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Liability for Copyright Infringement: an investigation of
the legal use of trained artificial neural networks in the
context of copyright law.

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Abstract

The current thesis critically investigates whether training and using third-party data in artificial neural networks (ANNs) could constitute a liability for copyright infringement. Furthermore, the present paper sets out to explore whether training and using ANNs could fall within the IP right holders' exclusive rights. In this regard, this thesis will mainly focus on the reproduction parts as the most common infringing restricted act arisen from copying.

The thesis also underlines the importance of computational processes that crucially play during the use of trained NNs. Although the infringing acts from NN-generated works are applicable in many other forms of intellectual property law such as design, patent and trademark law, the current thesis primarily draws attention from a copyright perspective. At the current stage, the ANN-generated work cannot be commercially exploited no matter whether the work is a copy reproduced from an original copyright work, or whether it is an innovative independent creation of an ANN-system.

Additionally, it is essential to examine the requirements that amount to primary and secondary copyright infringements. It is also crucial to analyse whether the infringer's state of mind resulting from secondary copyright infringement can be viewed and applied to ANN-systems. Therefore, the current thesis invites the legislative bodies to reconsider the current traditional copyright laws in relation to ANN-generated works and to set out explicit provisions on the liable party.

Keywords: Artificial Neural Networks, Artificial Intelligence, Copyright, direct and indirect copyright infringements.

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Abbreviations

AGI – Artificial General Intelligence

AI – Artificial Intelligence

ANN – Artificial Neural Networks

CDPA – Copyright, Design and Patents Act

CJEU – Court of Justice of the European Union

EU – European Union

InfoSoc – Information Society Directive

IP – Intellectual Property

ML – Machine Learning

NN – Neural Network

PETA – People for the Ethical Treatment of Animals

TDM – Text and Data Mining

TRIPS – The Agreement on Trade-Related Aspects of Intellectual Property

WMFH – Work Made for Hire

CHAPTER 1: INTRODUCTION

1.1 Background

The term of an Artificial Intelligence (AI) has been first coined by a famous computer scientist John McCarthy in 1956, describing an AI as; “making a machine behave in ways that would be called intelligent if a human were so behaving”.¹ To put it differently, some AI’s are used to characterise a set of skills and methods, enabling AI technologies to carry out given tasks that would generally necessitate human involvement and intelligence.² AI is not easily defined term because of the obstacles emerging from the lack of consensus on what amounts to ‘human intelligence’ at first instance.³ Furthermore, AI can be divided into two categories, namely; “weak or narrow” AI and “strong” AI, depending on whether the machine is instructed to handle with single or multiples tasks.⁴ The following terms does not imply that weak AI’s performs worse or less stronger. The differences between the two are that strong AI’s are powered to carry out its tasks independently by learning and adapting to various situations, just like humans. Whereas weak AI’s heavily rely on human involvement that imitates human behaviour.⁵ On the one hand, contemporary AI’s are considered as weak AI’s and primarily driven by machine learning (ML) algorithms.⁶ On the other hand, Artificial General Intelligence (AGI), also referred to as strong AI’s, having the ability to ‘think and adapt’ self-consciously just like a human.⁷

Another type of technological system that lies at the heart of an AI is based on deep learning with artificial neural networks (ANN), which can imitate the “web of

¹ Waymond Rodgers, ‘Artificial Intelligence in a Throughput Model: Some major Algorithms’, (1st edn, CRC Press 2020), 13.

² Ryan Calo, ‘Artificial Intelligence Policy: A Primer and Roadmap’, *University of California, Davis*, (2016), Vol. 51:399, 404, <https://lawreview.law.ucdavis.edu/issues/51/2/Symposium/51-2_Calo.pdf> accessed 7 April 2020.

³ Tobias Rothkegel & Mark Taylor, ‘What Characterises Artificial Intelligence and How Does it Work?’, *Computer and telecommunications law review*, (2016), 22 (4) 98.

⁴ Calo (n. 2).

⁵ E-3 Magazine, ‘Strong vs. Weak Artificial Intelligence’, (*E-3 Magazine*, 27 May 2019), <<https://e3zine.com/strong-artificial-intelligence/>> accessed 7 April 2020.

⁶ David Lehr and Paul Ohm, ‘Playing with the Data: What Legal Scholars Should Learn about Machine Learning’, *U.C. Davis Law Review*, (2017), 51, 653, <https://lawreview.law.ucdavis.edu/issues/51/2/Symposium/51-2_Lehr_Ohm.pdf> accessed 7 April 2020.

⁷ Rothkegel (n. 3).

neurons in the human brain”.⁸ According to DeepMind Technologies, “due to increases in computer power, neural networks (NNs) have become extremely powerful, and big NNs that operate on big data can achieve surprising outcomes”.⁹ For instance, AlphaGo an AI program found a way to learn how to play a Go game by searching powerful algorithms and combining NN, which produced a surprising outcome by defeating the world’s most influential Go player Lee Sedol.¹⁰ Moreover, the majority of AI-generated works heavily relied on human input as machines merely considered as tools rather than creators.¹¹ However, the revolutionary and rapid development of advanced ML technologies has proven the AI’s ability to make its own independent decisions during the process of creative work without any human intervention.¹² The creation of AI robot lawyers, smart contracts and Algorithmic Dispute Resolution, has become an inevitable part of the legal field.¹³ It is not surprising that AI-based intelligent machines have already become more human-like just like humanoid Sophia being the first-ever robot having granted citizenship of Saudi Arabia in 2017.¹⁴ A few months later, Japan became the first country to issue a residency to an AI chatbot Shibuya Mirai.¹⁵

Today, it can be discovered from the ‘literary, artistic and musical’ works how ML algorithms analysing and collecting the data accommodated by the software engineers and generates a final version of a work by its own. In 2016, Netherlands unveiled *The Next Rembrandt*, an artwork generated by the intellectual ability of a computer in 3-D

⁸ DeepMind, AlphaGo, ‘The Movie | Full Documentary’, (13 March 2020), <https://www.youtube.com/watch?v=WXuK6gekU1Y&feature=emb_title> accessed 8 April 2020.

⁹ *ibid.*

¹⁰ Jacob Turner, ‘Robot Rules’, (Palgrave, 1st edn, 2019), 74-75.

¹¹ Andres Guadamuz, ‘Artificial intelligence and copyright: The rise of the machines is here, but they do not come as conquerors, they come as creators’, *WIPO Magazine*, (2017), <https://www.wipo.int/wipo_magazine/en/2017/05/article_0003.html> accessed 1 April 2020.

¹² Ana Ramalho, ‘Will Robots Rule the (Artistic) World? A Proposed Model for the Legal Status of Creations by Artificial Intelligence Systems’, *Journal of Internal Law* (2017), Vol. 21, No. 1, <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2987757> accessed 10 April 2020.

¹³ Shlomit Yanisky-Ravid, ‘Generating Rembrandt: Artificial Intelligence, Copyright, and Accountability in the 3A Era – The Human-Like Authors Are Already Here – A New Model’, *Michigan State Law Review*, (2017), 665, <<https://digitalcommons.law.msu.edu/cgi/viewcontent.cgi?article=1199&context=lr>> accessed 11 April 2020.

¹⁴ Paresh Kathrani, ‘Who owns the work that AI creates?’, (*World Economic Forum*, 6 December 2017), <<https://www.weforum.org/agenda/2017/12/who-owns-the-work-that-ai-creates/>> accessed 10 April 2020.

