A PROPOSAL FOR THE REGULATION OF AI-GENERATED WORKS

Lim Jia Yi Edina

Abstract

This dissertation deals with the regulation of works generated by Artificial Intelligence ("AI"). It seeks to resolve the issues of authorship and ownership vis-à-vis AI-generated works ("AGWs"), and also aims to explore how competition law can play a role in regulating the AGW industry. Ultimately, it aims to propose solutions for regulating AGWs in the Singapore context. This paper first explores the current copyrightability of AGWs in various jurisdictions such as the United States, the United Kingdom, Europe, Australia, and Singapore. In most of these jurisdictions, AGWs would not be protected under copyright as authors' works due to the requirements of authorship and originality. However, it will be argued that there are good normative arguments in favour of conferring some form of protection over AGWs, and the paper will illustrate how such protection can be justified under the utilitarian rationale for copyright. It will also be shown that the economic considerations regarding the protection of AGWs is different from regular copyright works, and thus any proposed copyright regime must be tailored to suit this. Following a discussion of the various options for protecting AGWs, it will be concluded that ownership over an AGW should be determined through a multifactorial test of which entity took the arrangements necessary for the creation of the AGW. Furthermore, the best form of copyright protection would be to classify AGWs as a new category of entrepreneurial works, whilst incorporating principles of unfair competition into the scope of protection. The last chapter illustrates how competition law principles can be applied to the AGW industry, to prevent any abuse of dominance by the ultimate owners of AGWs.

Contents

Introduction

"there is no one else in the world.
there is no one else in sight.
they were the only ones who mattered.
they were the only ones left.
he had to be with me.
she had to be with him."[1]

On first glance, one would be forgiven for thinking that the above poem was written by a love-struck author. It is actually an Artificial Intelligence ("AI") generated poem, created after Google trained an AI on more than 11,000 unpublished books. The creation of AI-generated works ("AGWs") is not a novel phenomenon. In 1965, the US Copyright Office received the first application for registration of a musical composition created by a computer.[2] However, in recent times, machine learning, i.e. the idea that systems can learn and improve with experience, has become increasingly popular. This has led to an exponential increase in AGW creation.

Machine learning already permeates our everyday lives. Amazon and Netflix use AI algorithms to recommend products or films based on past preferences. Even mundane tasks like spam filtering are tackled using algorithms which learn which emails to classify as spam. Perhaps it is thus unsurprising that AI would eventually partake in traditionally "human" endeavours, like making music, painting pictures, or writing books, which are modes of human expression. Through computational creativity, algorithms now create works which copyright has traditionally classified as "authors' works" i.e. literary, dramatic, musical and artistic works ("LDMA works"). These works usually reflect human creativity, and the creation of such works by AI forces one to question if creativity is an exclusive human trait and makes one wonder what truly makes us human.

In the art world, a painting called "The Next Rembrandt" has been making waves ever since it was unveiled in 2016.[3] The 3D-printed painting was created following a collaboration between multiple entities.[4] Digitally rendered graphics derived from 346 Rembrandt paintings

[1] Burgess M, "Google's AI Has Written Some Amazingly Mournful Poetry" (*WIRED* October 4, 2017) https://www.wired.co.uk/article/google-artificial-intelligence-poetry accessed August 11, 2019.
[2] U.S. Copyright Office, Sixty-eighth Annual Report of the Register of Copyrights for the Fiscal year ending June 30, 1965, at 5 (1966).
[3] "The Next Rembrandt: Recreating the Work of a Master with AI" (*Microsoft News Centre Europe*) https://news.microsoft.com/europe/features/next-rembrandt/ accessed April 12, 2019.
[4] "J. Walter Thompson Amsterdam" (*The Next Rembrandt - ING - J. Walter Thompson Amsterdam*) https://www.jwt.com/en/work/thenextrembrandt accessed June 10, 2019.

were fed into a facial recognition algorithm which used machine learning to emulate Rembrandt's painting methods, ultimately generating a new painting in Rembrandt's signature style. While the painting was ultimately AI-generated, Herculean human effort was required to generate a satisfactory output, with its human creators clocking in more than 500 hours of rendering and undertaking an 18-month analysis of Rembrandt's work.[5]

Google is also entering the fray with its Deep Dream generator.[6] Users upload their own photos to the generator which then uses AI to remake the image. Recently, an artwork made using Deep Dream was sold for USD$8000.[7] In 2018, Christie's was the first auction house to sell an AGW, going for USD$432,500.[8] With AI-generated artwork commanding increasingly steep prices, one has to wonder who actually owns the copyright over such works and is thus entitled to any profits arising from the sale of these artworks. Typically, the author of the work would be its first owner, but who (or what) is the author? Is there even a human author? Such authorship and ownership issues will become increasingly pertinent as the volume and value of AGWs continue to grow.

AI has also been able to generate music. A London start-up called Jukedeck uses AI to compose music for sale.[9] As the cost of using AI to generate such music is far lower than commissioning a musician, start-ups are increasingly trying to produce AI-generated jingles and pop hits for profit. Open AI's MuseNet is able to generate songs with 10 different instruments in 15 different styles with a push of a button.[10] This also raises the same authorship and ownership questions as AI-generated art.

To resolve this authorship-ownership issue, one would require knowledge on how AGWs are generated, so that authorship and ownership can be attributed to the right entities. AGWs are created using the process of machine learning. Firstly, the relevant data is gathered

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[5] *Ibid.*
[6] "Human AI" (*Deep Dream Generator*) https://deepdreamgenerator.com/ accessed July 26, 2019.
[7] McFarland M, "Google's Psychedelic 'Paint Brush' Raises the Oldest Question in Art" (*The Washington Post* March 10, 2016) https://www.washingtonpost.com/news/innovations/wp/2016/03/10/googles-psychedelic-paint-brush-raises-the-oldest-question-in-art/?utm_term=.91e3e4e1a5df accessed April 26, 2019.
[8] Christie's, "Is Artificial Intelligence Set to Become Art's next Medium?: Christie's" (*The first piece of AI-generated art to come to auction | Christie's* December 12, 2018) https://www.christies.com/features/A-collaboration-between-two-artists-one-human-one-a-machine-9332-1.aspx accessed May 26, 2019.
[9] Marshall A, "From Jingles to Pop Hits, A.I. Is Music to Some Ears" (*The New York Times* January 22, 2017) https://www.nytimes.com/2017/01/22/arts/music/jukedeck-artificial-intelligence-songwriting.html accessed April 26, 2019.
[10] *Ibid.*

depending on the intended output. Secondly, the data are converted into computer-readable form and are fed into the algorithm either by the AI system's owner, user or programmer. The algorithm itself is a model coded by programmers to transform the inputs into the desired outputs. Thirdly, the data is used to "train" the chosen algorithm, and this is the essence of machine learning. The algorithms utilise neural networks (which mimic how human brains learn) to learn how to classify the input data, and the networks can be trained to generate artworks, musical works or literary works based on the inputs they receive. As the models are exposed to new data, they **independently** adapt or evolve through a process of self-referential learning, improving their performance on any task they are directed to. Such "learning" is done without any intervention from the user or programmer. Lastly, once the networks are trained on enough data for a sufficient period of time to generate decent outputs, the user or programmer can choose to tune parameters vis-à-vis the algorithm depending on the desired output. [11]

Training an algorithm to produce AGWs can be a tedious and complicated process. It requires large financial support, especially considering the amount of data needed to be stored, processed and cleaned in order to create the desired output. For "the Next Rembrandt", Microsoft provided the platform to host and analyse the data and its cloud platform was integral to the formation of the artwork.[12] This service would not have come cheap. There are also various entities that are involved in the whole process, like the programmer, the investor, the data provider, or the user, none of whom actually directly create the final work. Therefore, as AGWs become increasingly prevalent, the issues of authorship and ownership must be resolved, to protect investment and to encourage the production of such works.

When resolving authorship and ownership issues, another consideration to bear in mind is that giving ownership over AGWs to any entity e.g. the programmer or the investor could lead to that entity potentially owning the rights in a "near-infinite" amount of works.[13] For example, if the owners of Open AI's MuseNet were given ownership over all the musical pieces created at the push of a button, they would own countless works within a very short span of time, given that unlike human beings, AI system do not tire and do not require compensation. Therefore, academics have opined that future legislation on AGW should give limited rights

[11] Yufeng, "The 7 Steps of Machine Learning" (*Medium* September 7, 2017) https://towardsdatascience.com/the-7-steps-of-machine-learning-2877d7e5548e accessed May 26, 2019.
[12] See note 3.
[13] Ihalainen J, "Computer creativity: Artificial Intelligence and Copyright" (2018) 13 Journal of Intellectual Property Law & Practice 724 ("Computer Creativity") at page 725.

over works which are mainly AI created.[14] There is a need to prevent companies with financial resources and massive data-stores from using those resources to generate thousands of works in a short span of time to create a monopoly over AGWs and from profiting solely through copyright enforcement. Hence both intellectual property ("IP") and competition law will have to play a role in the regulation of AGWs.

The focus of this paper is on works **autonomously generated** by AI. This implies that the work has been produced solely through the actions of the AI, with no direct human contribution in the creation of the final work. A clear example of this would be songs generated by Open AI's MuseNet, which are created at the push of a button. On the other hand, the USD$8000 artwork created using Deep Dream was arguably a computer-**assisted** work since its creator had **substantial input** into the final product. He had not simply uploaded an image to the generator and sold the resulting output. He had altered the Deep Dream code to generate the output of his liking and merged the resultant images into a single image using an Adobe software. As the regime proposed in this paper will only pertain to **autonomously AI-generated** works, a preliminary distinction will have to be made between the two types of works.

