with the observation that “the motivating factor in producing the work was the employer or contractor who induced the creation”.²⁴⁰ The policy rationale is to incentive the employer or contractor at whose instance, direction, use, commercial purpose or risk the work is prepared, as well as give them control over the commercial force in the work.²⁴¹ The user, with his or her intention to produce a certain work, is the motivating factor in producing the work. As a result of intentional and conscious act of the user, the work become into existence. The user operates the AI system and provides direction to the system by instructing it what to paint, write or compose. Moreover, the user is the one who takes

²³⁷ ‘Analysis of International Work-for-Hire Laws’ (n 235), p. 2.

²³⁸ These categories generally covers: a contribution to a collective work, a part of a motion picture or other audiovisual work, a translation, a supplementary work, a compilation, an instructional text, a test, answer material for a test, and an atlas.

²³⁹ Especially in the US academic writing, several scholars have suggested the work-for-hire doctrine as a solution for authorship issue of AI-generated works. See e.g. Bridy (n 124), p. 26; Hristov (n 176), p. 442.

²⁴⁰ Denicola (n 49), p. 276.

²⁴¹ Yanisky-Ravid (n 36), p. 711.

the financial risk by purchasing or licensing the AI system and supplying it with input material and energy in a wish of producing a commercial product.²⁴²

However, the application of work-for-hire doctrine to the AI-generated works as such is not that straight forward. This is due to the two type of obstacles. First, there are some fundamental limitations set by the employment and contract law in the doctrine. Second, the applicability of the common law based work-for-hire doctrine in the EU is rather challenging as the work-for-hire doctrine is not currently recognized in the most of the EU countries.²⁴³

As the US work-for-hire provisions are currently drafted, they cannot be readily applied to AI-generated works. It is difficult to define a legal, contractual, employment or agency relationship between a human and an AI system. If we look into the definition of section 101(1) of the US Copyright Act, the relationship between the user and the AI system is not an employment relationship within the purpose of the section.²⁴⁴ Whereas the human employee has legal rights and duties by agreement with the employer, an AI system cannot be said to enter an agreement for employment, nor can it assert its legal rights or be cognizant of its legal duties.²⁴⁵

Neither is the definition of section 101(2) of the US Copyright Act directly applicable. As an AI system has no legal personhood, it is not able to conclude a contract with the commissioning party in order to assign the rights in the work. An assignment is a contractual concept that entails all elements necessary in a normal contract: mutuality, consideration and performance. As Butler states, it is hard to see how these elements could be satisfied by the AI system without doing severe damage to the traditional ambit of contract law.²⁴⁶

²⁴² Ibid, p. 712.

²⁴³ Only few countries, such as the UK and the Netherland recognize the work-for-hire doctrine. However, most of the countries, such as Germany, France and the Nordic countries transfer the rights from the employee to the employer based on the general principle of law.

²⁴⁴ The evaluation whether one is an employee in the light of the work-for-hire doctrine needs to be done based on the common-law agency principles. See the US Court case *Community For Creative Non-Violence v. Reed*, 490 U.S. 730 (1989) that established the rules how to establish the “employee-employer” relationship.

²⁴⁵ Butler (n 2), p. 741.

²⁴⁶ Ibid, p. 742.

As concluded previously in this thesis, AI system is unconscious. Consequently, it has been concluded that it cannot be regarded as the author under the current EU law or it cannot be vested ownership rights in the future. For the same reason, we are not able to classify it as an employee within the meaning of agency law or grant it legal capacity to conclude contracts in the future. In general, as AI systems lack of personhood for purpose of copyright ownership, it seems wrong to try to characterize them as “employees” or “contractors” in the way that this notion is currently interpreted under the work-for-hire doctrine.²⁴⁷

Instead, in order to apply the work-for-hire doctrine in allocating the ownership in AI-generated works to the user, the terms “employer” and “employee” need to be interpreted for this purpose. Hristov suggests the “relative interpretation” of these terms as a solution. According to Hristov, terms “employer” and “employee” should not be re-interpreted strictly but they should be left open to interpretation in order to satisfy newly arising requirements. This could mean that the user, as an “employer” may be considered as someone who employs the services of another entity in order to achieve a goal or complete task. Further, the AI system could be considered as an “employee” of the user since its generative services are employed by the user.²⁴⁸ Hence, it is suggested that EU would implement the work-for-hire doctrine applicable specifically to the AI-generated works by following the relative interpretation of the terms.