¹⁵ Patrick Caughill, ‘An Artificial Intelligence Has Officially Been Granted Residency’, (*Futurism*, 6 November 2017), <<https://futurism.com/artificial-intelligence-officially-granted-residency>> accessed 1 April 2020.

printed form.¹⁶ The final painting revealed an astounding result; how an AI-generated computer managed to produce a piece of portrait that scanned 169,263 fragments from 346 paintings of a Dutch artist Rembrandt.¹⁷ Essentially, while the software engineers are controlling the parameters of the work, the AI-generated systems are capable of creating the work entirely on their own by the use of an ANN. This means that AI-generated work is created with similar thoughts that usually are processed by humans.¹⁸ However, this has raised some grave concerns and debated discussions among legal scholars, practitioners and lawmakers that AI-generated works in the realms of copyright law may constitute copyright infringement. These concerns and debates will increase as modern technology improves, and the threat to copyright infringement for AI-generated works will increase.¹⁹

In 2016, Parliament of the United Kingdom proposed a report on issues concerning accountability and liability for works generated by robotics and AI's.²⁰ However, the UK parliament has not yet found any solutions in response to liability issues and who should be held accountable if something goes wrong. Dave Coplin suggests that people creating algorithms for an AI should bear legal responsibility for the AI's outcome.²¹ Moreover, Coplin indicates that people should use a "safety net" in order to take a careful approach on how to build AI systems.²² The following year in 2017, the European Parliament adopted Civil Law Rules on Robotics and considered whether robots should be granted a special legal status as "electronic persons" and whether robots should be liable for its accidents.²³ European Parliament believes that adopting such regulations will allow the independent and uncontrolled AI robot to bear legal responsibility for its acts or omissions.²⁴ However, Jyh-an Lee, argues that assigning a legal right to an AI machine would pose severe difficulties and in order to

¹⁶ Mark Brown, 'New Rembrandt' to be unveiled in Amsterdam', *The Guardian* (London, 5 April 2016), <<https://www.theguardian.com/artanddesign/2016/apr/05/new-rembrandt-to-be-unveiled-in-amsterdam>> accessed 1 April 2020.

¹⁷ *ibid.*

¹⁸ Guadamuz (n. 11).

¹⁹ *ibid.*

²⁰ House of Commons Science and Technology Committee, 'Robotics and artificial intelligence', *Fifth Report of Session*, (2016-17), 20, <<https://publications.parliament.uk/pa/cm201617/cmselect/cmsctech/145/145.pdf>> accessed 15 April 2020.

²¹ *ibid.*

²² House of Commons Science and Technology Committee (n. 20).

²³ European Parliament (2017), European Parliament resolution of 16 February 2017 with recommendations to the Commission on Civil Law Rules on Robotics, (2015/2103(INL)).

²⁴ *ibid.*

do that, an AI system would need to be granted legal personhood with its rights and responsibilities.²⁵ According to Xu Xinming, if the content collected without clear authorship, this could potentially lead to serious copyright infringement issues.²⁶ In 2017, an American tech company presented “Clearview AI” a new facial recognition software engine that is capable of scraping and matching over three billion images from internet websites and social media.²⁷ Thus it does not only raise significant privacy issues but also brings up some debatable questions in relation to copyright infringement of the AI-generated work. This is due to the fact that scraping and retaining images in Clearview AI’s database can potentially result in copyright infringement of copyright-protected images.²⁸

1.2 Aim and Research Questions

This paper seeks to understand the conditions on what constitutes copyright infringement in the computational processes involved during training and using ANNs. The aim of this paper is to investigate and find out whether the infringing acts committed as part of the computational processes involved in the use of trained ANNs can be considered as primary or secondary infringements as such. This will be achieved by thoroughly analysing the following central question:

What conditions constitute a liability for copyright infringement within the training and using of artificial neural networks?

Two operational questions will assist in answering the central research question:

- a) How is the liability for the infringing acts prescribed in the context of copyright law?
- b) What actors should be held liable for the damages caused by the infringing acts?

²⁵ South China Morning Post, ‘Who owns the copyright to works created by AI?’, (*Abacus News*, 20 December 2020), <<https://www.abacusnews.com/tech/who-owns-copyright-works-created-ai/article/3042946>> accessed 10 April 2020.

²⁶ *ibid.*

²⁷ Teresa Scassa, ‘How Clearview AI Could Violate Copyright Law: Clearview AI scraped countless copyright-protected images from social media sites to develop a commercial facial recognition technology. Could copyright law be used to dismantle its service?’, (*CIGI*, 10 March 2020), <<https://www.cigionline.org/articles/how-clearview-ai-could-violate-copyright-law>> accessed 11 April 2020.

²⁸ *ibid.*

The following questions seek to investigate the issues concerning the liability for copyright infringement of the works generated during the training of ANNs from a theoretical perspective and how these issues have been examined in practice. Another important matter that these research questions bring up is what the current traditional copyright laws and case law suggest at the present stage. Although the analysis does not provide a definitive answer to part (b), the research findings collected in this paper finds persuasive evidence against the infringing party from different cases. Moreover, the legal analysis highlights the urgent need for a full investigation on the liable party as the current copyright laws are not clear-cut when the case is concerned the infringing acts as part of the computational processes involved in the use of trained ANNs.

1.3 Method

1.3.1 Legal Dogmatic Method

The legal dogmatic method has been chosen as it goes beyond a mere description of the law.²⁹ Instead of focusing solely on case law and legislations, the author will not only look at the law as it is and how it is interpreted, but how the law and its application are analysed and critiqued by legal scholars and legislators.³⁰ The legal dogmatic approach is especially crucial in this thesis because the subject of copyright infringement in the use of trained NNs has caused significant debate and necessitates a closer examination on whether the current copyright law should be revised and reconsidered.

1.3.2 Comparative Legal Method

In addition to legal dogmatic method, the author will conduct a comparative case analysis of wide range of primary and secondary sources, which will shed light on current legal implications concerning accountability and copyright infringement of the

²⁹ Jan M. Smits, 'What is Legal Doctrine? On the Aims and Methods of Legal-Dogmatic Research', In Rob van Gestel, Hans-W. Micklitz and Edward L. Rubin (eds). *Rethinking Legal Scholarship: A Transatlantic Dialogue*, (CUO, 2017), 207.

³⁰ Andrzej Korybski, 'Application of Law as an Object of Study: Key Concepts, Issues and Research Approaches', (2015), Vol. 24, No. 2, <<http://cejsh.icm.edu.pl/cejsh/element/bwmeta1.element.ojs-doi-10.17951.sil.2015.24.2.13/c/598-582.pdf>> accessed 29 March 2020.

NN-generated works from the UK and EU law perspectives. This will be achieved by a thorough analysis of the legal doctrines applied between the UK and EU, and whether the aforementioned jurisdictions are aimed to examine one confined issue jointly.³¹ Importantly, the current thesis primarily deals with copyright infringement issues from the UK perspective, mainly because the UK approach in relation to AI-generated works are applied slightly differently than in the EU.

1.4 Literature Review

The literature conducted in this thesis will explore and analyse a wide array of primary and secondary sources such as relevant case law, legislations, books, peer-reviewed journal articles, IP law blogs, newspaper magazines, reliable websites, as well as other archived commentaries written by academic scholars and legal practitioners. Moreover, the sources selected for this thesis will help the author to gain an insight into the factual issues concerning copyright infringement in relation to AI-generated work.

Furthermore, Although the UK and EU legislatures have not considered the IP policy in relation to AI-generated works just yet, the suggested reports are promising exciting developments and perhaps amendments in current copyright laws in the future years. Subsequently, the questions on accountability and copyright infringement of the works generated during the training and using processes of NNs call for in-depth critical analysis and its practical application must be explored accordingly.

Lastly, many legal scholars and practitioners argue that training and using third-party data during the computational process of NNs may constitute primary copyright infringement. However, these scholars and practitioners have not analysed how the situation would look like in practice. The author believes that this might be due to the rapid development of AI technologies putting the legislators to a dead end. Dealing with the complexity of AI-generated work within the context of copyright law may both require an advance technical background and an extensive knowledge of copyright law. Based on the research findings, it could be discovered how AI-systems are

³¹ Paris Marie-Luce, 'The Comparative Method in Legal Research: The Art of Justifying Choices', *Legal Research Methods: Principles and Practicalities*, (2016), No. 09/16, 4, <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2798643> accessed 29 March 2020.

gradually becoming uncontrolled, and it can be suggested that the legislating bodies should take reasonable measures in implementing new copyright law provisions in relation to creative work developed by AI-machines to avoid possible legal implications, which may appear in the future years.

1.5 Limitations

Although there are various types of AI systems, the current paper primarily focuses on deep learning machines which are derived from the use of NN's.³² A review of the literature revealed that liability for copyright infringement of the legal use of trained ANNs in the context of copyright law is a relatively broad subject. If a study merely focused on copyright infringement, it would be studied and reported to a wider extent. There are many sub-topics to study and fitting them all into one thesis would pose a complicated challenge. The study's thematic limitations are tied entirely on the possible risk of copyright infringement during the training and using an ANNs, and whether the use of third-party data that may constitute copyright infringement.