This paper will also have a national focus. It aims to propose a solution for regulating AGWs in Singapore. Singapore currently places strong emphasis on the AI sector, recently launching two programmes to teach Singaporeans the basics of AI[15] while developing guidelines to encourage the ethical and responsible use of AI, through its Model Artificial Intelligence Governance Framework.[16] Singapore also aims to be a Global IP Hub, with its 10-year master plan launched in 2013.[17] Given Singapore's focus on both IP and AI, it is only a matter of time before the issue of IP ownership and regulation of AGWs comes to Singapore's shores. Ideally, Singapore should have a framework in place to deal with this issue.

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[14] *Ibid* at page 728.
[15]Kwang K, "Singapore to 'Double down' on Artificial Intelligence Efforts, Says Vivian Balakrishnan" (*CNA* February 28, 2019) https://www.channelnewsasia.com/news/singapore/singapore-double-artificial-intelligence-efforts-balakrishnan-11298028 accessed May 2, 2019.
[16] "Singapore Releases Asia's First Model AI Governance Framework for Public Consultation, Pilot Adoption and Feedback" (*Allen & Gledhill*) https://www.allenandgledhill.com/sg/publication/articles/9803/releases-asia-s-first-model-ai-governance-framework-for-public-consultation-pilot-adoption-and-feedback accessed June 26, 2019.
[17] "Update to the Intellectual Property Hub Master Plan" (*Intellectual Property Office of Singapore* May 2017) https://www.ipos.gov.sg/docs/default-source/about-ipos-doc/full-report_update-to-ip-hub-master-plan_final.pdf accessed August 8, 2019.

This paper will show that many jurisdictions, not just Singapore, currently do not protect AGWs under copyright law. This lacuna is unfortunate because there are normative arguments for protecting AGWs under copyright law, not as authors' works, but under a different copyright category. It will also be argued that protection can be justified under the utilitarianism rationale for copyright, but in order to account for the manner in which AGWs are produced, the extent of copyright protection for AGWs must be curtailed. The paper will compare different options of protecting AGWs, ultimately selecting an approach which is conceptually sound and implementable in Singapore. Lastly, the paper will illustrate the importance of using both IP and competition law to regulate the AGW sphere.

Chapter I: Comparative analysis of whether AGWs can be protected by copyright

Generally, copyright protection exists in two forms. The first is the classic form of copyright, namely protection for LDMA works, also known as "authors' works". The second protects "subject-matter other than works" or "entrepreneurial works".[18] This section focuses on whether an AGW can obtain protection under the classic form of copyright – i.e. as an author's work, as the scope for protection under entrepreneurial copyright is limited to closed categories of works and AGWs would not fall under any of these categories. Moreover, the works generally produced by AI usually come in the form of LDMA works. This chapter will discuss whether AGWs can be protected under copyright law in different jurisdictions.

A. Comparative Analysis of whether AGWs can be protected as authors' works

In order for an AGW to be protected under classic copyright, it would need to be a "work", be original, be in material form, and have a connecting factor to a Berne Convention[19] country. These requirements are standardised across most countries due to the Berne Convention.

The main obstacles impeding the protection of AGWS as authors' works are the requirements of authorship and originality. Originality forms part of "authorship" and is the bedrock of copyright subsistence. [20] In Ginsburg's seminal work comparing authorship requirements across different common law and civil law jurisdictions, she found that "in most copyright jurisdictions, originality is the overarching standard of authorship".[21] Unfortunately, based on the concepts of authorship and originality, copyright law in Singapore, the United States ("US"), Australia, and the European Union ("EU") deny protection for AGWs. Contrastingly, English law protects AGWs as authors' works.

[18] Singapore Copyright Act 2006 Part IV; Australia Copyright Act 1968 Part IV.
[19] Berne Convention for the Protection of Literary and Artistic Works, September 9, 1886, as revised at Stockholm on July 14, 1967, 828 U.N.T.S. 221 ("Berne Convention").
[20] McCutcheon J, "The Vanishing Author in Computer-Generated Works: A Critical Analysis of Recent Australian Case Law" [2013] SSRN Electronic Journal at page 935 ("The Vanishing Author").
[21] Ginsburg JC, "The Concept of Authorship in Comparative Copyright Law" [2003] SSRN Electronic Journal at page 1077 ("Authorship in Comparative Copyright Law").

Authorship

The Berne Convention does not define authorship, nor explicitly state whether a human author is required. Arguably, the way the Convention is crafted implies the precondition of a human author. Ricketson argues that clauses linking protection duration to the author's lifespan, and the granting of moral rights, show that human authorship is required by the Berne Convention.[22] Ginsburg also notes that Art 14bis(2) Berne Convention vests copyright ownership in the "maker" of a cinematographic work rather than the "author", arguing that this shows a distinction made in the Convention between "authorship" and "ownership", reinforcing the argument that the former must refer to humans.[23] Furthermore, in all the legal systems Ginsburg analysed, authors "[are] human being[s] who exercise subjective judgement in composing the work and who control the execution."[24]

Should there be a prerequisite that the author of a work must be human in order to be copyrightable, AGWs would be unprotected. AGWs arguably have no identifiable human author as the AI has authored the work itself using its own creative decisions. For example, in Google Deep Dream, the AI decides how to transform the input based on a predetermined algorithm. As the AI is the entity deciding what to amplify in the image creation, the final image is unpredictable to the user.[25] The direct "author" or creator of the work is the AI itself. Should national copyright laws contain a human authorship pre-requisite, AGWs would be unprotectable if AIs are considered the authors of the final work.

Singapore

In Singapore, human authorship is required for copyright subsistence. S7 of the Singapore Copyright Act[26] ("SCA"), defines "author" vis-à-vis a photograph as the **person** who took it. Furthermore, the Court of Appeal laid down two key principles on copyright authorship in *Asia Pacific Publishing v Pioneers*.[27] Firstly, it held that for there to be an "original work" protectable by copyright, the author who created the work must be identified.

[22] Ricketson S, "People or Machines: The Bern Convention and the Changing Concept of Authorship" [1991] The 1992 Horace S. Manges Lecture, 16 COLUM.-VLA J.L. & ARTS 1 at page 34 ("People or Machines").
[23] Ginsburg JC, "People Not Machines: Authorship and What It Means in the Berne Convention" (2018) 49 IIC - International Review of Intellectual Property and Competition Law 131 at page 132 ("People Not Machines").
[24] Authorship in Comparative Copyright Law at page 1064.
[25] Guadamuz Andres, "Do Androids Dream of Electronic Copyright? Comparative analysis of originality in AI generated works" [2017] SSRN Electronic Journal at page 3 ("Do Androids Dream of Electronic Copyright").
[26] Singapore Copyright Act 2006.
[27] *Asia Pacific Publishing Pte Ltd v Pioneers & Leaders (Publishers) Pte Ltd* [2011] SGCA 37.

Secondly, it held that only a human being can qualify as an author. The reason for this is because the duration of copyright protection under the SCA is limited to the author's life plus 70 years. Allowing a non-human entity to qualify has an author could lead to a perpetual monopoly with the work permanently being kept out of the public domain. Therefore, under Singapore law, an AI will not be considered as an author as human authorship is a precondition to the existence of an "original work". Hence, AGWs would not be protected under Singapore's copyright law if AIs are considered the authors.

Other jurisdictions

In the US, s102 of the Copyright Law of the United States (Title 17), provides that copyright protection subsists in "original works of authorship", "fixed in any tangible medium of expression".[28] It does not explicitly state that authors must be human. However, s313.2 of the Compendium of U.S. Copyright Office Practices ("the Compendium") states that in order to be a work of "authorship", the work must be "created by a human being". [29] S306 of the Compendium further states that works will not be registered by the Copyright Office if they are "produced by a machine or mere mechanical process that operates randomly or automatically without any creative input or intervention from a **human author**". This seems to preclude any form of protection for AGWs since an AGW is essentially a work generated automatically by a machine without any creative input of a human into that work itself. In *Naruto v Slater*,[30] the Northern District Court of California denied authorship to an animal, stating that the Supreme Court and the Ninth Circuit have consistently referred to "human beings" when determining authorship.

US Copyright Law does have one mechanism where non-humans can be authors. S201(b) of the US Copyright Law states that for "a work made for hire, the employer for whom the work was prepared is considered the **author**". This suggests that the deemed author can be a non-human e.g. a company. Some argue that under US law, the work made for hire ("WMFH") doctrine can be expanded to include AGWs, where the AI is viewed as the "employee" under

[28] Copyright Law of the United States and Related Laws Contained in Title 17 of the United States Code, s 102 ("US Copyright Law").
[29] U.S. Copyright Office, Compendium of U.S. Copyright Office practices §313 (3d ed. 2014), http://www.copyright.gov/comp3/docs/compendium.pdf. ("US Compendium").
[30] *Naruto v. Slater*, No. 15-cv-04324-WHO, 2016 WL 362231, at *1 (N.D. Cal. Jan.28, 2016) ("Naruto").

the control of the AI owner as the "employer".[31] The pros and cons of this approach will be analysed in Chapter II. At present, the human authorship requirement precludes AGW protection under US copyright law.

In the EU, many member states' ("MS") laws strongly imply that the author must be a human. For example, Art 5 of Spanish copyright law[32] states that the author of a work is "the natural person" who creates it. Furthermore, in the Explanatory Memorandum to the Proposal for a Database Directive, it was stated that the "fundamental principle of the Berne Convention… is that the human author who creates the work is the first owner of the rights in that work".[33] The Explanatory Memorandum to the Software Directive Proposal also stated that "a human author must have the right to claim authorship of the program".[34] These statements show that AGWs are unlikely to be protected under existing EU law with the AIs as authors. EU standards for originality also support the notion that the author must be human. In *Infopaq v Danske*,[35] the court held that originality entailed that the work must be the author's "own intellectual creation" and that it "bore his personal touch stamp". This seems to highlight the need for a human author, thus precluding the protection of AGWs with the AI as the author.

