

6 CMET (2019) 103

Artificial Intelligence As the New Creator - Changing Dimensions in Copyright Law

ARTIFICIAL INTELLIGENCE AS THE NEW CREATOR — CHANGING DIMENSIONS IN COPYRIGHT LAW

by

Narayani Anand

Abstract

Existing Artificial Intelligence (hereinafter 'AI') technology is now producing what may be deemed as 'original' literary and artistic works that are subject to copyright law. Pertinent challenges to existing copyright law are emerging as a result of these 'creative' AI. This paper seeks to examine the role of AI technology as a 'creative' machine and address the challenges in copyright law that emerge as a result of improvements in AI technology, with an attempt to find possible solutions. Traditional theories of intellectual property jurisprudence have been examined and an attempt has been made to analyse the position of creative AI with respect to these theories. Existing copyright law in the US, UK and New Zealand has also been examined to explain the position of 'computer-generated works' in the legislations of these jurisdictions. To conclude, possible solutions have been proposed for each of these questions that have emerged recurrently in the debate for authorship rights for creative AI — thus proposing amendments to copyright law.

INTRODUCTION

The human willingness to push the limits of our own intellect has led us to a significant milestone in the history of innovation — the development of AI. It is better understood as the theory and development of computer systems being able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages¹ and is set to fundamentally alter our lives as we know it.

The interaction of AI technologies with the living world is presenting challenges and opportunities unforeseen in human history. Innovation in AI has reached a point where computers are producing, what can be deemed to be



Page: 104

intellectual property, across the gamut of original creation, such as music, art, design and others. This new age of innovation demands a careful understanding and redefinition of intellectual property laws (hereinafter 'IP laws') to regulate the types of creative works emerging these days.

In this context, this paper examines some of the key debates surrounding the question of copyright protection for AI generated works. Cross-jurisdictional analyses have been provided wherever necessary. Specific solutions to some of these questions have been provided as a means to build upon in the further development of existing IP laws.

UNDERSTANDING ARTIFICIAL INTELLIGENCE

AI is the capacity of computers or other machines to exhibit or simulate intelligent behaviour.² It is the technology programmed to mimic human action and 'think' the

way a human does. These machines target specific goals towards the performance of which, actions are rationalised and then taken. The goals of AI include learning, reasoning, and perception, and the machines are wired using a cross-disciplinary approach based in mathematics, computer science, linguistics, psychology etc.³ The rationale behind AI is the existence of specific terms that can define human intelligence, which can then be mimicked by a machine.

The 'thought' process in AI technology is carried out in an Artificial Neural Network (hereinafter 'ANN')— an information processing paradigm that is inspired by the way biological nervous systems, such as the brain, process information. The information processing system is composed of a large number of highly interconnected processing elements (neurons) working in unison to solve specific problems. ANNs, like in case of humans, learn by example. An ANN is configured for a specific application, such as pattern recognition or data classification, through a learning process.⁴

Another emerging concept that is bringing about more diverse and versatile AI is called 'deep learning'. Whereas machine learning takes some of the core ideas of AI and focuses them on solving real-world problems with neural networks designed to mimic our own decision-making, deep learning focuses even more narrowly on a subset of machine learning tools and techniques, and applies them to solving just about any problem which requires 'thought'— human or artificial.⁵ This dramatically improves the state-of-the-art in speech



Page: 105

recognition, visual object recognition, object detection and many other domains such as drug discovery and genomics.⁶

With new problems arising in the fields of finance, science, industry and education, AI technologies are stepping up to provide newer solutions. In medicine, it is proving to be an elixir of life for individuals in different conditions. It is being used, among others, to restore touch⁷, detect diseases⁸, in robotic surgeries⁹ and cases of heart sound analysis.¹⁰

Recent advances in AI technology have exhibited feats of compelling nature. Take, for example, Google's much celebrated computer programme AlphaGo. It was programmed in 2015 with the specific task of playing the board game Go— invented over 2,500 years ago in ancient China. The abstract strategy board game is more complex than chess, and is believed to be the oldest board game being played today. In May 2017, AlphaGo created history by defeating the world's best Go player, KeJie.¹¹ Similar is the case of IBM's Watson— a supercomputer combining complex analytical software and AI with the primary task of performing as a question-answering machine. In 2011, the Watson computer system defeated former *Jeopardy!* champions Brad Rutter and Ken Jennings in head-to-head matches.¹²

This progress is not limited to gaming. Voice controlled AI technologies are revolutionising our lives within the home-space. Amazon Echo, the E-commerce giant's brand of smart speakers, 'Connect to Alexa'— a voice controlled intelligent personal assistant. The device then responds to the 'wake word' 'Alexa', taking instructions to perform functions as diverse as playing music, streaming podcasts, providing traffic, weather and other real-time updates, setting alarms, making to-do lists, as well as controlling multiple smart devices such as lights, air conditioners and others.



Page: 106

AI is emerging as the single-most disruptive force in cross-industry innovation. Study has found that the more the integrated AI is into economic processes, the greater is the potential for economic growth. AI has the potential to boost rates of profitability by an average of 38 percent by 2035 and lead to an economic boost of USD 14 trillion (an average of 1.7%) across 16 industries in 12 economies by 2035.¹³

COMPUTERS AS 'CREATORS'

These fascinating leaps in AI technology have transcended the boundaries of remaining ancillary to human action. AI technologies have entered an era of creation—generating musical, artistic and literary works that can be regarded as copyrightable material.