This research is limited by the fact that this is an area of research that is relatively new and complex, given that the phenomenon of AI-generated work in copyright law is. Although the EU Parliament adopted the Civil Law Rules on Robotics in 2017 by considering the issues relating to legal personality and accountability of AI's, there is no single case in the legal databases that would analyse how the current copyright laws can apply in relation to infringing AI technologies. In addition, there is no individual case mentioning that liability for copyright infringement should be on the person who creates, owns, develops or uses AI-systems during computational processes involved in training and using NNs. Therefore, the opportunity to observe the development and trends are limited by a narrow window of opportunity.

Additionally, given the specificity of the research question, this thesis has focused on the subject of liability for copyright infringement of the legal use of trained ANNs in the context of copyright law rather than the broader implications of liability. While some factors have been considered, the author admits that a portion of relevant

³² Data Revolution, 'Artificial Intelligence vs. Machine Learning', (*Data Revolution*, 9 November 2017), < <https://www.datarevolutionhr.com/view-article.asp?article=bgluuiiultykl7> > accessed 7 April 2020.

material went unanalysed in the interest of maintaining the focus on copyright infringement from an AI perspective mainly. Moreover, this study is limited by the fact that the author used the existing copyright infringement cases and related legislations to find out whether the rules can apply in relation to current ANN-generated works. Thus it does not give the author the depth of material to appropriately compare and apply the existing statutes and cases with regards to ANN-generated works where the party who has been infringed upon should bare legal consequences for its acts or omissions.

1.6 Disposition

The following thesis is comprised of five chapters, including this introductory chapter. The second chapter presents detailed analysis on what constitutes a copyright infringement including the most common infringing act of “copying” as listed in the restricted acts of the Copyright, Designs, and Patents Act 1988 (CDPA). In the third chapter, the author will present a detailed explanatory on neural networks and its role of data in technological development. The chapter will also analyse the copyright infringement of exclusive rights in creative works within the EU. With respect to chapter four, the author will then go into an in-depth analysis of answering the research questions and the results reached in this thesis. Finally, the fifth chapter encompasses the concluding remarks and a number of additional recommendations and areas for further research that are highlighted in this paper.

CHAPTER 2: COPYRIGHT AT THE GLANCE

When a person purchases a copyrighted work, for example, a portrait, that does not necessarily mean that a person owns the copyright to the portrait unless the ownership of a copyright work is fully transferred and assigned to that person.³³ In addition, the copyright owner may also grant a license in order for another party to exercise certain copyrights. The copyright law protects the creative inputs of a copyright owner and grants the owner exclusive rights with respect to the copyrighted work.³⁴ Copyright infringements are divided into two categories, namely primary infringement, also known as (direct infringement) and secondary infringement, also known as (indirect infringement). Primary infringement may arise if a person unlawfully makes use of unauthorised copies of the author's original work.³⁵ As an illustration, by purchasing the portrait, a person is allowed to admire and hold care of the portrait. However, a person is not permitted without the copyright owner's consent to authorise or do any of the restricted acts as per Section 16 of the Copyright, Designs and Patents Act (CDPA) 1988: copying the work, making, renting, lending, performing, showing or displaying the copies available to the public and adapting the copyrighted work or performing any of the above mentioned acts with regard to adoption.³⁶

2.1 Primary infringement

An infringing person is strictly liable, meaning that the infringer's state of mind would not apply to liability.³⁷ Moreover, innocent infringement cannot apply to the existing copyright work. As can be seen from *David Hoffman v Drug Abuse Resistance Education* (DARE), the defendant copied 19 various drug pictures that belonged to Mr Hoffman and used the pictures in DARE's webpage.³⁸ The defendant asserted that there was no intention to infringe Mr Hoffman's copyrights and relied on section 97 CDPA. However, Section 97 CDPA cannot be used as a defence in relation to "innocent copying".³⁹ As such, Section 97 CDPA can only be referred as a defence

³³ Retrieved from LexisNexis Academic Database, 'Copyright infringement', < <https://www.lexisnexis.com.uow.idm.oclc.org/uk/lexispsl/informationlaw/document/393990/55YX-NS31-F18F-K546-0000-00/Copyright%20infringement>> accessed 20 May 2020.

³⁴ *ibid.*

³⁵ Retrieved from LexisNexis Academic Database (n. 33).

³⁶ Section 16 of the Copyright, Designs and Patents Act 1988.

³⁷ Retrieved from LexisNexis Academic Database (n. 33).

³⁸ *David Hoffman v Drug Abuse Resistance Education (UK) Ltd* [2012] EWPC 2.

³⁹ Hiroshi Sheraton et al., "The "innocent" copying defence: only applicable to works out of copyright", (*McDermott Will & Emery*, Lexology, 30 March 2012), <

where the copyright does no longer exist, or to works where the copyright owner cannot be traced.⁴⁰ Such works are recognised as ‘orphan works’ where the user of such works is free to exploit the copyrighted work of an undefined author.⁴¹ However, reusing the ‘orphan works’ might be highly risky and costly infringement lawsuit, especially in the event when the genuine copyright owner emerges.⁴² In order to prove a primary infringement, the claimant must demonstrate an “objective similarity”, and that similarity took place from an act of copying, whether consciously or subconsciously. Apart from “objective similarity” between the copyright works, the claimant must also prove a causal link between the works.⁴³ For instance, the causal link may arise from a subconscious act of copying where a song is subconsciously stored and parts of it reproduced later.⁴⁴ Other than the causal link, the claimant must also prove that the defendant copied the protected work in whole or in part, where that part is considered as substantially similar to the author’s original work.⁴⁵ In the case of *Ladbroke v William Hill*, Lord Reid stated that the substantiality test is a matter of quality rather than a quantity of the extracted part of the original copyright work.⁴⁶

Furthermore, in order to apply the qualitative test and determine the substantial similarity of the copied work, it is essential to identify at first instance whether the copied features correspond to the author’s original work. The investigation then made based on quality and similarity to find out whether an infringement has resulted from copying. If an act of copying is discovered, then the evaluation is made based on whether the copied parts represent a "substantial part" of the copyright work. As could be seen from the *Designers Guild* case, the court established that the copied features of an artwork that belonged to the fabric design *Ixia*, cumulatively constituted a substantial amount of the work.⁴⁷ As such, the “substantial similarity” test does not

<https://www.lexology.com/library/detail.aspx?q=29c1dab6-216e-4d83-9dc9-d8b9f95f8fc4>> accessed 20 May 2020.

⁴⁰ *ibid.*

⁴¹ Out-Law Guide, ‘Unwitting infringements and the law’, (*Pinsent Masons*, 13 February 2009), < <https://www.pinsentmasons.com/out-law/guides/unwitting-infringements-and-the-law>> accessed 20 May 2020.

⁴² Jennifer Urban and David Hansen, ‘Report on Orphan Works Challenges for libraries, archives, and other memory institutions’, *Berkeley Law, University of California*, (2013), (4), < https://cmsimpact.org/wp-content/uploads/2017/05/report_on_orphan_works_challenges.pdf> accessed 20 May 2020.

⁴³ *Francis Day & Hunter v. Bron* [1963] Ch. 587.

⁴⁴ *ibid.*

⁴⁵ Retrieved from LexisNexis Academic Database (n. 33).

⁴⁶ *Ladbroke (Football) Ltd v William Hill (Football) Ltd* [1964] 1 WLR 273 at 276.