Australian law also suggests that authors must be humans. S10 of the Australia Copyright Act 1968 defines "author" as, in relation to a photograph, the **person** who took the photograph. In *Ice TV v Nine Network*,[36] the High Court stated that the overall aim of the Australian Copyright Act 1968 was to "reward authors".[37] In *Telstra v Phone Directories*,[38] the court said that copyright in a work only subsists if it had originated from an "**individual**", denying protection to telephone directories which had been compiled by automated processes of a computer system. Justice Perram stated that if a computer performs functions ordinarily performed by human authors, and if the **human** operating the computer is **not controlling the nature of the material form produced by the computer**, then copyright does not subsist in

[31] Generating Rembrandt; Bridy A, "Coding Creativity: Copyright and the Artificially Intelligent Author"2012 STAN. TECH. L. REV. 5 ("Coding Creativity"); Hristov K, "Artificial Intelligence and the Copyright Dilemma" (2017) 57 IDEA 431 - The Journal of the Franklin Pierce Center for Intellectual Property ("AI and the Copyright Dilemma").
[32] Ley 22/11 sobre la Propiedad Intelectual de 1987 .
[33] Explanatory Memorandum to the proposal for a Database Directive, COM(92) 24 final, 13 May 1992.
[34] Explanatory Memorandum to the proposal for a Software Directive, COM (88) 816 final, 17 March 1989, at para 20.
[35] Case C-5/08 Infopaq International A/S v Danske Dagblades Forening [2009] ECR I-06569 at [37].
[36] *IceTV Pty Ltd v Nine Network Australia Pty Ltd* (2009) 239 CLR 458 ("Ice TV").
[37] *Ibid* at [20].
[38] *Telstra Corporation Ltd v Phone Directories Co Pty Ltd* (2010) 264 ALR 617, affd (2010) 194 FCR 142 ("Telstra v Phone Directories").

the final work created. In *Acohs v Ucorp*,[39] it was held that there was no copyright in the source code for computer-generated electronic safety data sheets as "the need for a work to spring from the original efforts of a human author is a fundamental requirement of copyright law".

Therefore, Australian case law clearly establishes that authors must be humans, preventing protection of AGWs with the AI as the author.

Ultimately, a comparative analysis of copyright case law shows that AGWs cannot be protected as authors' works with the AI as the author in many jurisdictions, including Singapore.

Originality

While the above analysis has showed that the human authorship requirement precludes copyright protection with AIs being recognised as the authors of the AGW in the above jurisdictions, it could be inquired whether the human most closely responsible for the AGW's creation – e.g. programmer or user or owner of the AI system, could be recognised as the author of the AGWs under copyright law in these jurisdictions.

However, the threshold for originality seems to preclude such an analysis. This is because most of the "creative effort" invested into the AGW has emanated from a machine. Even if some effort was put in by the programmer or the user to select the parameters for the AI to work within, it is unlikely that such effort would meet threshold of "originality" in many jurisdictions in order for that person to be considered the "author" of the final AGW.

Singapore

In Singapore, the originality threshold seems to preclude the awarding of authorship of AGWs to the AI system's owner or user. In *Global Yellow Pages*,[40] when determining that copyright did not subsist in telephone directories' listings, the Singapore Court of Appeal rejected the "sweat of the brow" approach, which allows copyright over a compilation of facts if enough **effort** had gone into the creation of the compilation, even if no creativity had been exercised by the compiler. Instead, it adopted the "creativity" approach, similar to the positions

[39] *Acohs Pty Ltd v Ucorp Pty Ltd* (2010) 86 IPR 492, affd (2012) 201 FCR 173 ("Acohs").
[40] *Global Yellow Pages Ltd v Promedia Directories Pte Ltd and Another Matter* [2017] SGCA 28.

in US, EU and Australia.[41] According to the US Supreme Court in *Feist Publications Inc v Rural Telephone Service*,[42] such an approach means that a work must be an independent creation which displays a **modicum of creativity** to be copyrightable.

Applying this criterion, it would be hard to attribute the "creative effort" of the human who programmed or used the AI system to the final work itself since setting parameters and feeding data to the AI is hardly a creative endeavour vis-à-vis the eventual output. This seems to preclude authorship attribution to the AI system's owner or user, leaving AGWs outside the scope of copyright protection.

Other jurisdictions

In the US, the *Feist* requirement of a modicum of creativity still stands, thus precluding protection for AGWs. Notably, before *Feist*, the test for originality was the "sweat of the brow" approach. Unfortunately, *Feist* reversed this and established the higher standard of a "modicum of creativity", stating that "uncopyrightable facts do not magically change their status when gathered together in one place".[43]

In the EU, the Court of Justice of the EU held in *Infopaq* that creativity in the **selection process** could warrant originality.[44] This allows the AI users and programmers who set the parameters and selected data for the AI to contend that they are the authors of the AGW on the basis that there was originality in the selection of data. For example, the creation of the Next Rembrandt involved intellectual effort by the team of experts who identified portraits to be the desired output, selected specific Rembrandt portraits according to the personal characteristics they wanted to be displayed, and constantly trained the AI on such specific data sets.[45] Arguably, in the case of the Next Rembrandt, the team who trained the AI displayed enough creativity in the selection process to warrant originality under *Infopaq* standards. However, this may be specific to the facts of how the Next Rembrandt was generated, and other AGWs may not involve such a high degree of human input.

[41] "Narrower Protection for Compilations: Where Creativity Trumps Effort" (*Singapore Law Blog*) https://www.singaporelawblog.sg/blog/article/187 accessed July 26, 2019.
[42] *Feist Publications Inc v Rural Telephone Service Co Inc*, 499 US 340 (1991) ("Feist").
[43] Feist at [345].
[44] *Infopaq* at [7].
[45] Do Androids Dream of Electronic Copyright at page 11.

Furthermore, there remains the problem that the creativity exercised is a step removed from the final work. Notably, once the Rembrandt team decided on the selected parameters and datasets, multiple **different** AGWs can be produced under the AI system which created the Next Rembrandt without any **additional exercise of creativity** on the part of the user or owner of the AI system. The creativity shown by them in this case in the selection of parameters and datasets is different from the creativity in the selection and arrangement of uncopyrightable facts in *Infopaq* as the final work is not the direct result of creativity in the selection process. The ultimate creative spark creating the final AGW comes from the AI system, and such computational creativity can be used to generate other AGWs. Therefore, it is likely that the creativity exercised by the humans will be too far removed from the actual works. As AGWs rely on even less human intervention in the future, any link between human creativity and the AGW will cease to exist.

In Australia, case law establishes that originality must emanate from the human involved in creating the work. This prevents copyright protection of AGWs even if authorship is attributed to the human most closely connected to the work. Initially, Australia's position in *Desktop Marketing v Telstra*[46] was that the "task of carefully identifying and listing units" warranted copyright protection in phone directories. Unfortunately, this case was reversed in *Ice TV*, which adopted the *Feist* approach, holding that there was not enough intellectual skill or labour in creating TV schedules. This was affirmed in *Phone Directories v Telstra* where the judge stated that the authors had not exercised "independent intellectual effort" in creating the phone directories.[47] Therefore, the argument that AI programmers or users could be the "author" of the final AGW would likely be unsuccessful given the current state of the law.

The UK is one of the few countries which have a provision protecting computer-generated works ("CGWs"), which include AGWs. It does not treat the AI as the author of the AGW, and instead confers authorship on a deemed author.[48] Under s9(3) of the UK Copyright Designs and Patents Act 1988 ("UK CDPA"), a LDMA work which is computer-generated is **deemed** to have been **authored** by the person making "the arrangements necessary for the creation of the work". S178 defines a CGW as a work that is "generated by a computer in

[46] *Desktop Marketing Systems Pty Ltd v Telstra Corporation Ltd* (2002) 119 FCR 491 at [161] ("Desktop Marketing").
[47] Telstra v Phone Directories at [134].
[48] The Vanishing Author at page 43.

circumstances such that there is no human author of the work". S12(3) then states that the protection for such works lasts for 70 years from the end of the year of creation.

In the reform of the UK Copyright Act, which led to the inclusion of s9(3) into the UK CDPA 1988, the Whitford Committee stated that the author would be the person who "devised the instructions and originated the data used to control and condition a computer to produce a particular result".[49] Guadamuz argues that the UK law recognises that there is no human creative input in CGWs, and thus s9(3) CDPA has been framed as an **exception** to the creativity and originality requirements for the subsistence of copyright. [50]

Therefore, following a comparative analysis of both authorship and originality requirements in multiple jurisdictions, it is clear that apart from the UK, no other jurisdictions currently provide copyright protection over AGWs as authors' works, whether with AIs as the authors or with humans as the closest author. The next question is whether AGWs **should** even be protected as **authors' works** in the first place.

Should AGWs be protected as authors' works

It is submitted that it would be inappropriate to protect AGWs as **authors' works** as the concept of authorship is still largely human-centric. Ricketson strongly defends the concept of **human authorship**. He argues that reserving the concept of authorship to humans affirms "basic human values where people are given precedence over machines" and it would distort Berne's original humanist conception of authorship to extend protection to other forms of creation that do not have identifiable authors.[51] Protecting AGWs as authors' works would deviate from this human-centric notion of authorship since the AI creator is not human, and the human closest in causal proximity to the AGW is too far removed from the creative process in generating the AGW.