The application of work-for-hire doctrine in allocating the rights to the user would resolve many issues. First, copyright would be vested to a natural person instead of non-human with no legal protection. Human user, as a natural person, would be fully responsible under the law, enjoying both privileges and bearing responsibilities related to it. Hence, by allocating the authorship to the user under the work-for-hire doctrine, the human authorship requirement of EU copyright law would be fulfilled. This would eliminate the need for lengthy debate over the legality and practicality of non-human authorship. Another problem that would be avoided is the issue related to the term of

²⁴⁷ Denicola (n 49), p. 283.

²⁴⁸ Hristov (n 176), p. 446.

protection. If the authorship is directly vested from the AI system to the user, the protection would last the lifetime of the user plus 70 years.²⁴⁹

However, the application of this common law based doctrine is challenging in the European legal tradition.²⁵⁰ Moral rights are in the core of the European copyright tradition. However, there is no moral rights in the work-for-hire doctrine. The lack of moral rights is the fundamental reason why most of the EU Member States do not recognize the work-for-hire doctrine or any other type of deemed authorship doctrines.²⁵¹ Whereas the US work-for-hire exemption treats the employer or commissioning party as the author, most of the EU Member States vest all rights in the author despite any status as employee or independent contractor.²⁵² The author can then transfer some or all of his or her rights to a third party through contractual agreement. However, only economic rights can be transferred.²⁵³

Hence, the excuse of moral rights in respect of AI-generated works would be necessary in order to apply work-for-hire doctrine in the EU.²⁵⁴ A fictitious author should not enjoy moral rights, which are heavily linked to the personality of human author.²⁵⁵ Hence, in the EU, the application of work-for-hire doctrine requires both a comprehensive amendment of the existing law and the legal practice.²⁵⁶ This is however, only a question of careful consideration and drafting.

Interestingly, even though the work-for-hire doctrine is not known in most of the EU Member States, the analogue in the existing legislation can be found to support the applicability of the doctrine within the EU. The employee-employer relation presented in the current EU legislation, namely in the Software Directive 91/250/EEC, supports

²⁴⁹ Term Directive 2006/116/EC.

²⁵⁰ Jacobs (n 78), p. 72.

²⁵¹ The Netherlands is the only civil law country that has incorporated the work-for-hire doctrine into its copyright law. See Jacobs (n 78), p. 66.

²⁵² 'Analysis of International Work-for-Hire Laws' (n 235) p. 8.

²⁵³ For instance under French law, all rights of a work vest in the original author of the work, regardless of any contract for hire or service by the author. C. IP. Art. L111-1 (2003). This applied equally to the works of employees and commissioned authors.

²⁵⁴ It is noteworthy that other jurisdictions that have incorporated deemed authorship provisions have excluded moral rights in this respect. See CDPA 1988, c 48, Art 79, 81, which provides that the right of paternity and the rights to object to derogatory treatment do not apply to computer-generated works. See also Copyright Act 1994 (New Zealand) Art 97(2)(b), 100(2)(b).

²⁵⁵ McCutcheon (n 138), p. 72.

²⁵⁶ Gürkaynak (n 214), p. 3.

the allocation of rights, at least economic part of them, directly someone else than the actual author of the work. According to the Art 2(3) of the Software Directive 91/250/EEC,

“Where a computer program is created by an employee in the execution of his duties or following the instructions given by his employer, the employer exclusively shall be entitled to exercise all economic rights in the program so created, unless otherwise provided by contract.”

Hence, the legislator have regarded that in the case where a work is created by an employee acting as such, the best solution is to allocate the economic rights to the party who through the employment was responsible for causing a creative work to be brought into existence.²⁵⁷ Similarly, in the case of AI-generated works, the economic rights could be allocated directly to the user, being the “employer”, and in addition to exempt the existence of moral rights. I suggest that taking inspiration from the Art 2(3) of the Software Directive, the following provision could be issued at the level of EU in order to protect the AI-generated works:

“Where a work is generated by an AI system in the execution of his duties, the user of the AI system exclusively shall be entitled to exercise all economic rights in the work so created. Moral rights shall not exist in the works generated by AI.”

We already have a country in the EU that applies deemed authorship doctrine to the AI-generated works and exempt the moral rights in such works. The UK has introduced provisions regarding authorship in the copyright in computer-generated works, which were included in the Copyright, Design and Patents Act 1988 (CDPA).²⁵⁸ The CDPA states that computer programs may be used to generate literary, dramatic, musical and artistic works that will obtain copyright protection. A computer-generated work is

²⁵⁷ Samuelson (n 134), p. 1203.