⁴⁷ *Designers Guild v Russell Williams* [2001] 1 All ER 700.

require whether the copied work is similar to the original one. However, the test requires to see whether the copied features appear in the infringer's work and whether the copied features compose a “substantial part” of the author's original work.⁴⁸ To put it differently, a substantial part of the work can appear in the introductory song or in the middle of a memorable riff that is fundamentally crucial to the whole work. The case of Designers Guild primarily deals with substantiality within the scope of artistic work. Additionally, the substantiality test can be applied in many other instances. For instance, in *Hawkes v Paramount Film services*, using a few bars of a full march belonging to “Colonel Bogey March” infringed the copyright because the bars were easily identifiable.⁴⁹ Similarly, in *HRH Prince of Wales v Associated Newspapers*, Blackburne J held that unauthorised extracts from the Prince of Wales’s journal published on *The Mail on Sunday*, satisfied the ‘substantiality’ test as the extracts touched upon Prince’s opinion were of highest interest to the newspaper’s readers.⁵⁰ Blackburne J also stated that only 15% of extracts taken from an entire journal could be substantial in quantitative terms.⁵¹

2.2 Restricted act: “to copy”

Reproducing the copyrighted work is one of the most common infringing acts as listed in Section 16 of the CDPA.⁵² Unauthorised copying may occur in all types of copyright work which may amount to an infringement. The infringer's work must be done in a material form.⁵³ For instance, baking a pie from a written recipe may not constitute a copyright infringement simply because the pie would not show visual resemblance to the written recipe.⁵⁴ Moreover, copyright infringement may appear in a drawing or sculpture as well as in a literary, artistic or musical work stored in computer's hard disk drive. For the artistic work, “a three-dimensional copy of a two-dimensional work and vice versa” may constitute copyright infringement.⁵⁵

⁴⁸ *ibid.*

⁴⁹ *Hawkes v Paramount Film services* [1934] Ch 593.

⁵⁰ *HRH Prince of Wales v Associated Newspapers* [2008] IP & T 583.

⁵¹ Peter Brownlow, ‘Case Bulletin: HRH The Prince of Wales v Associated Newspapers Ltd’, <
<https://www.yumpu.com/en/document/read/24231556/bird-bird-case-bulletin-on-hrh-prince-of-wales-v-associated>> accessed 22 May 2020.

⁵² Retrieved from LexisNexis Academic Database (n. 33).

⁵³ Section 17(2) of the Copyright, Designs and Patents Act 1988.

⁵⁴ *ibid.*

⁵⁵ Bainbridge, D, ‘Intellectual Property’, (Pearson, 10th edn, 2018), 178.

2.3 Secondary infringement

In contrast to primary infringement which in most cases requires reproduction of the work, secondary infringement is primarily dealing with infringing copyright works in commercial activities.⁵⁶ Secondary infringing acts include: making, importing, selling, letting for hire, exposing for sale or hire, distributing and or possessing infringing copies in the course of commercial activity.⁵⁷ Unlike the primary copyright infringement, secondary infringement requires infringer's state of mind, such as knowledge. As such, the infringing party should be aware or at least have a reason to believe that the performed acts are infringing the original work of a copyright owner.⁵⁸ These acts are mainly concerned when dealing with infringing copyright material and providing the resources for their production. The ones authorising the infringing act by way of facilitating performance within the infringing work might be involved in the proceedings as a joint tortfeasor.⁵⁹

2.4 The infringer's "state of mind" in the context of ANNs

Having analysed the requirements for primary and secondary copyright infringements, an interesting legal question arises whether infringer's state of mind can be applied in the context of ANN-generated works or does it merely require human participation to determine a secondary infringer. As previously mentioned there cannot be a cause of action unless the defendant is aware or "had no reason to believe" that the activities carried out in the works are infringing the copyright owner's rights. To satisfy the criteria for 'knowledge', a reasonable person test is likely to apply. It is also essential to establish an objective test with a subjective element, which should come forward from the defendant's own knowledge and experience.⁶⁰ In the case of *Law Gear Inc v Hi-Tec Sports plc*, the defendant was selling a prototype shoe which belonged to the claimant. The claimant sent a letter of claim with enclosed imaged of a shoe asking the defendant to abstain from making a sale of shoes. The defendant refused the claimant's letter of claim and made its shoes available for sale. As a result, the

⁵⁶ Section 22-27 of the Copyright, Designs and Patents Act 1988.

⁵⁷ *ibid.*

⁵⁸ Out-Law Guide (n. 41).

⁵⁹ *MCA Records v Charly Records* [2001] All ER (D) 115 (Nov).

⁶⁰ *LA Gear Inc v Hi-Tec Sports PLC* [1992] FSR 121.

defendant held liable for secondary liability because the defendant received proof of design drawings from the claimant. Therefore, the defendant had reason to believe that selling shoes were a secondary infringement.⁶¹ In most instances where the infringer is a company, the state of mind would heavily rely on the director of the company. However, in some instances as in the case of *Tesco Stores Ltd v Brent London Borough Council*, the knowledge or belief of an employee can be more than enough to make the company liable.⁶² It is therefore recommended for the claimant to send a letter of notice together with an attached digital example of the protected work to the defendant to warn about the secondary infringing act. The defendant is then given a reasonable amount of time to evaluate and formulate a view on secondary infringement. The reasonable amount of time for straightforward cases are given 14 days and up to three months for the controversial ones.

Although ANNs are capable of providing human-like interactions and can be of great assistance in completing particular tasks, it cannot, however, replace humans as it is far beyond from that level.⁶³ It can be argued that the current ANN-systems are primarily based on rules-based “expert systems”, which heavily relies on the decision-making processes of its programmers and users.⁶⁴ The proponents of AI’s may disagree in this regard. However, even though ANNs can complete the most complex tasks, they may not truly be considered creative because ANNs can only process the information provided in ANN’s knowledge base by its programmer.⁶⁵ It can also be argued that ANN is incapable of making accurate ethical, social, legal and any other related judgements in relation to the final product.⁶⁶ Having considered all the facts, it can be concluded that ANNs cannot have an infringing state of mind because ANNs cannot make a judgement on what is right or wrong during the infringing process. This does not, however, mean that primary infringement may not be present in the infringing acts itself. Any questions in relations to ANNs infringing acts will essentially require a

⁶¹ *ibid.*

⁶² *Tesco Stores Ltd v Brent London Borough Council* [1993] 2 All ER 718.

⁶³ SAS, ‘Artificial Intelligence: What it is and why it matter’, <https://www.sas.com/en_us/insights/analytics/what-is-artificial-intelligence.html> accessed 24 May 2020.

⁶⁴ Shlomit Yanisky-Ravid (n. 13), 674.

⁶⁵ *ibid.*

⁶⁶ Hugh Stephens, ‘AI, Ethics and Copyright’, (*Hugh Stephens Blog*, 16 March 2020), <<https://hughstephensblog.net/2020/03/16/ai-ethics-and-copyright/>> accessed 25 May 2020.

human involvement behind ANN-generated work who will take responsibility for decisions made in the editing and finalisation of ANNs work.⁶⁷

⁶⁷ *ibid.*

CHAPTER 3: NEURAL NETWORKS AND ITS ROLE OF DATA IN THE TECHNOLOGICAL DEVELOPMENT

The following chapter critically analyses and explores whether and under which circumstances the use of third-party data to create AI applications could constitute copyright infringement. The chapter underlines explicitly the importance of using machine learning technology, namely artificial neural networks which can be instructed to conduct certain tasks. In order to build up an AI application that is based on ANN-trained data, it is required to have access and an authorisation for the use of data which suits for training purposes.⁶⁸ That is to say, in order for a neural network to recognise various types of dogs during the training process, it is essential to use labelled pictures of various types of dogs. Considering that data can be protected by an IP right holder, any unauthorised use of that data without IP right holders' permission may constitute copyright infringement.⁶⁹ However, it is not entirely clear if using trained NN could fall within the scope of copyright holders' exclusive rights, namely "the right to reproduce copyright work".⁷⁰ The following chapter will further examine whether the "computational processes" during the NN's training process and the use of trained NNs could amount in direct copyright infringement. Furthermore, the "computational processes" that are involved in NNs; direct and indirect infringement which arise from the training and use of NNs with an aim to produce goods or services cannot "be subject to such fundamental uncertainty in the applicability of exclusive rights".⁷¹ The paper investigates and offers legal solutions for resolving the issues relating to accountability for copyright infringement of the ANN-generated work.

As previously mentioned, the vast majority of the technological work involved in the field of AI such as voice recognitions, images and automated vehicles are heavily relied on NNs.⁷² The benefit of NNs is that a programmer is not required to instruct what an AI-machine should do as NN can by its own analyse and learn new techniques from the existing data and decide how to carry out its tasks.⁷³ To give an example, NN

⁶⁸ Rosa Maria Ballardini et al., 'Regulating Industrial Internet Trough IPR, Data Protection and Competition Law, (Wolters Kluwer 2019), 99-114.