Unfortunately, the laws in several jurisdictions have ignored the importance of human authorship and have conflated authorship with ownership. For example, despite the existence of the Berne Convention for authors rights and the Rome Convention for "neighbouring rights" protection, the UK CDPA was amended in 1988 to remove the distinction between authors'

[49] "Report of the Whitford Committee to Consider the Law on Copyright and Designs" (Cmd 6732, 1977) at para 513.
[50] Do Androids dream of Electronic Copyright at page 9.
[51] People or Machines at page 35.

rights and neighbouring rights, expanding conferment of authorship to non-humans, contrary to Ricketson's suggestions. The US has also expanded its notion of "authorship" by conferring authorship status (rather than mere ownership) to employers (i.e. even corporations).[52] It is submitted that these laws conflate the notions of authorship and ownership. Authorship connotes a direct relationship between the work created and the human creating it. It should remain a factual analysis on whether a work was authored by someone or not, thus allowing for unassignable moral rights. On the other hand, ownership is a legal concept in that the law determines whether an entity should own a particular work. This is evidenced by the Berne Convention where the owner of a cinematographic work is called the "maker" and not the "author" on the basis that a non-human entity can "make" a cinematographic film but an LDMA work can only be authored by a human.[53] Therefore, for conceptual clarity and to respect the notion of human authorship, AGWs should not be protected as authors' works.

However, there are normative arguments in favour of protection for AGWs, just not as authors' works. Firstly, without prospects of commercialising AGWs, there would be no incentives for AI developers to create and invest in AI systems that produce AGWs. [54] Secondly, there is currently uncertainty surrounding the protectable status of AGWs and whether they can be licensed. This may cause potential owners of AGWs to be reluctant to enforce their rights due to uncertainty as to whether those AGWs are even protected. Thirdly, giving protection over AGWs would mean there are entities accountable for any potential infringements which may arise from the creation of AGWs. Fourthly, given that some jurisdictions already protect CGWs to a certain extent, it would be beneficial for the sake of consistency for such works to be protected in other jurisdictions as well, so that the principle of national treatment would lead to similar results when applied in different jurisdictions. Lastly, providing less extensive protection may even have the effect allowing more works to be released to the public domain sooner. The current state of affairs may have led to owners of AI systems to falsely claim that they are the authors of the AGWs, for fear of the work falling into the public domain due to the absence of protection. Giving protection (even if less extensive), might encourage the owners to declare the true origins of the work, since limited protection would now seem like a better alternative than ending up with no protection due to a false statement as to the origin of the work.

[52] Authorship in Comparative Copyright Law at page 1071.
[53] Art 14*bis*(2) Berne Convention.
[54] AI and the Copyright Dilemma at page 438.

Ultimately, AGWs should not be protected as authors' works since such protection would be incompatible with the humanist concept of an "author" in many jurisdictions. However, given the normative arguments in favour of conferring some form of protection on AGWs, there are evidently benefits of conferring such protection on AGWs and thus it should be analysed if such protection is consistent with copyright rationales.

B. Compatibility of AGW protection with theoretical and economic justifications for copyright

Determining if AGWs should be protected by copyright depends on whether such protection would comport with copyright rationales. Furthermore, AGW protection should be consistent with the economic basis for copyright protection.

Compatibility with copyright rationales

There are two main theoretical justifications for copyright. The first is generally found in civil law countries and is based on the natural rights of the author, whose personal creativity and effort justifies his exclusive rights. There are two main branches arising from this natural rights justification – the labour theory and the personality theory.[55] Under the labour theory, copyright rewards the intellectual effort spent by authors in shaping an idea or concept into an "intellectual good".[56] The **mind** behind the intellectual effort (and not the entity that executes it) is rewarded with authorship.[57] With the **mind** being the focus, the labour theory cannot justify protection of works autonomously generated by AI unless we recognise AIs as conscious beings. As regards the personality rights theory, copyright protection is a right given to authors to recognise the individuality contained in his work.[58] However, AI systems do not need such recognition for personal expression. It is unproven that AIs have any form of

[55] Ramalho Ana, "Will Robots Rule the (Artistic) World? A Proposed Model for the Legal Status of Creations by Artificial Intelligence Systems" (*SSRN* June 19, 2017). https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2987757 at page 14 ("Will Robots Rule the Artistic World").
[56] *Ibid* at para 97.
[57] *Ibid* at para 99.
[58] Generating Rembrandt at page 706.

emotional connection to their works. Additionally, the essence of "personality" derives from a human person, making it an inappropriate basis for affording AGWs copyright protection.

It would also be difficult to root granting of copyright protection to the **human** closest to the work (not the AI itself) in these two theories since the programmer or user of the AI was not directly involved in the creation of the AGW, thus it cannot reflect his personality, nor did he expend any labour to create the work itself.

The second theoretical justification for copyright protection, **utilitarianism**, is found in common law countries. Copyright protection provide incentives to create, to invest in creativity and to disseminate works for the general benefit of society by protecting their works from unauthorised exploitation by non-creators and by allowing them to derive commercial value from those works. The underlying justification for protection is to promote societal welfare since society ultimately benefits from the creation and dissemination of new works. However, Shlomit[59] and Ramalho [60] argue that unlike humans, AI systems do not need incentives to create works. Furthermore, AIs have no way of reaping the economic benefits of copyright protection.[61] Therefore, they argue that this utilitarian theory cannot act as a justification for allowing AGWs to be protected with AIs as the author.

That said, utilitarianism could act as a justification to give copyright to the **entity most closely connected** to the AGW even if the output was autonomously generated by the AI. It is submitted that the creators or users of the AI system producing AGWs would be incentivised to create the AI system or generate more AGWs if they could derive commercial value from its products. Shlomit[62] argues that programmers and AI owners already have protection over AI itself, whether it is copyright over the AI software or patent over the AI machinery and hence the incentive justification is unsuitable as a basis for AGW protection as there is a weak causal relationship between the creativity of the AI programmers and the creativity of an AI system. However, it is submitted that protection for the outputs is necessary to incentivise the creation of the AI system in the first place.

Given the fact that copyright law in Singapore has utilitarian roots, much like the USA, it would be appropriate to justify protection of AGWs on the basis that it would promote societal welfare. After all, Singapore's IP regime was established following pressure from USA

[59] Generating Rembrandt at page 700.
[60] Will robots rule the artistic world at page 15.
[61] *Ibid* at page 15.
[62] Generating Rembrandt at page 700.

and the regime was used to achieve economic goals.[63] However, in order for the utilitarian theory to act as an appropriate basis for protection of AGWs, it must be analysed if conferring protection is justified under an economic analysis, such that the goal of promoting societal welfare is achieved and to avoid over-rewarding AGW owners.

Compatibility with economic rationales for copyright

Unlike traditional copyright works, investment in AGWs is focused on the production of the generative program, rather than the resulting output.[64] The conundrum is that in order to incentivise investment in the generative program in the first place, protection needs to be given to the resulting AGWs so that the owners of the AI system can make profits off the output. However, because each additional AGW generated requires no human effort to produce, copyright protection is unnecessary to incentivise the production of more AGWs, and thus the incentive theory fails to apply after the first AGW is generated. Therefore, Goldstein cautioned against the conferment of copyright protection to AGWs where the "economics of investment and competition depart from those that have traditionally justified copyright protection".[65]

It is thus appropriate to examine the traditional economic basis for copyright and the economics of production of AGWs to determine if protection would truly promote societal welfare, in line with the utilitarianism theory.

One of the most important aspects about copyrighted material is that they are essentially public goods.[66] While the creation of works usually involves high costs in terms of effort, once they are put on the market, they are subjected to non-exclusive and non-rivalrous consumption. This means that it is difficult to exclude others from the resource and the use of the resource does not deplete the amount of resources available for other people.[67]

Without copyright, copyrighted material would be consumed by the public at little to zero cost due to its nature as a public good. This would force the prices of copyrighted material

[63] "The Development of Singapore's Intellectual Property Rights Regime", Lee Kuan Yew School of Public Policy – Microsoft Case Studies Series on Information Technology, Public Policy and Society.
[64] Goldstein P, "Copyright in the New Information Age" (1991) 40 Catholic University Law Review 829 at page 839 ("New Information Age").
[65] *Ibid* at 837.
[66] Stojkov A; Naumovski G; Naumovski V, "Economics of Copyright: Challenges and Perspectives" (2013) 7 Mizan Law Review 126 at 132 ("Economic of Copyright").
[67] Cornes R; Sandler T, "The Theory of Externalities, Public Goods and Club Goods" (1986) Cambridge University Press.

toward the marginal cost of reproduction,[68] causing **underproduction** of such works because the authors' revenue would be far below the cost incurred from producing them.

With copyright, market power is conferred on the owner for a specific duration. The exclusive rights enable the author to recoup the investment he has made in the work.[69] In selling the copyrighted material, the copyright owner must charge **more** than the marginal cost of reproduction to be able to recoup the high fixed costs of creating it. However, setting a price above the marginal cost causes a deadweight loss to society. A deadweight loss is caused when goods are not supplied to consumers who are actually willing to pay more than the marginal cost.[70] Since there may be consumers who value the works at **more** than marginal cost but **less** than the price stipulated by the copyright owner, the copyright owner's pricing causes deadweight loss since some consumers who value the goods would not be willing or able to buy it at the price. Additionally, copyright protection may deter derivative innovative works, which would also be another cost to society.

Ultimately, copyright law seeks to strike a **balance** between the creation of incentives for producing copyrighted material and the need to ensure public access to such works.[71] It recognises that there has to be some deadweight loss as a trade-off for the production of more works. Copyright promotes societal welfare and economic efficiency by ensuring that there is a **net benefit to society** generated by the creation of new works minus the losses from limiting access.[72] Hence, copyright protection has certain limits.[73] For example, the subject-matter of copyright is limited, the extent of exclusive rights is limited, and the duration of copyright protection is also limited depending on the subject-matter concerned. These limits are in place to ensure an appropriate balance between ownership rights and access rights, ensuring that the costs of protection do not outweigh its benefits to society.