²⁵⁸ McCutcheon (n 138), p. 50.

defined as a work “generated by a computer in circumstances such that there is no human author.”²⁵⁹

The copyright of computer-generated works is attributed to “the person by whom the arrangements necessary for the creation of the work are undertaken”.²⁶⁰ This person, like the employer under the work-for-hire doctrine, is decided to be the author for legal purposes. The effect of the CDPA provisions is that where a work is computer-generated, similarly to the work-for-hire doctrine, it may obtain copyright protection because authorship is attributed to the person who undertook the arrangement necessary for the creation of the work. Therefore, the provision fictionalizes an author for the purposes of conferring protection similarly to work-for-hire doctrine.²⁶¹

The CDPA provisions are an example of exemption in moral rights. During the discussion of the enactment of the CDPA, it was stated that “moral rights are closely concerned with the personal nature of creative effort, and the person by whom the arrangement necessary for the creation of a computer-generated work are undertaken will not himself have made any personal, creative effort.” The CDPA 9(3) recognizes that there is no creative acts in the creation process carried out in respect of computer-generated works, and therefore CDPA 9(3) has been framed as an exception to the creativity and originality requirement for obtaining the copyright.²⁶² Similarly, the rest of the EU should adapt the exemption to the moral rights regime and value the AI-generated works as such, without the creativity and originality coming from the human soul.

Implementing the work-for-hire in the EU, under which autonomously acting AI systems would be seen as employees of the users will require new legislation. A fundamentally new component needs to be included to the copyright legislation – most prominently, the recognition that works generated by AI systems are copyrightable even though there is no human creator in the traditional sense. All in all, in respect of AI-

²⁵⁹ CDPA 1988, c. 48, Art 178.

²⁶⁰ CDPA 1988, c. 48, Art 9(3). A number of other jurisdictions have adopted a virtually similar identical authorial deeming provision in relation to computer-generated works. Provisions identical to s 9(3) of the CDPA are found in Copyright Ordinance of Hong Kong, Cap 528, Art 11(3); Copyright Act 1994 of New Zealand, cl 5(2)(a); Copyright Act 1987 of South Africa, Art 1(1) and; Indian Copyright Act 1957, Art 2(d)(vi).

²⁶¹ McCutcheon (n 138), p. 51.

²⁶² Guadamuz (n 47), p. 175.

generated works, the rationale of the copyright law should be refocused from the “author” to the “work”. As the example of work-for-hire doctrine shows, the copyright law can do without the author, meaning that the law, at least in some countries, may tolerate a framework whereby the statutory author is divorced from the actual creator, but cannot do without the protected-subject matter which is the ultimate target and reason for protection.²⁶³

6 CONCLUSIONS

In the long history of copyright law, the creativity has been considered uniquely human attribute. However, humans are no longer the only source of creativity or innovations. Today, the “strong AI” systems, relying on machine learning and artificial neural network technology, generate independently works of art in almost every copyrightable medium. In this thesis, various examples in the field of literature, music and visual art have been presented in order to illustrate the current development. The works generated by these modern AI systems have been referred as AI-generated works.

In the first part of this thesis, it has been claimed the AI-generated works are not protected under current EU copyright law. This conclusion has been drawn primarily on the basis of the finding that the AI systems, no matter how sophisticated they are, are unconscious and hence, cannot generate work of art that would fulfil the fundamental requirement for protection, namely the originality requirement. Consequently, the interpretation of originality requirement and case law related to it establish that in order to a work being protected, the author needs to be a human. It does not matter how artistically valuable the AI-generated works are, but if the creation process lacks sufficient human input, the current EU copyright law does not recognize them at all.

Further, it has been claimed that even a minimal human input at some phase of the creation process can be sufficient in order to claim protection for the work otherwise generated by the AI system. It has been argued on the basis of the CJEU case law of originality that if an AI system generates the work but the human is involved in the selection process, the sufficient human involvement for claiming the protection may exist. It has been illustrated in this thesis that the selection can take place either in the

²⁶³ Maggiore (n 115), p. 1.

input or output phase of the AI-generation. If the AI system generates a great number of works from which the human selects which one is worth for further distribution, this may warrant originality. Further, if the human carefully selects specific input data to be provided to the AI system, with the intention that it will create a work of a certain nature, this could be enough to satisfy the originality requirement, even though the creation itself was performed by the AI system.