⁶⁹ *ibid.*

⁷⁰ Ballardini (n. 68).

⁷¹ *ibid.*

⁷² Ian Goodfellow et al., 'Deep Learning and neural networks', (*Elements of AI*, 2016), Ch. 5, <<https://course.elementsofai.com/5>> accessed 7 May 2020.

⁷³ *ibid.*

could be trained by using dog images to see whether the NN-system can recognise a dog from an image.⁷⁴ However, it is not an easy task to achieve such functionality as different types of dogs can be represented differently in each image. Likewise, NNs could be trained to use and independently produce completely new images of dogs.⁷⁵

Furthermore, an NN is a system consisting of interrelated neurons, which can process the received data either from the network or other form of neurons. Once the given data is supplied into the system, it is capable of processing the data and produce new outcomes. Different types of NNs may perform different functionalities. As an illustration, a deep NN may have more than one concealed layer of neurons “between its input and output layers”.⁷⁶ Moreover, deep NN is competent enough to tackle with complex missions. Consequently, deep NN are the foundation of the most existing AI applications. Hence, the use of deep NN in practice is very limited by the algorithms, computational resources, and data available for training.⁷⁷ To put it differently, some AI applications necessitates a vast and complicated NNs, which may require extensively broad computational resources. The issue arises that developing such computational resources from a technical or commercial point of view may be practically impossible.⁷⁸

Furthermore, data plays a significant part during the training process of NNs. As such, NN processes the supplied data and adjusts the parameters on the basis of outcomes it produced. Having attempted several trainings, the desired outcome may be attained. That is to say, a NN can by way of “trial and error” modify the parameters to learn whether it can recognise an image of a dog. After the appropriate training, NN is capable of producing outcomes based on supplied data and processed network, e.g. to establish whether an image is representing a dog which has been supplied into NN.⁷⁹

⁷⁴ Kirill Panarin, ‘Dog Breed Classification using Deep Learning: a hands-on approach’, (*Towards data science*, 25 October 2017), < <https://towardsdatascience.com/dog-breed-classification-hands-on-approach-b5e4f88c333e>> accessed 7 May 2020.

⁷⁵ Kyle Wiggers, ‘DeepMind AI can generate convincing photos of burgers, dogs, and butterflies’, (*Venturebeat*, 2 October 2018), < <https://venturebeat.com/2018/10/02/deepmind-ai-can-generate-convincing-photos-of-burgers-dogs-and-butterflies/>> accessed 7 May 2020.

⁷⁶ *ibid.*

⁷⁷ Goodfellow (n. 72).

⁷⁸ *ibid.*

⁷⁹ Goodfellow (n. 72).

3.1 Copyright Infringement in training and using the artificial neural networks

Thus, computational processes that are involved during the use and training processes of NNs, are relevant within the context of copyright law especially when NNs contains third-party data that may constitute copyright infringement.⁸⁰ Important to note that copyright infringement may occur if during the training process the protected images of dogs were copied and supplied into NN's data to reproduce its own version of an image.⁸¹ However, as previously mentioned it is not entirely clear to what degree the “computational processes” during the use and training process of NNs may fall within the ambit of copyright holders’ exclusive rights.⁸² Since none of the “computational processes” corresponds to any exclusive rights of the copyright holder, the possibility may arise where these computational processes could possibly involve “using, making or reproducing protected subject matter, all actions covered by the exclusive rights” by various copyrights.⁸³

3.2 Copyright infringement of exclusive rights in creative works within the EU

The EU copyright law protects the intellectual creation of the author’s original work and “gives rise to both moral and economic exclusive rights”.⁸⁴ The requirements for direct copyright infringement in the EU have been partly harmonised through different types of directives in which EU Member States (MS's) are required to provide “certain exclusive rights to authors”, and allow to grant or request MS's to establish certain “limitations or exceptions” to author's exclusive rights.⁸⁵ However, important to note that secondary infringements in the EU are not harmonised because secondary infringements can only appear in the case where a primary infringement is in place.⁸⁶ Furthermore, the EU Member States are also part of the contracting parties of the

⁸⁰ Ballardini (n. 68).

⁸¹ *ibid.*

⁸² Ballardini (n. 68).

⁸³ *ibid.*

⁸⁴ EUIPO, ‘IP for Consumers: What does copyright and related rights mean and cover, and is it the same all over the world?’, < <https://euipo.europa.eu/ohimportal/en/web/observatory/faqs-on-copyright-it>> accessed 7 May 2020.

⁸⁵ 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 (22 June 2001).

⁸⁶ Christina Angelopoulos, ‘European intermediary liability in copyright: a tort-based analysis’, *Centre for Intellectual Property and Information Law*, (2016), p. 9.

TRIPS agreement, which comprises the Berne Convention requiring the contracting parties to provide “a set of exclusive IP rights”, to which “limitations or exceptions” are allowed under specific conditions.⁸⁷

Having said that, one of the appropriate exclusive rights that can be considered within the framework of using and training NNs is the right of reproduction.⁸⁸ Although the copyright work can be copied during the digital operational processes in the use of trained NNs, it does not necessitate that the copied materials must be communicated or distributed to the public.⁸⁹ As stated in Article 5(a) of the Computer Programs Directive and extended in Article 2 of the InfoSoc Directive, the reproduction right covers “direct or indirect, temporary or permanent reproduction by any means and in any form, in whole or in part”.⁹⁰ Importantly, in order to prove the infringing reproduction, it is necessary to establish that the copying act originated from the protected work, irrespective of the person's intention who performed the copied act. However, “independent creation of a similar work” cannot be qualified as an infringing reproduction.⁹¹

⁸⁷ Article 13 of the Trade-Related Aspects of Intellectual Property Rights agreement.

⁸⁸ Ballardini (n. 68).

⁸⁹ *ibid.*

⁹⁰ Mireille M. M. van Eechoud, ‘Harmonizing European Copyright Law: The Challenges of Better Lawmaking’, (*Wolters Kluwer*, 2009) p. 74.

⁹¹ *ibid.*

CHAPTER 4: MAIN ANALYSIS

4.1 What conditions constitute a liability for copyright infringement within the training and using of artificial neural networks?

The use of copyright work by trained NNs poses an interesting question on whether the authors exclusive rights could be infringed upon the “computational processes” during the NN's training procedure or in the use of NNs once it passes the training.⁹² Importantly, the current law on exclusive rights does not cover the use of data as such, and copyright infringement will not occur unless the author can prove an unlawful exploitation of any exclusive rights under the national law.⁹³ For example, by using information contained in the length of a recorded sound in some seconds may not fall within the scope of protection provided to that work. This implies that using the information to model trends within the length of a song cannot be protected by any exclusive rights just as in the case of “Batt Cage” in which silence did not amount to copyright.⁹⁴

In fact, the use of copyright materials in training and developing NNs may involve conduct that falls within the context of copyright owner's exclusive rights. The most obvious infringement which may arise in exclusive right is when copyright material is reproduced during the use of trained NNs. Reason for this is that when trained NNs using copyright material, “digital reproduction of the data is often required in the random-access memory, hard drives, central processing units or specialised microprocessors” devised for NN based machines.⁹⁵ With that said, reproduction may arise in various stages during the use of trained NNs. The first stage is that in order to prepare NNs for training, data containing dog images will digitally be copied into NNs hard drive. As a result, it can certainly be asserted that digital copying the identical part of the work in the use of trained NNs can constitute an infringement based on the reproduction right.⁹⁶ The second stage where right of reproduction could be infringed is when the “computational processes” are involved during the training of NNs. As an example, when NNs are trained by use of dog images, data which is fed into NNs as

⁹² Ballardini (n. 68).

⁹³ *ibid.*

⁹⁴ Jeremy Phillips, ‘The price of silence and the myth of the Batt Cage’, (*IPKat*, 19 April 2012), <<http://ipkitten.blogspot.com/2012/04/price-of-silence-and-myth-of-batt-cage.html>> accessed 14 May 2020.

⁹⁵ Ballardini (n. 68).