However, the economic analysis differs when it comes to AGWs. Firstly, the potential copyrighted material, i.e. AGWs, are AI-generated rather than human-generated. Given that AIs are not conscious beings and cannot be incentivised, copyright protection for AGWs does not necessarily lead to the creation of more AGWs. Therefore, the balance may tilt in favour

[68] Lindsay D, "The law and economics of copyright, contract and mass market licences" (2002) Centre for Copyright Studies Ltd at para 3.2 ("The law and economics of copyright").
[69] Hugenholtz P, "Harmonising European Copyright Law" (2009) 19 Information Law Series, Kluwer Law International at page 186 ("Harmonising European Copyright Law").
[70] The law and economics of copyright at page 25.
[71] *Ibid* at page 25.
[72] Economics of Copyright at page 133.
[73] The law and economics of copyright at page 28.

of no protection since the losses from limiting access and the costs of administering copyright protection would outweigh the benefits to society from the creation of new works.

Yet, the creation of the AI which generates the AGW is done by humans. Without copyright protection of AGWs, humans may have no incentives to create such AI machines because they would have no way of recouping their investment. While it may be argued that this is not necessarily the case such AI machines currently exist even though AGWs are not protected in many jurisdictions, it is submitted that in the long run, the lack of protection of AGWs would lead to reduced investment in such AI machines. This would be a detriment to society as it prevents new works from being created.

Unfortunately, giving copyright ownership over the AGWs to the human most closely connected with the AGW (e.g. the user, owner or programmer of the AI system) would also be difficult to reconcile with economic analysis. If copyright ownership is given to the **user** of the AI, society would be rewarding the user even though he had not put in effort into the specific AGW itself. Hence the deadweight loss to society would be even greater since the marginal cost of producing the AGW was zero and yet consumers who value the good more than the marginal cost may not be willing or able to pay the price charged by the AGW owner. Secondly, allowing the **owners or developers** of the AI machine to have copyright in order to recoup their investments would mean that they now have sources of revenue from **both** the IP covering the AI machine itself, as well as the copyrighted AGWs. This would lead to double reward and allow them to receive **additional returns far beyond cost recovery**. This would be economically inefficient since the rationale for recoupment of costs no longer justifies causing deadweight loss to society.

Therefore, any regime for the protection of AGWs must account for the fact that (1) protection is required to incentivise the initial investment into AI systems which generate AGWs; but (2) the rewards obtained by the ultimate owner of the AGWs should not allow him to recover much more than he has put in, be it into the AI system or the AGWs, since he is not responsible for producing each additional AGW. This could be done by giving less extensive copyright protection to AGWs.

The following chapter will explore the different options for protection of AGWs and evaluate them based on whether they are conceptually sound and whether they can be justified by the economic theories which underpin traditional copyright. The option best suited for Singapore's context will also be evaluated.

Chapter II: Best form of IP protection for AGWs

A. UK CDPA

The first option which Singapore could consider implementing is the approach taken in the UK CDPA. As mentioned above in Chapter I, under the s9(3) UK CDPA, a CGW is **deemed** to have been **authored** by the **person** who took the arrangements necessary for its creation. Under s11, the deemed author would also be the work's first owner.

One of the main practical issues with following the UK's approach is that too many stakeholders could be involved in the process of creating the AI and it might not be possible to identify the person who took the arrangements necessary for the AGW's creation.[74] For example, the creation of the "Next Rembrandt" depended on the efforts of art historians, engineers, data scientists and developers. It was ultimately a collaborative investment by a dutch bank, an advertising agency, Microsoft, and several other partners.[75] Under s154(1)(c) UK CDPA, a corporation can be an author (and thus the first owner), but in a situation like the "Next Rembrandt" which involved coordinated efforts from multiple corporations, the deemed "author" may be hard to determine. Perhaps all the collaborating companies would have been regarded as joint authors of the work under s9(3) CDPA and thus joint owners.

Although joint authorship and ownership would make exercising control over the works complex, this is not a strong argument against the application of the UK CDPA regime since any regime to be implemented would face the problem of determining which entity protection of the AGW should be given to. In fact, such open wording may be necessary to allow flexibility in determining which entity should own the copyright over the AGWs as the production of AGWs become more complex, with the involvement of more entities. In *Nova Productions v Mazooma Games Ltd*, the "author" who took the arrangements necessary for the creation of the work (i.e. composite frames generated by a computer during a game) was held to be the programmer who had "devised the appearance of the game" rather than the player of the game.[76] The broadness of the test of "taking arrangements necessary" allowed the court to

[74] Generating Rembrandt at page 691.
[75] Moura FT, "Computers Became Painters? Oh Yes. Meet 'The Next Rembrandt'" (*MusicStats.org* February 27, 2018) https://musicstats.org/computers-became-painters-oh-yes-meet-the-next-rembrant/ accessed July 26, 2019.
[76] *Nova Productions Ltd v Mazooma Games Ltd* [2006] EWHC 24.

take a multi-factorial approach in determining the deemed author and to consider the contributions of all parties.

The main problem with implementing a regime like s9(3) UK CDPA, i.e. a "deemed author" provision, is the difficulty of reconciling such protection with established copyright concepts. As mentioned above, the notion of "authorship" in copyright law generally connotes the presence of a human author. Here, the UK CDPA deems an entity to be an "author" even if the entity did not directly author the work and even if it is not actually human. This goes against the established notion of authors being humans. As opined by Ginsburg, it is "unfortunate and confusing"[77] that the UK CDPA here has conflated the notion of authorship with the notion of copyright **ownership**. The CDPA clearly acknowledges that there is no human author of the CGW – as defined in s12 of the UK CDPA, but yet decides to confer **authorship** onto a separate (possibly non-human) entity. For clarity, authorship and ownership should be conceptually distinct. For AGWs, it is clear that the direct creator of the AGW is the AI itself. If the drafters of the UK law were intending to fill a lacuna in the law by identifying an entity to own the rights over the AGW, they should have used the correct terminology of **ownership** rather than authorship. This would be consistent with the established copyright concept of authorship without, as Ginsburg puts it, "tricking out the owner in the garb of an author".[78]

Notably, during the enactment of this provision, the House of Lords had acknowledged that the "deemed author" would not himself have made any personal creative effort, thus justifying an exemption from any form of moral rights.[79] In recognising that there is no human **creative** input into the AGW itself, s9(3) UK CDPA confers copyright protection even though originality requirements are not fulfilled. By conferring **authorship** on the person who made the necessary arrangements for the creation of the work and by recognising CGWs as authors' works, the UK CDPA is creating an inconsistency with the originality and human authorship requirements for copyright subsistence. This conceptual inconsistency is undesirable.

Another issue with the UK CDPA regime for the protection of AGWs is that it fails to address the issue of the different economics of production of AGWs. Copyright protection given to AGWs under the UK CDPA regime is essentially the same as other authors' works apart from the absence of moral rights and the shortened protection duration of 50 years. As

[77] Authorship in Comparative Copyright Law at page 1070.
[78] *Ibid.*
[79] HL Deb vol 493 col 1305 25 February 1988.

illustrated in the previous chapter, due to the different economics of production of AGWs, such extensive protection could lead to increased deadweight losses in society, which would not serve to promote societal welfare.

Therefore, while the test of undertaking "the arrangements necessary for the creation of the work" may be helpful in determining which entity deserves IP ownership over the AGW, the regime to be established should (1) clearly distinguish between authorship and ownership; and (2) provide less extensive protection of AGWs so as to account for the difference in the economics of production of AGWs and to reduce any deadweight loss to society.

Singapore currently has no provision on CGWs. Although Singapore should not adopt the UK CDPA approach for the reasons above, it could consider adopting the test of "making arrangements necessary for the creation of the work" when determining which entity should be the rightful owner of the work. A non-exhaustive list of factors could be set out in legislation to aid in determining ownership according to that test. For example, it could be provided that placing large investments into the creation of the AGW should be a big factor into determining ownership, since the rationale for protection is utilitarianism, so as to incentivise the generation of more works in society's interest.

B. Extension of WMFH doctrine

It has been proposed that the "work made for hire" ("WMFH") doctrine in the US could be extended to include AGWs.[80] S201(b) of the Copyright Law of the US (Title 17) states that in the context of a WMFH, the "employer or other person for whom the work is prepared" is considered the "author" and the owner of the copyright. Under s101, a WMFH is defined as either "(1) a work prepared by an employee within the scope of his or her employment", or "(2) a work specially ordered and commissioned for use [in nine specific situations]" and there is a written agreement between parties that the work be considered a WMFH. Case law[81] has established several non-exhaustive factors to determine when an "employer-employee" relationship exists (thus falling under the WMFH definition). The factors fall into three broad categories: (1) control by the employer over the work; (2) control by the employer over the employee; (3) status and conduct of the employer.

[80] Generating Rembrandt at page 711.
[81] Community for Creative Non-Violence v Reed 490 U.S. 730 at [737].

Proponents of this model argue that AI systems can be seen as "creative employees" or independent contractors working for the entities that employ or commission them.[82] As such, although the AI is the creator of the work, the commissioning party would be entitled to ownership. They argue that a "relative interpretation"[83] could be given to the meaning of "employer" and "employee", with the former referring to an entity using the services of another entity to complete a task e.g. an owner of an AI system who uses it to create AGWs, and the latter referring to the AI system whose generative services are being used by its owner.

Unfortunately, the model faces the same issue plaguing the UK CDPA. It conflates the concepts of authorship and ownership when it states that the employing entity is the **author** as well as the owner of the copyright. It also fails to deal with the issue of the differing economics of production of AGWs. Even proponents of such a model acknowledge that the solution might not be completely consistent with the policy rationale for giving rights. Shlomit [84] acknowledges that the original policy consideration for giving rights to the **employing entities** of artists or musicians was to allow them to recoup the "upfront costs" incurred in developing talent and slowly producing a marketable product. However, in the AI context, the costs would be far lower for generating an individual work since the machines can create works indefinitely and for no cost. Furthermore, under US law, works created as a WMFH merely enjoy a shorter duration of protection compared to normal copyrighted works.[85] Hence this model also fails to curtail the extensive suite of rights conferred by copyright and may lead to greater deadweight loss to society.