However, even though the selection might warrant originality, there is a large number of AI-generated works in the market that are both generated and selected independently by the AI system. The outdated nature of the current EU copyright law fails to reflect this reality resulting in the releasing a number of AI-generated works into the public domain. It has been found in this thesis that the underlying issue in the copyright protection of AI-generated works in the EU is the view of the “romantic author”. The current copyright law focuses on rather the production process than the outcome. However, common law countries, such as EU’s rival US, adapts utilitarian approach to copyright. I has suggested that in order to maintain the competitiveness, the EU should follow this path. Granting the protection to AI-generated works, where no human input in the traditional sense can be found in the creation process, but that however are incrementally valuable as such to the society, would be a starting point in this evitable change in thinking.

Thus, in the second part of this thesis, it has been claimed that the AI-generated works should be granted protection similar to the works generated by humans. The current legislative environment does not benefit the willingness of investing in the development of AI. The consequences can be far reaching and result in decrease of valuable works in the society. The AI-generated works are culturally and artistically at least equally valuable to the human generated works, and hence, should be protected. It has been shown through several practical examples, in the field of education, art and newspaper industry that AI-generated works benefit largely our society. The argumentation that AI-generated works should be protected have been further supported by the practical considerations, among other claiming that if the AI-generated works are not protected but the human generated are, the enforceability issue would be particularly acute as proving the machine origin of certain work would require technical knowledge and detailed information from the court.

Further, it has been assessed who of the following ownership candidates should be vested rights in the AI-generated works: the AI system, the programmer or the user. It has been argued that the AI system should not be granted rights itself but the requirement of consciousness supports the claim that the rights should be allocated to the human being behind the machine. AI system being unconscious, it cannot enforce the allocated rights, such as go to a court or enter into licensing arrangements. Hence, allocating rights to an AI system would be highly impractical solution. The author of this thesis sees that the feasible solution is not to redefine the term authorship to include non-human authors but in order to avoid future legal complications and challenges, the authorship of a work should be allocated only a human beings also in the future.

Moreover, it has been assessed whether the programmer or the user would be better owner candidate. It has been argued that the programmer should not be vested rights as the programmer creates only the potentiality for the creation of the output, not the actuality of the output. In addition, the lack of control and the fact that the programmer does not need the ownership rights in the AI-generated works as the programmer can protect his or her interest by other ways support the claim that rights should not be vested to the programmer. Importantly, under the Software Directive 91/250/EC, the programmer has the ownership rights in the AI system itself and hence, is already provided with the incentive to generate to algorithm. Over intensive is not the purpose of the IP system.

It has been concluded that the user of the AI system should be vested the rights. If the users are not provided rights to the works, they have no incentive to employ advanced AI systems in the creation of the works. Another practical advantage in user ownership is that the necessity of pursuing the distinction between the AI-assisted and AI-generated works would be eliminated. Most importantly, it has been claimed that the society would benefit most if the user has been allocated rights as granting copyright for the user would incentive he or she to bring the work into the public circulation. Moreover, it has been claimed that if the users are incentive to generate more works by AI systems, they will look around for market for better AI systems, both in quality and quantity. This market mechanism would encourage developers of AI systems to invest in development in more sophisticated AI systems and consequently, both the user and the developer of the AI system would benefit.

Lastly, it has been looked into other jurisprudences in order to find an applicable legal tool to allocate the ownership to the user. The US based work-for-hire doctrine has been proposed as a solution. Under this doctrine, the AI system would be regarded as a creative “employee” of the user. The authorship would be allocated under the doctrine directly to the user, and the author-in-fact, namely the AI system, would be recognized as it in reality is, essentially as a tool.

Challenges regarding the applicability of the work-for-hire doctrine to the AI-generation as such, and specifically within the EU have been identified. These challenges include issues related to contract and employment law as well as moral rights regime in the EU. However, the challenges identified are not obstacles but mere restrainers that can be addressed through careful consideration and drafting. Moreover, if the US is considering to allow protection of AI-generated works without the human authorship requirement, as can be believed from the wide discussion in respect of the topic among the scholars, EU should adapt the similar approach in order not maintain the competitiveness towards one of its major rivals.

The world is changing and the methods of creating art are too. The foundation for AI research was established only less than 70 years ago. In these 70 years, AI technology has developed from predictable computer programs to intelligent neural network algorithms. As the sophistication and complexity of AI technology continues to grow, so will the number of works it produces. This thesis has argued that the traditional copyright law is inadequate to cope with the new AI technology involving in the creation process of art. It has been argued that in order to maintain the competitiveness of EU, new legislation needs to be drafted in the community level in order to grant the protection for AI-generated works. The law needs to be adapted to the reality of the modern world and it needs to be done quickly.