⁹⁶ *ibid.*

part of the computational processes or by way of outputs produced during the NNs training can result in infringing reproduction.⁹⁷ Additionally, the infringement of the reproduction right may arise, if the produced dog images contains identical parts or substantial amount of similarity to copyright images of dogs used during the course of training NNs.⁹⁸

Irrespective of whether the protected elements can be reproduced primarily depends on how the NN was designed. If an NN only analyses to find out whether the provided picture illustrates a dog, it would not be enough for the NN to generate an infringing output. However, an infringement may arise if the copies were produced within NN itself in the frame of “computational processes”.⁹⁹ Moreover, it is required to prove that the reproduced work entailed in NN's hard drive is of a substantial similarity to the author's original expression. Evidently, reproduction of copyright work may take place at various instances during the use of trained NNs. Accordingly, an infringement may arise if the “exceptions or limitations” does not apply to activities, which are performed without copyright owner’s permission.¹⁰⁰ Important to note that EU copyright law does not set out any specific “exceptions or limitation”, which explicitly covers the commercial use of trained NNs. Additionally, EU copyright law only allows a few “exceptions or limitations” to be adopted and applied to commercial activities by the EU Members States namely in the instances where “certain specific activities” are linked to the work reproduced within the ambit of journalism.¹⁰¹

This implies that the development activities carried out for commercial purposes of NNs scarcely ever may gain an advantage of "exceptions to the exclusive rights". However, in certain cases, “temporary copies”, which take place during the part of technological procedure could satisfy the provisions for the “mandatory exception” in which all 27 EU Member States are required to envisage during “temporary copying”.¹⁰² In addition, Directive on Copyright in the Digital Single Market adopted two exceptions in relation to text and data mining (TDM), namely "mandatory TDM exception for the benefit of non-commercial research organizations and cultural

⁹⁷ Ballardini (n. 68).

⁹⁸ *ibid.*

⁹⁹ Ballardini (n. 68).

¹⁰⁰ *ibid.*

¹⁰¹ Article 5(3)(c), Directive 2001/29/EC.

¹⁰² Article 5(1), Directive 2001/29/EC.

heritage situations" and "conditionally permitted TDM for commercial purposes", which also gained a mandatory status.¹⁰³ Having said that, the indicated mandatory TDM exceptions could be applied for training purposes of NNs to a degree in which training NNs constitutes TDM and, in the course of commercial uses, based on condition that "right holders have not expressly reserved their rights".¹⁰⁴

The current copyright laws on AI technologies are not equipped to deal with copyright infringements. According to Section 16(2) of the Copyright, Designs and Patents Act 1988 (CDPA), copyright can only be infringed by a person.¹⁰⁵ As such, from a practical point of view, copyright infringement cannot occur directly by an AI system. Having said that, this could potentially lead to an unsatisfactory position since the copyright owner would highly likely be rejected to claim compensation for damages caused as a result of NN-generated work.¹⁰⁶ Moreover, it is worth to mention that if the primary infringement is not in place because the infringing act is committed by an NN-generated system, then the question of a secondary infringement by a person will not be present.¹⁰⁷ Section 16(2) of the CDPA also asserts that "copyright is only infringed by a person who authorises another to do, any of the restricted acts by the copyright".¹⁰⁸ One of the listed restricted acts includes "copy the work" of a copyright owner.¹⁰⁹ Furthermore, section 17(2) CDPA states that:

"copying in relation to a literary, dramatic, musical or artistic work means reproducing the work in any material form. This includes storing the work in any medium by electronic means."¹¹⁰

Additionally, section 17(6) provides that, "copying in relation to any description of work includes the making of copies which are transient or are incidental to some other use

¹⁰³ Bernt Hugenholtz, 'The New Copyright Directive: Text and Data Mining', (Kluwer Copyright Blog, 24 July 2019), <http://copyrightblog.kluweriplaw.com/2019/07/24/the-new-copyright-directive-text-and-data-mining-articles-3-and-4/?doing_wp_cron=1590180133.6523768901824951171875> accessed 20 May 2020.

¹⁰⁴ *ibid.*

¹⁰⁵ Section 16(2) and (3), Copyright, Designs and Patents Acts 1988.

¹⁰⁶ Kyra Nezami, 'AI AND INTELLECTUAL PROPERTY: CAN AI INFRINGE COPYRIGHT?', (*IP Harbour*, 14 August, 2017), <<https://ipharbour.com/blog/latest/ai-intellectual-property-can-ai-infringe-copyright/>> accessed 5 May 2020.

¹⁰⁷ *ibid.*

¹⁰⁸ Section 16(2), Copyright, Designs and Patents Acts 1988.

¹⁰⁹ Section 16 (1) (a) of the Copyright, Designs and Patents Act 1988.

¹¹⁰ Section 17 (2) of the Copyright, Designs and Patents Act 1988.

of the work.”¹¹¹ Thus, training ANNs by ‘copying’ could be infringed in three essential ways:

- (1) Through copying and saving the copyrightable materials into USB drive during the preparation process for training the ANNs;
- (2) Through processing the materials on computer’s hardware during the training process; or
- (3) By using ANNs to create a derivative work to reproduce the components contained from original work.¹¹²

By referring to the third part, an interesting question appears whether the work created by a trained ANN reproduces a substantial portion of an original copyright work. The following requires a ‘qualitative test’.¹¹³ As it can be seen from *Infopaq*, the Court of Justice of the European Union, (CJEU) established that “various parts of a work enjoy protection under Article 2(a) of the InfoSoc Directive (Directive 2001/29/EC)”.¹¹⁴ The CJEU further states that infringing reproduction can be proved if the copied work derived from the “substantially similar” parts of the protected work and that the protected work “contain elements which are the expression of the intellectual creation of the author of the work”.¹¹⁵ The CJEU in *Infopaq* concluded that:

“An act occurring during a data capture process, which consists of storing an extract of a protected work comprising 11 words and printing out that extract, is such as to come within the concept of reproduction in part within the meaning of Article 2 of Directive 2001/29”.¹¹⁶

However, CJEU passed this determination further to the national courts. It could be argued however that the conditions laid down in Section 16(3) of the CDPA 1988 on the wording of ‘substantial part’ must be interpreted in accordance with InfoSoc Directive.¹¹⁷ Having said that, Article 2 of the InfoSoc Directive, in regards to

¹¹¹ Section 17 (6) of the Copyright, Designs and Patents Act 1988.

¹¹² Eleonora Rosati, ‘When does AI infringe copyright?’, (*IPKat*, 20 March 2019), <<http://ipkitten.blogspot.com/2019/03/when-does-ai-infringe-copyright.html>> accessed 6 May 2020.

¹¹³ *ibid.*

¹¹⁴ Rosati (n 112).

¹¹⁵ Case C-5/08 *Infopaq International A/S v. Danske Dagbaldes Forening* ECLI:EU:C:2009:465, 24.

¹¹⁶ Case C-5/08 *Infopaq International A/S v. Danske Dagbaldes Forening* ECLI:EU:C:2009:465, 2.

¹¹⁷ Charlotte Waelde et al., ‘Contemporary Intellectual Property Law and Policy’, (OUP, 2016 4th edn), 131.

'reproduction right' does not refer to 'substantial part' and should be interpreted in a similar way to the whole EU.¹¹⁸

The UK courts can hardly allow a person authorising an AI-system in a pertinent sense. The UK courts will neither permit the use of AI within the restrictive meaning of "authorises". The case of *CBS Songs v Amstrad*, is a good example as the data feed into AI system can without exception be used in a non-infringing act and by supplying the given data can simply facilitate copying which does not necessarily result to authorisation.¹¹⁹ Nevertheless, AI systems gradually become more uncontrollable due to independent acts without the involvement of a human. Therefore, Section 16(2) of the CDPA on "any authorisation by a person" becomes highly unlikely to apply.¹²⁰ Today, it can be discovered how AI systems are capable of learning through advanced ML methods such as NNs by processing a wide range of data and analyses the correlation between the data it contains.¹²¹ However, even the most advanced AI systems primarily depending on the information provided by AI's programmer. Even though an AI system cannot own copyrights for its creative works, nor can it be sued for copyright infringement, the creator of an AI program may by virtue of section 9(3) of the (CDPA) 1988 claim the copyright of a computer-generated work only if "the arrangements necessary for the creation of the work are undertaken" by an author.¹²² To put it differently, the programmer who directed the operation of an AI program by devising the appearances of the substantial amount of elements of a program may be deemed to claim the authorship of the computer-generated work.¹²³ However, application of Section 9(3) CDPA may not apply to autonomous AI systems because it would be impossible to identify a human author in place.¹²⁴

An interesting question appear whether the independently AI-generated work can be granted a copyright or whether the work would most probably fall in the public domain. The answer to this question it depends. If the work merely created by an AI-

¹¹⁸ *ibid.*

¹¹⁹ *CBS Songs Ltd v Amstrad Consumer Electronics Plc* [1988] 1 AC 1013.