An additional conceptual difficulty with the WMFH model is that it essentially acknowledges that AI systems can express ideas and enter into legal contracts. Only under such an assumption can an AI system be considered an "employee" or an "independent contractor" capable of forming legal contractual relations. Admittedly, there may be evidence that AI systems can form and express ideas. Recent advances in deep learning are through "Generative Adversarial Networks (GANs)", which train an AI through a feedback loop not dissimilar to the traditional human learning process.[86] However, before AI systems are actually recognised

[82] Generating Rembrandt at page 713.
[83] AI and the Copyright Dilemma at page 442.
[84] Generating Rembrandt at page 715.
[85] S302(c) US Copyright Law.
[86] Brownlee J, "A Gentle Introduction to Generative Adversarial Networks (GANs)" (*Machine Learning Mastery* July 19, 2019)
https://machinelearningmastery.com/what-are-generative-adversarial-networks-gans/ accessed July 31, 2019.

as creative entities similar to mankind and beings capable of forming legal relations, it is not the place of intellectual property to assume the existence of such a state of affairs.

In applying this model to Singapore, s30(6) SCA does address situations where the work is made by an author under the employment of another person. However, it is unclear if the notion of "employment" can be expanded to accommodate AGWs. Unlike the US, there is no case law setting out non-exhaustive factors when determining the existence of an employer-employee relationship. It is likely that an employment relationship will only be found when an employment contract exists. Therefore, it is submitted that there are conceptual difficulties and other deficiencies with this approach, thus Singapore should not adopt this model.

C. Expanding subject-matter other than works

A third model suggested by academics is to classify AGWs as "subject-matter other than works". [87] This terminology is used in both the Singapore[88] and the Australian Copyright Act[89] to illustrate protection of subject-matter not protected as "authors' works". "Subject-matter other than works" refer to sound recordings, cinematograph films, broadcasts, cable programmes, and published editions of works. They are also known as "neighbouring" or "entrepreneurial works". As mentioned in Chapter I, there are good reasons why AGWs should not be protected as authors' works. In the light of this, protecting AGWs under the "authorless" domain of Part IV of the SCA (as well as Part IV of the Australian Copyright Act) seems more appropriate.

The rationale for allowing copyright over entrepreneurial works is to protect financial investment. [90] Protection is important because the financial cost of creating these entrepreneurial works is high and these costs can only be recouped if protection is given, thus incentivising creators to produce more material. For entrepreneurial works, there is no requirement for human authorship or originality for copyright protection to subsist. Protection is given solely on the basis of rewarding investment and protecting commercial interests. Due to the lower standards required to obtain protection, the extent of protection is also curtailed.

[87] McCutcheon J, "Curing the Authorless Void: Protecting Computer-Generated Works Following IceTV and Phone Directories" [2013] SSRN Electronic Journal ("Curing the Void").
[88] Part IV Singapore Copyright Act 2006.
[89] Part IV Australia Copyright Act 1968.
[90] Will Robots Rule the Artistic World at page 16.

For example, entrepreneurial works enjoy a shorter duration of protection[91] and also come with less exclusive rights.

In 1995, the Australian Copyright Law Review Committee actually considered the issue of CGWs.[92] It acknowledged the difficulty of protecting CGWs as authors' works due to the possibility of unidentifiable authors. However, it agreed that such CGWs were worthy of protection as they were the result of organisational or technological investments. It thus recommended that CGMs be classified under a new category in Part IV of the Australian Copyright Act and be protected as an entrepreneurial work. In terms of identifying who the owner of the CGM should be, the Committee suggested adopting the test from s9(3) of the UK CDPA – i.e. deeming the owner/maker to be the person by whom "the arrangements necessary for the creation of the material are undertaken".

Given that the SCA was based on the Australian Copyright Act, implementing this option for reform would require the least legislative amendments. The biggest advantage of this approach is that it does not treat AGWs as authors' works and avoids the legal fiction of creating an "author" through a deeming provision, when there was in fact no human author. It avoids conflating authorship and ownership like the UK CDPA and the US WMFH model. Unlike the WMFH model, it also removes the need to recognise AI systems as potentially creative beings who may be considered "employees" or "independent contractors". Additionally, it recognises that the rationale for protection is to ensure that investment costs can be recouped – in line with the rationale for protecting all other entrepreneurial works. This is also in line with the utilitarianism theory.

However, although this solution incentivises investment in AI systems which generate AGWs, if the rights and the duration of such rights given to the owner of the AGWs is the same as other entrepreneurial works, the level of protection would still be too high. The relevant owner of the AGW would be in possession of the copyright over an indefinite amount of AGWs with extensive exclusive rights for as long as 70 years. This is despite the fact that each additional AGW created by the AI system requires no effort from the copyright owner. This would allow the owner to recoup investments far surpassing the cost of coming up with the AI system. It would also prevent free public access to many of the works generated by the AI for a rather long time. This would not be in society's best interest.

[91] Part IV Division 4 Singapore Copyright Act 2006; Australia Copyright Act 1968.
[92] CLRC, Parliament of Australia, *Computer Software Protection* (1995) [13.08].

Therefore, while this third model resolves some of the issues plaguing the first two models, the issue remains that extensive exclusive rights are given to the copyright owner in spite of the lack of human effort needed to create each additional AGW. Therefore, the model must be modified to curtail the extent of exclusive rights given so that society will ultimately benefit from the protection given to AGWs – i.e. there is a **net benefit** to society generated by the creation of new works minus the losses from limiting access.

D. Tailoring "subject-matter other than works" to AGWs

As mentioned in Chapter I, limits are placed on copyright protection to account for the economics of copyright and the costs of such protection, so that societal welfare is best served. While all three models have several good features dealing with the protection of AGWs, none of the models satisfactorily deal with the problem of the differing economics of production of AGWs i.e. they do not sufficiently curtail the exclusive rights conferred on AGW owners so as to reduce the deadweight loss to society created due to the existence of copyright protection.

It is submitted that the ideal model for the protection of AGWs would place sufficient limits on the rights given, be it in terms of limiting the scope of the right, the degree of exclusivity conferred, or the duration of the rights. Such a model would classify AGWs as a **new entrepreneurial subject-matter** under the "Subject-matter other than works" regime in Part IV of the SCA but have more stringent limits placed on the extent of protection, in order to account for the difference in the economics of production of AGWs.

There are three ways in which IP protection over AGWs can be curtailed in order to strike the right balance between the rights of the AGW owner and access rights of the public. Firstly, limiting the scope of protectable AGWs; Secondly, reducing the degree of exclusive rights; Lastly, limiting the duration of IP protection over AGWs. It is submitted that a combination of such limits would allow the right balance to be struck between incentivising creation of new works and the costs that such protection may cause to society.

(1) Limiting scope of protectable AGWs

Nature of the AGW

Under traditional copyright law, a protectable work must fall under a recognised category. Under the SCA, LDMA works are only protected under Part III if they fall into

LDMA categories and under Part IV if they fall into the categories of entrepreneurial works. This requirement should also apply to AGWs, i.e. an AGW should only be protected under this new model (as a new entrepreneurial subject matter) if the AGW created is of a nature that falls under the traditional categories of copyrightable subject-matter. This ensures that the term "AI generated works" is not interpreted too broadly to include, for example, even 3D printed items like functional organs,[93] which may in the future also be created by AI systems.

Novelty of AGW

Usually, for authors' works to be protected, be it under the SCA or other national copyright regimes, the requirement of originality must be met. As this proposed regime envisions the protection of AGWs as entrepreneurial works rather than authors' works, this originality requirement (as well as the human authorship requirement) does not apply. However, it is submitted that some form "originality" standard **not** linked to human authorship has to be present to ensure that the scope of protectable AGWs is not too broad. For example, should Open AI's MuseNet music generator happen to generate a tune which **already exists**, then the resulting AGW should not be deserving of protection. Since the main basis for conferring protection on AGWs is to encourage the investment into AI systems which create new works, the AGWs to be protected should be **new** works which serve the purpose of the creation of incremental knowledge. Thus, it is submitted that in lieu of the originality requirement that usually exists for authors' works, a "novelty" standard can be implemented to determine whether an AGW deserves protection. This was initially proposed by Maggiore,[94] who suggested that a less stringent "non-obviousness" standard similar to patent law should replace the traditional originality/creativity requirement in copyright.

Having a "novelty" threshold would also be consistent with economic considerations. Under the traditional notion of copyright, the low threshold of originality served its economic purposes by ensuring that protectable work has **some social value**[95] – the assumption being that material which had no originality would have negligible social value, thus extending protection to such works would lead to costs of protection outweighing its benefits. Similarly,

[93] "5 Most Promising 3D Printed Organs for Transplant" (*All3DP* March 8, 2019) https://all3dp.com/2/5-most-promising-3d-printed-organs-for-transplant/ accessed July 31, 2019.
[94] Maggiore M, "Artificial Intelligence, Computer Generated Works and Copyright" Non-Conventional Copyright 382.
[95] The law and economics of copyright at page 32.

a "novelty" standard for AGWs would ensure that only AGWs which add social value to the existing pool of works would benefit from protection, thus ensuring that the costs of conferring protection do not outweigh its value to society.