¹²⁰ *Nezami* (n. 106).

¹²¹ *ibid.*

¹²² Section 9(3), Copyright, Designs and Patents Act 1988.

¹²³ Gerald Dworkin & Richard D. Taylor, 'Blackstone's Guide to the Copyright, Designs and Patents Act 1988', (Blackstone Press, 1989), 47.

¹²⁴ Madeleine de Cock Buning, 'Autonomous Intelligent Systems as Creative Agents under the EU Framework for Intellectual Property', *European Journal of Risk Regulation*, (2016) 2, 310.

system, then the AI owner may not claim copyright protection nor can the owner bring the case for copyright infringement. The *Monkey Selfie* case is a good illustration of where a non-human author could not bring a case for copyright infringement.¹²⁵ In this case, a smiley macaque Naruto, took a selfie from David Slater's photo camera. Once Mr Slater published the photographs taken by Naruto, the People for the Ethical Treatment of Animals (PETA), brought a claim against Slater for infringing Naruto's copyrights. The court dismissed the case based on the grounds that as an animal, Naruto lacked "statutory standing" to sue for copyright infringement.¹²⁶ Therefore, the widespread pictures of Naruto taken from Slater's camera appeared in the public domain. However, Chinese copyright law experts would disagree with the outcome produced in the case of *Naruto*. Taking the example of *Shenzhen Tencent v Shanghai Yingxun* case it became the first-ever copyright infringement lawsuit for an article generated by an AI program.¹²⁷ In 2018, the Chinese giant tech company Tencent Holding Ltd published an article with a clear disclaimer that the work "automatically written by Tencent Robot Dreamwriter".¹²⁸ A few months later the original article appeared on Shanghai Yingxun's webpage. Tencent Holding Ltd brought a lawsuit against Shanghai Yingxun for replicating and publishing the article without Tencent's permission. The People's Court of Nanshan District of Shenzhen said that:

"the article's form of expression conforms to the requirements of written work and the content showed the selection, analysis and judgement of relevant stock market information and data... the article's structure was reasonable, the logic was clear, and it had a certain originality".¹²⁹

As a result, the court ordered Shanghai Yingxun to compensate Tencent 1,500 yuan (\$216) for illegal use of material initially written by Tencent's AI robot.¹³⁰ It would be interesting to see whether the outcome of this case could influence the current EU

¹²⁵ *Naruto et al., v. David Slater*, 888 F.3d 418 (9th Cir. 2018).

¹²⁶ Loeb & Loeb, 'Naruto v. Slater', (*Lexology*, USCA, Ninth Circuit, 23 April 2018), < <https://www.lexology.com/library/detail.aspx?q=6c52581e-d82f-4bb7-802c-191db44dca9f>> accessed 20 May 2020.

¹²⁷ Paul Sawers, 'Chinese court rules AI-written article is protected by copyright', (*Venture Beat*, 10 January 2020), < <https://venturebeat.com/2020/01/10/chinese-court-rules-ai-written-article-is-protected-by-copyright/>> accessed 18 April 2020.

¹²⁸ *ibid.*

¹²⁹ Parimal Rohit, 'Chinese Court: Article generated by Artificial Intelligence is protected by copyright', (*AH1*, 15 January 2020), < <https://www.ah1.live/blogn/2020/1/15/chinese-court-article-generated-by-artificial-intelligence-is-protected-by-copyright>> accessed 18 April 2020.

¹³⁰ Sawers (n. 127).

and national copyright laws, and whether the policy makers will take a similar approach from a Chinese copyright perspective and will suggest new provisions that would benefit AI-based companies.

4.2 Which actors should be held accountable for the damages caused by the infringing copyright acts?

Under the Section 9(3) of the CDPA 1988, the creator of an AI might be held accountable for the ANNs direct infringing acts.¹³¹ In other words, if the ANN's owner trains an ANN system employing data inputs or programming to cause the ANNs infringement, then the owner will result in direct infringement.¹³² Such an infringement is akin to using an ANN system to copy and reproduce copyright material, which can amount to direct infringement.¹³³ On the other hand, if an ANN system autonomously decides to infringe a copyright, then an ANN owner can be vicariously liable for possessing the right and for supervising the infringing act as well as any commercial interests within the infringing act. Additionally, allowing an ANN system to copy copyright materials may lead a person for contributory copyright infringement in some cases.¹³⁴ Unlike the UK approach, the US approach considers that ANN system should bare legal responsibility for its own acts or omissions.¹³⁵ However, the present copyright laws does not recognise an ANN-system as a copyright infringer nor does it grant any legal personality rights for an ANN to be responsible for its acts or omissions.

Establishing who should be held liable for damages caused as a result of infringing acts during the training and using of ANNs may not be an easy task because there might be several actors involved in the development processes of ANNs.¹³⁶ These actors involves: the programmes, trainers or the data providers, feedback providers, the users, states or the employers that might be accountable the infringing actions of ANNs. Moreover, many common law jurisdictions including UK, US,

¹³¹ Jason Bloom and Stephanie Sivinski, 'Are Works Generated by AI Subject To IP Protection?', (*Law360*, 9 March 2018), < <https://www.law360.com/articles/1020262>> accessed 6 May 2020.

¹³² *ibid.*

¹³³ Bloom and Sivinski (n. 131).

¹³⁴ *ibid.*

¹³⁵ Shlomit Yanisky-Ravid (n. 13), 689.

¹³⁶ Shlomit Yanisky-Ravid (n. 13), 692.

Australia and Japan recognised the doctrine of Works Made for Hire (WMFH).¹³⁷ The WMFH doctrine primarily deals with authorship of copyright works that is created by employees and independent contractors during the course of an employment. This implies that the authorship is not vested to the original creator of the copyright work, but rather to the employer of the author. Realistically, WMFH doctrine seems to fit well theoretically with the issue concerning ANN-generated works.¹³⁸ However, it may not always be a clear-cut who should be the employer or independent contractor for ANN-generated work. This may vary from case to case. In most of the cases, it will be the user who will operate and provide directions to ANNs e.g. what to draw or write.¹³⁹ As such, the user may stand along for any financial risks of buying or hiring the ANNs and may be accountable for the data fed into ANNs with an aim to produce a final product. The user can be private individuals, commercial entities, states or governmental bodies. Having said that, the WMFH doctrine is perhaps the only reasonable solution for the issue posed on accountability as it vests the responsibility on the users being considered as employers or contractors of the ANNs. Considering ANNs as an employee creators or independent contractors enables the legislators to take control over the ANNs outcomes. Finally, imposing accountability on users may provide careful, economical operation of ANNs and may prevent from possible damages arisen as a result of copyright infringement.

4.3 Possible defence for infringing NNs

There are three possible solutions to file a defence for part (1) and (2). Firstly, Section 28A of the CDPA states that:

“Copyright in a literary work, other than a computer program or a database, or in a dramatic, musical or artistic work, the typographical arrangement of a published edition, a sound recording or a film, is not infringed by the making of a temporary copy which is transient or incidental, which is an integral and essential part of a technological process and the sole purpose of which is to enable – (a) a transmission of the work in a network between third

¹³⁷ Sutherland Asbill & Brennan LLP, ‘Analysis of International Work-for-Hire Laws’, *Sutherland Asbill & Brennan LLP*, (2004), < <https://us.eversheds-sutherland.com/portalresource/lookup/poid/Z1tOI9NPluKPtDNIqLMRV56Pab6TfzcRXncKbDtRr9tObDdEuS3Dr0!/fileUpload.name=/WorkforHireLaws.pdf> > accessed 26 May 2020.

¹³⁸ Shlomit Yanisky-Ravid (n. 13), 712.

¹³⁹ *ibid.*

parties by an intermediary; or (b) a lawful use of the work; and which has no independent economic significance.”¹⁴⁰

Thus, the core meaning of this defence which originates in Article 5(1) of the InfoSoc Directive means that otherwise reasonable uses of works could be prevented by the reproduction right, e.g., browsing the internet or transmitting over the computer networks.¹⁴¹ Secondly, Section 29(1) of the CDPA states that:

“fair dealing with a work for the purposes of research for a non-commercial purpose does not infringe any copyright in the work provided that it is accompanied by a sufficient acknowledgement”.¹⁴²

Thirdly, as stated in Section 29A of the CDPA, a copyright cannot be infringed in a work as long as a person has a “lawful access to the work” and performs “computational analysis of anything recorded in the work for the sole purpose of research for a non-commercial purpose”.¹⁴³ Realistically, using and training an ANN for research purposes would most likely amount as non-commercial purpose. However, it can be unclear whether the researcher's output can be qualified as a commercially valuable product. As in certain cases, ANN-generated works may cause serious competition against artists' and musicians' original works.¹⁴⁴ Some authors of Walter Arthur Copinger are uncertain in regards to defences that are based on the purpose for being non-commercial when the intended research could be used with an aim which is of a commercial nature.¹⁴⁵ Now, whether the use is lawful, the para 33 of the InfoSoc Directive makes it clear that “a use should be considered lawful where it is authorised by the right holder or not restricted by law”.¹⁴⁶

¹⁴⁰ Section 28A of the Copyright, Designs and Patents Act 1988.

¹⁴¹ Rosati (n. 112).

¹⁴² Section 29(1) of the Copyright, Designs and Patents Act 1988.

¹⁴³ Section 29A of the Copyright, Designs and Patents Act 1988.

¹⁴⁴ Rosati (n. 112).

¹⁴⁵ *ibid.*

¹⁴⁶ Para 33 of the Directive 2001/29/EC.

CHAPTER 5: CONCLUDING REMARKS

In light of this conclusion, training and the use of NN-generated works could constitute a copyright infringement of third-party copyright works, as the computational processes that are involved during the training and using of NNs could potentially include activities that fall within the context of the copyright owners' exclusive rights. Moreover, copyright can be infringed even if the "goods or services" have not been exploited into the market.¹⁴⁷ This is because digital processes itself may constitute an infringement of the protected copyrights when the selected data is being used to train an NN. Despite this fact, it is not entirely clear to what degree the "computational processes" within the use of trained NNs can fall within the framework of exclusive rights.¹⁴⁸ Important to stress, that the "computational processes" involved during the training of NNs, are not legally defined within the concepts of "making or using". Considering that the works created by NNs have not been considered at the legislative level just yet, it is hard to predict whether "reproduction or use" are present within neural networks in any specific scenario.

It is also worth to note that the concept of similarity in the copied work is not always obvious. Modified copies as part of the computational processes involved during the training and using of NNs will constitute a copyright infringement if the copied work incorporated a substantial part of the intellectual creation of the author's original work. Furthermore, the AI generated work continuing to pose some serious implications in the lens of copyright law. The legislators should clearly revise and pose the current provisions in the copyright legislations on the matters relating to liability for copyright infringement of the work created by AI systems. It can be therefore suggested that the current traditional copyright laws should be transformed into a better copyright system for AI-driven era.

¹⁴⁷ Ballardini (n. 68).

¹⁴⁸ *ibid.*

5.1 Recommendations for further research

Based on the research findings and the conclusion drawn, it is possible to suggest a step-by-step approach for the governing bodies to follow in relation to the modifications and transformation of the current traditional copyright legislations. The following recommendations are made for potentially adapting the current copyright legislation or adding up new provisions in relation to infringing AI-generated works. It is also crucial to underline in the legislation the infringing parties as there might be more than one infringer in the development process of AI-systems. It is also recommended to nominate the most efficient legislative body to control the ANNs infringing actions, so it does not fall out of control. Therefore, it can be suggested that the lawmakers adopt (WMFH) model, which can view ANN systems as a possible “creative employee or independent contractor of the user”.¹⁴⁹ Enacting such a model into current copyright legislation may enable the governing bodies to control and impose the legal responsibility on the infringing person. On top of that, the implementation of new ANN WMFH doctrine will require the lawmakers to either modify the current traditional copyright laws or to adopt entirely new legislations. This is because the current copyright laws are not sufficient enough to cope with advanced systems such as ANNs.¹⁵⁰

The literature findings on the subject of training and using NNs that may result in copyright infringement do not offer much information on how the current law on copyright infringements should be applied in relation to ANN-created work and its programmers who are actively engaging during the training and using processes of third-data copyright works, which may constitute copyright infringement. Therefore, the legislators should revise and set out explicit provisions in the CDPA and Directive on Copyright in the Digital Single Market to navigate private individuals, commercial entities and researches. Additionally, the current copyright law seems so far favouring the copyright owners but not the commercial entities who are willing to invest and develop its AI-systems.¹⁵¹

¹⁴⁹ Shlomit Yanisky-Ravid (n. 13), 660.

¹⁵⁰ Shlomit Yanisky-Ravid (n. 13), 717.

¹⁵¹ Rosati (n. 112).

Moreover, there is a paucity of research on how the current copyright laws deal with damages caused as a result of infringing AI-generated works. It would, therefore, be helpful to gain some insight into why infringers should compensate the copyright owners when the computational processes involved during the training and using processes is considered as an activity for non-commercial purposes.

Research findings further indicate that since EU copyright law is largely harmonised international wide, the main focus should address the question of how the conflict of laws rules from a political point of view could be adopted and enforced.¹⁵² However, the current copyright laws are silent on how to impose the remedy when an AI system independently copies and analyses millions of copyright materials and reproduces its own version of a work. Policymakers are highly concerned about the challenges that AI machines can bring in copyright law and trying to resolve the liability of copyright infringement issues by various reports.¹⁵³ However, policymakers are unable to foresee all challenges that AI machines may cause because of the rapid advancement of AI technologies. Therefore, understanding how these policies and practices can be put into practice, could give a much clearer understanding of how legislators can improve the current copyright laws to respond to deficiencies in these practices and policies. Although the current UK and EU copyright legislation and case law cannot clarify the legal uncertainties surrounded by AI-generated works in the lens of copyright law, it is important to consider that the technological advancements of AI-systems will continue to be the central topic in the following years.¹⁵⁴

It can be argued that although the current copyright laws do not recognise AI systems as an infringer, there should be explicit provisions on who should be held liable for copyright infringement of the work generated by AI systems. It might be said that expanding the existing copyright laws may enable judiciaries and public policy to apply AI's copyright infringement and especially enforce remedies on a person suffering damages. In fact, this might be a difficult task for the courts to establish and raises an interesting question: to what extent AI's owner or creator contributed to the

¹⁵² Begoña Gonzalez Otero and João Pedro Quintais, 'Before the Singularity: Copyright and the Challenges of Artificial Intelligence', (*Luwer Copyright Blog*, 25 September 2018), <<http://copyrightblog.kluweriplaw.com/2018/09/25/singularity-copyright-challenges-artificial-intelligence/>> accessed 9 April 2020.

¹⁵³ European Parliament (n. 23).

¹⁵⁴ Gonzalez and Quintais (n. 152).

AI's infringing work. Furthermore, if AI's owner distributes the copied work of an AI, then the infringement will lie on the AI's owner for breaching the distribution rights, regardless of the work being created by an AI.¹⁵⁵ On the other hand, if the infringing work created by an AI is hidden in AI's private file, the owner of copyright work will never find out the existence of an infringement, and therefore no claim for copyright infringement will occur. With that in mind, some countries such as the UK and US, drafted reports to accommodate AI's transformation and especially reconsidering the existing copyright laws towards AI-driven era.¹⁵⁶

Primarily, even if an AI system can meet the originality criteria, the current copyright laws would not be recognised without a human author's creative input. Although it can take ages before the current copyright laws change toward AI-driven era, it could be interesting to see what the situation could look like if an AI would be granted a special legal status as "electronic persons" and if the independent work created by an AI will be granted copyright for its original intellectual creation. It could also be interesting to see to what extent the AI-systems will be developed for not infringing the copyrighted work of a copyright owner and what the situation will be if a person conducts the infringing acts in relation to the original work created independently by an AI-system.

¹⁵⁵ Bloom and Sivinski (n. 131).

¹⁵⁶ *ibid.*

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