Commercial value

Additionally, the proposed regime can limit the amount of protectable subject matter by requiring a justification for **continued** protection. After AGW owners are given a period of exclusivity to be able to exploit the works and recoup some costs, continued protection should be justified on the basis that a specific AGW has generated significant commercial value. A similar idea was proposed by Japan in its "Intellectual Property Strategic Program 2016"[96] where it considered the issue of IP protection for AGWs. The Committee determined that granting IP protection to all AI-created works would be excessive. However, the Commitee deemed it necessary to protect certain AGWs which were put on the market and which generated a given amount of commercial value in order to prohibit free-riders. Hence it suggested only protecting AGWs which generate a given amount of value.[97]

It is submitted that requiring the generation of commercial value to justify continued protection would be consistent with economic principles. Allowing less popular works (i.e. works which generate less commercial value) to enter the public domain helps to reduce deadweight loss to society caused by AGW protection because it ensures that consumers who value more obscure AGWs above the marginal cost but below what the AGW owner would have charged if there had been IP protection over the work are **able to access** the work, thus avoiding deadweight loss in respect of those AGWs. Simultaneously, it allows AGWs which have generated some commercial value to continue to be protected. This ensures that owners of AGWs have the incentive to commercialise the AGWs or risk losing protection, which safeguards against a situation where a single entity owns large quantities of AGWs with the sole aim of profiting through copyright enforcement.[98]

[96] Intellectual Property Strategy Headquarters, "Intellectual Property Strategic Program 2016" (May 2016) http://www.kantei.go.jp/jp/singi/titeki2/kettei/chizaikeikaku20160509_e.pdf accessed March 10, 2019.
[97] *Ibid* at page 11.
[98] Computer Creativity at page 728.

(2) Limiting exclusive rights

Traditionally, exclusive rights on a copyrighted work is limited. For example, unlike patent protection, copyright owners do not have the right to prevent the independent creation of similar works. For AGWs, although the fixed costs of creating the AI system are high, there is little to no additional cost in the generation of each additional AGW. Furthermore, the owner of the AGWs may also be obtaining revenue from the IP rights protecting the AI system itself. Therefore, it is likely that the owner of the AGWs can easily recoup his initial investment into the AI system through his exclusive rights in both the AI system and the AGWs. As such, it is submitted that **after** a certain period of exclusivity, where the AGW owner enjoys the same exclusive rights as the copyright owner of a similar work so as to recoup investment costs, **the exclusive rights over an AGW should be curtailed** for the subsequent duration of protection.

Following the period of full exclusivity, it is submitted that an AGW owner should only be able to enforce his entrepreneurial copyright under the principles of **unfair competition**. The rationale for this is to ensure that the public can access and copy the AGWs **as long as they are adding value to the work and are not simply copying the work wholesale.** This will help to protect the rights of the AGW owner to a certain extent while ensuring that beneficial derivative works can still be created, thus promoting societal welfare.

Traditionally, the principles of unfair competition are found under the protection of industrial property, which excludes copyright. However, it is argued that these principles of unfair competition should apply to AGW protection as well. Under Art 10bis(2) of the Paris Convention (which deals with the protection of industrial property), unfair competition is defined as "any act of competition contrary to honest practices in industrial or commercial matters"[99]. Art 10bis(3) gives three examples of what kind of unfair competition practices should be prohibited, but it is a non-exhaustive list and merely acts as a floor of protection and not a ceiling.

The World Intellectual Property Office ("WIPO") observed in a 1994 study that a separate act of unfair competition known as "slavish imitation" had emerged in several European countries.[100] This refers to a type of unfair free-riding and was an exception to the general rule allowing the free appropriation of unprotectable products, or allowing

[99] Paris Convention for the Protection of Industrial Property as revised at Stockholm on July 14, 1967, and as amended on September 28, 1979, 21 UST 1583, 828 UNTS 305.
[100] World Intellectual Property Organization International Bureau, *Protection against Unfair Competition: Analysis of the Present World Situation* (WIPO 1994) at [112] to [114].

appropriation where there was no likelihood of confusion. Under this exception, appropriating the marketable results of the work of another person **without any corresponding effort** is treated as a form of unfair competition and is prohibited. Typically, the unfairness arises from the "lack of research, investment, creativeness and expense" on the part of the imitator, who has simply copied the achievement of another, instead of choosing to compete fairly.[101] For example, Art 5(c) of the Swiss Law Against Unfair Competition and Art 11(2) of the Spanish Law of Unfair Competition prohibits the unfair act of imitating the achievement of others by taking undue advantage of the other's goodwill or efforts.

It is submitted that this notion of unfair competition can be applied in the context of the IP protection of AGWs. Analogies can be drawn with several US cases concerning copyright protection of compilations. It is argued that copyright was unjustifiably extended in those contexts to protect compilations which were created mechanically and devoid of intellectual creativity. Instead of extending the scope of copyright, unfair competition would have served as a better basis for enforcement of rights. Similarly, unfair competition would serve as a better basis for enforcement of rights vis-à-vis AGWs since the main issue to protect against is the appropriation of the AGW without any added value or investment on the part of the defendant.

Many US cases in the 1900s regarding the copying of compilations of fact material (which were uncopyrightable) displayed an inclination to protect the money and labour expended in the compilation of such material against unethical competition.[102] Unfortunately, as the principles of unfair competition were not yet developed, courts used copyright to prevent such competition instead, extending the scope of copyright to such compilations even though they completely lacked any intellectual creativity. It has been argued by several academics[103] that these cases should have been decided on the basis of unfair competition instead, with the main issue being that the defendant (who has copied large amounts of compiled fact material) is trying to "reap where it has not sown",[104] and is profiting from the plaintiff's efforts without putting in any effort of his own.

It is submitted that unfair competition could have been used to award a remedy to the plaintiffs in the Singaporean and Australian cases on copyright subsistence in telephone

[101] *Ibid* at page 58.
[102] Callman R, "Copyright and Unfair Competition" (1940) 2 Louisana Law Review 651 https://digitalcommons.law.lsu.edu/lalrev/vol2/iss4/5.
[103] Oberst P, "Use of the Doctrine of Unfair Competition to Supplement Copyright in the Protection of Literary and Musical Property" (1941) 29 Kentucky Law Journal 271.
[104] Callman at page 649.

directories as well, on the basis that their hard work had been unfairly taken advantage of. This would have avoided any inquiry into whether "creativity" had been exercised in respect of the selection and arrangement of the information in the telephone directories so that it could be protected as a compilation under copyright. After all, how creative could one be in arranging a telephone directory which for common-sense purposes should be in alphabetical order? It is submitted that the courts' concerns were mainly to prevent the defendant from taking unfair advantage of another's work but had no other option apart from copyright to deal with the situation.

Similarly, for AGWs, especially those which have generated significant commercial value, the AGW owner has invested a significant amount of effort and money into not only commercialising the AGW itself, but also the AI system which generated the AGWs. Hence, he should be able to protect his work from misappropriation by a defendant competitor who has put in no effort to create his own works. For example, if the AI generates a musical work which has proven to have generated commercial value, the owner should be able to sue a defendant who then appropriates the work wholesale to use it for his own purposes. However, if the defendant makes a remix of the musical work, the AGW owner should not be able to sue since some effort was put in to add value to the musical work and it is not simply a "slavish imitation" of the work. This would help to protect the AGW owner's rights while allowing a certain degree of public access to the work.

(3) Limits on the duration of exclusive rights

Another way copyright law attempts to balance the benefits of creating incentives for the generation of works against the costs of reduced access is by placing limitations on the duration of copyright protection. The optimal duration of copyright protection is when the marginal benefit of longer protection (i.e. the incentive to create new works) is equal to the marginal costs of protection.[105] However, it is practically impossible to determine exactly what copyright term would be optimal. That said, it is clear that for AGWs, the marginal benefit of protection would be rather low, since the creators of AGWs are not human, and will not be incentivised by a longer duration of protection. At the same time, the marginal costs of protection would be the same as other copyrighted works, in terms of the lack of access to AGWs and enforcement costs. Hence it is submitted that there should be a shorter duration of protection for AGWs since the point at which the marginal cost would equal the marginal benefit would be much sooner for AGWs than for regular copyright works. Providing for a shorter protection duration would likely lead to a more economically efficient outcome.

Proposed regime

The above recommendations should be implemented in a coherent manner under the "subject-matter other than works" regime in Part IV of the SCA, with AGWs constituting a new protectable entrepreneurial subject-matter.

The definition of an AGW could be limited to AGWs which were autonomously generated by a machine through machine learning with no identifiable human author. The AGW would need to have a degree of "novelty" to warrant protection. A registration system could be created for registering AGWs to facilitate the assessments of "novelty" and whether there was indeed no identifiable human author. This would allow for a preliminary determination of whether an AGW deserves protection under the stipulated criteria. Charging a small registration fee for each AGW would also make potential owners think twice before registering all the AGWs created by an AI system. Similar to the US copyright registration system, works must be registered in order for the owners to take action for any infringement.[106] Hence owners would not be able to commence infringement actions vis-à-vis unregistered

[105] The law and economics of copyright at [151].
[106] United States Copyright Office, "Copyright Basics" (*Circular 1*) https://www.copyright.gov/circs/circ01.pdf accessed May 12, 2019.

AGWs. A registration system would also facilitate the identification of which AGWs are protected and to what extent, which would help consumers determine whether a work can be used freely.

Secondly, when registering the work, the potential owner of the AGW can provide evidence to justify that it was the entity which took the arrangements necessary for the creation of the work, and a provisional assessment of this can be made. Some factors to consider in this assessment are: proximity to the act of final creation, the extent to which the arrangements made were responsible for the materialisation of the work, and the investments made into the creation of the AI system which generated the work.[107]

Thirdly, protection of AGWs could be split into three different time periods with a difference between the exclusive rights conferred during each period. In the first time period, AGW owners can exploit all exclusive rights in the AGW akin to the exclusive rights conferred to a similar category of works under the SCA. Essentially, if the AI system produces a LDMA work, this AGW would be protected as if it were a LDMA work under the SCA and the owner would possess the same exclusive rights conferred on a traditional LDMA copyright owner. Such extensive protection could be conferred onto the AGW owner for the first 10 years.

After the first 10 years, the AGW owners can only have **continued** protection over AGWs which they have commercialised and which have generated significant value, in line with the earlier recommendation of limiting the scope of protectable works. This means that obscure and uncommercialized works can now enter the public domain, free for all to use. This prevents a situation where an AGW owner restricts distribution of an AGW and only retains ownership for the sole purpose of profiting through copyright enforcement. For the AGWs which have generated significant commercial value, they can continue to be protected like regular copyrighted works, with the AGW owner having the full suite of exclusive rights available under traditional copyright. This protection can last for another 10 years.

After the second decade, it is likely that through the commercialisation of AGWs and through the commercialisation of the AI system itself, the AGW owner would have been able to recoup the investment he put into the AI system or the AGW itself. Therefore, the extent of exclusive rights should be reduced, and the AGW owner should only be able to enforce its rights in accordance with the principles of unfair competition. This will ensure that derivative

[107] Curing the Void at page 55.

works can be formed from the AGWs, while also preventing the wholesale misappropriation of AGWs, thus protecting the owner to a certain extent while promoting societal welfare by increasing the pool of new works. This protection can last for another 20 years before all protection over the AGWs end. The full duration of protection would only be 40 years, which would be shorter than any current copyrighted work. It is submitted that this is rightfully so, given the differing economics of production of AGWs.

Taking such a nuanced approach to the protection of AGWs is the best way forward for Singapore. Part IV of the SCA could be amended to include AGWs as a new protectable subject-matter, with new provisions describing the different levels of protection. The presence of such legislation will lead to clarity in the law surrounding AGWs, which will potentially incentivise even more innovation and creativity. It is submitted that the proposed framework strikes the balance between the AGW owner's rights and the public's right to access in the best way possible, thus ultimately promoting societal welfare.

However, concerns still remain about the potential monopoly power big companies could have over AGWs, should IP protection be given. This will be addressed in the next chapter.

Chapter III: Regulation of AGWs through competition law enforcement

One of the concerns about awarding AGW ownership to the entity which makes the "arrangements necessary" for the creation of the AGW is that it could lead to a virtual monopoly in AI-created works. This is because the company that created the AI system responsible for generating the AGWs or whichever entity ownership is given to could potentially be awarded ownership of a "near-infinite"[108] amount of AGWs and would have the exclusive rights to exploit those works for a significant period of time, assuming that it is found to have made the "arrangements necessary" for the creation of AGWs. Although the modified entrepreneurial works regime described above would significantly limit the exclusive rights of the AGW owners, there is still the possibility that large companies with the financial resources to invest in AI and which currently own the copyrights over many works could use their

[108] Computer Creativity at page 725.

existing portfolio as well as works in the public domain as inputs into an AI system and generate thousands of works in a short span of time. This is especially because AI systems do not get tired and require no monetary compensation. As a result, these owners would be able to capture market share easily and efficiently and obtain a dominant position a specific AGW industry (e.g. the market for musical works).

As there are limits to the extent to which copyright protection can curtail ownership rights to strike the right balance between access and ownership, competition law needs to be used to prevent concentration of exclusive rights in big companies and to ensure that they do not abuse their dominant position in the industry vis-à-vis AGWs. This concern about the potential dominant position of major internet platforms was also reflected in Japan's Intellectual Property Strategic Program 2016. During a cabinet discussion on the issue of awarding copyright over AGWs, lawyer and copyright expert Kensaku Fukui raised the issue of AGWs potentially "overwhelming" human-created copyright works in terms of volume, resulting in the "dominance of content" by major internet platforms like Google and Facebook which have enormous access to big data.[109] His concern was that companies with huge data stores can produce an infinite number of AGWs and have a monopoly on content, which may "threaten the human exercise of creativity".[110]

Therefore, it is imperative for competition law to play a role in regulating the AGW space. This chapter will illustrate how competition law principles can be used to ensure that producers of AGWs compete on legitimate grounds.

[109] Intellectual Property Strategic Program 2016.
[110] Otake T, "Japanese Researchers Take Artificial Intelligence toward the Final Frontier: Creativity" (*The Japan Times*) https://www.japantimes.co.jp/news/2016/06/19/national/science-health/japanese-researchers-take-artificial-intelligence-toward-the-final-frontier-creativity#.XUEXkegzY2w accessed July 31, 2019.

Abuse of dominance

As mentioned earlier, the competition concern in relation to AGWs is that large companies which already own many copyrighted works in a particular industry could eventually easily dominate the industry with AGWs, thus preventing smaller companies like start-ups trying to break into the AGW market from competing effectively. The theory of harm which best suits such a scenario is an abuse of dominance through "margin squeeze".[111] This occurs where a vertically integrated firm has a dominant position in relation to a product which is a necessary input for provision of downstream output, and chooses to set a very small margin between its input price and the price it sets in the downstream market such that an equally efficient downstream competition is forced to exit the market or is unable to compete efficiently.[112]

To put this into the AGW context, one has to imagine a scenario where one of the biggest music companies in the world decides to invest in AI to grow its own music catalogue, thus requiring less human input. Currently, the global music industry is controlled by three big entities: Universal Music Group ("Universal") with 29.85%, Sony Music Entertainment ("Sony") with 29.29% and Warner Music Group ("Warner") with 19.13%.[113] If one of them, e.g. Universal, decides to enter the AI market for AI-generated musical works, it would be considered a vertically integrated firm since it would be supplying the inputs (existing copyrighted musical works) to the AI-system to generate the outputs (the AI- generated musical works), which it would then commercialise.

Since Universal controls almost a third of the world's music, it is possible that Universal could choose to price its existing copyrighted works at a price close to the price of the AGW it is intending to commercialise. Small start-ups trying to enter the market for AI-generated musical works would thus find it very costly to buy inputs for their AI-system and may be forced out of the market as they would not be able to recoup the cost spent on both the inputs and the AI-system by selling the AGWs, as Universal would be selling their own AGW output at a very low price. Therefore, competition law must step in to prevent dominant players from adopting such practices. This could be by deterring such actions with financial sanctions or by imposing behavioural remedies on such companies, for example by making it compulsory to

[111] Competition and Consumer Commission of Singapore Guidelines on the Section 47 prohibition 2016 ("CCCS Guidelines").
[112] *Ibid* at [11.18].
[113] "Music Industry" (*Wikipedia* June 20, 2019) https://en.wikipedia.org/wiki/Music_industry accessed July 31, 2019.

license their works at a certain price. Abuse of a dominant position is prohibited under s47 of the Singapore Competition Act ("CA") and infringement gives rise to a financial penalty.[114] Such principles should be applied to the AGW industry as well.

Another theory of harm which could apply would be refusal to supply. While entities generally have the freedom to decide who they want to deal with, a refusal to supply is regarded as an abuse of a dominant position if it leads to substantial harm to competition with no objective justification for such a refusal. In the AGW context, using the example above, this theory of harm would apply if Universal simply refuses to supply its copyrighted works to potential competitors in the AI-generated musical works market. In order for such refusal of supply to be actionable, it must cause substantial harm to competition with no objective justification. In the AGW context, refusal to supply a large amount of works would definitely cause substantial harm to competition since such inputs are used both to train the AI system and to generate the works. They are "essential facilities" – i.e. they are indispensable for competing in the AGW market and duplication is impossible or extremely difficult due to copyright protection. Therefore, competition law must step in to mandate that key inputs – i.e. existing copyrighted works must be supplied to potential competitors. This will allow effective competition in the AGW market. This would also fall under the s47 prohibition in the CA.

While the production of AGWs currently seems to be occurring at a slow pace, with notable works only occasionally hitting the news, it is likely that the technology used to produce such AGWs will become more and more commonplace. As it becomes less complex to generate AGWs, it is not inconceivable to think that a company with access to large datasets could generate a near-infinite amount of works in a particular industry, thus monopolising the production of works in that sector. For example, the start-up "Jukedeck" charges USD$21.99 for an AI-generated musical track, which is a tiny fraction of the cost of hiring an actual musician.[115] Tech giants like Google are also getting involved, with its "Magenta" project aiming to use AI to produce music.[116] A company with access and ownership rights to many of pop music's greatest hits could simply feed this data into an AI system to potentially generate a near-infinite amount of musical works, thus preventing those without such resources (e.g. start-ups) from competing effectively with their own music. Therefore, competition law must step in to regulate the AGW space to ensure fair competition.

[114] CCCS Guidelines at [8.1].
[115] See note 11.
[116] *Ibid.*

Conclusion

The regulation of AGWs is a complex issue. It will require lawmakers to go back to the basis of conferring protection on works to determine if copyright protection of AGWs is justified by traditional copyright rationales. Any proposed regime must also be consistent with economic analysis to ensure that society ultimately benefits from such protection. As technological advancements continue, it is inevitable that AGWs will become a more prevalent phenomenon. Therefore, it would be wise for Singapore to start considering how to regulate this space, just as it has come up with guidelines for the ethical use of AI. Following this paper's analysis of the current copyright regimes in different jurisdictions, and the requirements of authorship and originality, it is submitted that AGWs should not be protected as authors' works. However, following the discussion on copyright rationales, it is submitted that AGWs can be protected under Part IV of the SCA justified on the utilitarianism theory, as a new category of entrepreneurial works, combined with principles of unfair competition. Lastly, competition law and IP must work together to ensure that there is fair competition and that society benefits from the production of more AGWs from a variety of providers. It is only with such measures that the protection of AGWs will create the most value for society and ultimately promote societal welfare.

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