Even though technology has forever impacted the production of music, new innovations in AI technology are now enabling original compositions which, to some extent, mirror human compositions. An AI called Emily Howell created by David Cope has made its mark in the field of Algorithmic Computer music.¹⁴ The algorithm used behind Emily Howell has been registered as a patent in the US. In 2012, an AI called Iamus created the first fully computer-composed classical album.¹⁵ Not far behind is Artificial Intelligence Virtual Artist, the first virtual composer in the world to be recognized by a professional association of music.¹⁶ Google's next foray into the burgeoning world of AI would be a creative one. The company has previewed a new effort to teach AI systems to generate music and art called Magenta.¹⁷

In future, robots are likely to produce new solutions to problems and in so doing, would create intangible outputs that could, at least in theory, be perceived as intellectual property.¹⁸ If a machine does compose something, such as a piece of music, and it is impossible to tell by hearing the music whether



Page: 107

it was composed by a computer or by a human, one might wonder whether the notion of machine authorship ought to be accepted.¹⁹

Some have opined that materials produced by intelligent machines constitute copyrightable works. Others argue in favour of human authorship suggesting that machine-generated works cannot constitute subject matter for IPR law. The EU funded RoboLaw project in its 'Guidelines on Regulating Robotics' addressed to European policymakers to recognise the ambiguity of existing IPR laws in governing computer generated or robot generated works. The UK Copyright, Designs and Patents Act 1988 is the only legislation that accords recognition to computer-generated or robot-generated works but even then the exact application remains a question of debate.²⁰

ARTIFICIAL INTELLIGENCE AND IP LAW

In order to understand the legal relation between AI and IP law, it is important to understand their various dimensions. While traditional theories form the jurisprudential basis for IP law, it has been argued that newer forms of creative works such as those produced by AI render those traditional theories outdated, and that legislators and legal theorists must look elsewhere. Besides this, there are other dimensions specific to the 'computer as creator' debate, which have been explored hereinafter.

Theories of Intellectual Property and AI -Generated Works

The philosophical foundations of IP law provide great insight into much of the existing IPR legislation across the world. With the increasing importance of intellectual property in society and the development of particularly new technologies, among which the most notable are digital technology and the decoding of genetic structure, the theory of intellectual property has attracted heightened interest.²¹ It is argued that claims in favour of machine-ownership of intellectual property for AI generated works do not find basis in the philosophical and theoretical foundations of IP law. Some of the traditional theories are discussed below:

Utilitarian Theory

The Utilitarian Theory to intellectual property proposes that property rights should result in the maximisation of net social welfare. The approach



Page: 108

was advocated chiefly by Jeremy Bentham and J.S. Mill. 'The greatest good for the greatest number' is the general principle guiding the Utilitarian theory. In the context of intellectual property, the pursuance of maximum social welfare requires one to strike an optimal balance between increased innovation through exclusive rights on the one hand, whereas, tendencies of monopolisation and curtailed public enjoyment on the other.²²

Landes and Posner²³ have argued that easy replication and enjoyment by one person of most intellectual products does not prevent their enjoyment by other persons. In combination, these two characteristics create a danger for the creator being unable to regain their 'costs of expression', that is, the time and effort devoted to writing or composing and the costs of negotiating with publishers or record companies. This happens because of the low 'cost of production' for the manufacture and distribution of copied material incurred by copyists. Due to this danger, creators will be deterred from making intellectual products with social value. Exclusive rights to make copies rests with the creators which further helps avoid this situation.

In the context of AI-generated works, however, this conflict between expression and production costs does not arise. A computer algorithm programmed to mine sound samples from a repository, for example, is not motivated by the financial benefits it may potentially enjoy if a resulting piece of music were regarded as an original, copyrightable work. AI pre-programmed to create literary or musical works are machines performing user-defined functions and are not motivated by economic benefits. They would continue to create socially valuable works without the disincentive of an unreturned cost.

Personality Theory

The Personality Theory places an individual's fundamental human needs at the centre of private property rights. Derived from the works of Hegel and Kant, the theory claims that an idea belongs to its creator because it is the manifestation of the creator's personality or self.²⁴ Because of the central role assigned to the satisfaction of human needs, this theory is referred to as the Personality Theory.

When seen in the context of intellectual property, exclusive rights to the fruits of an individual's self-expression may be justified on the ground that they create social and economic conditions conducive to creative intellectual



Page: 109

activity, which in turn is important to human flourishing.²⁵ The theory is especially effective in recognising intellectual property rights for artistic, musical and literary expressions. It is easy to think of the personal attributes of an author or artist as contained, in some sense, in their works.²⁶

Hughes has explained this emphasis on an individual's 'persona', described as their "*public image, including his physical features, mannerisms, and history*"— all elements of their 'personality'. An individual's personality in itself deserves legal protection, even though it is not a by-product of labour.

Existing AI technology, however, consists of personality-deficient robots. While there are breakthroughs in programming that recognise the need for robots to interact with humans on a social level, these robots do not possess a personality in the sense described by Hegel. Robotic personalities are inherently different from human personalities as they are artificially engineered to simulate human socio-psychological behaviour. When seen in a jurisprudential context, the satisfaction of needs that is central to Hegel's conception cannot be attributed to mechanised generation of works by robots. Machines, unlike humans, do not create works of literature or art as a means of conscious self-expression.

Social Planning Theory

The Social Planning Theory is based on the proposition that property rights can and should be developed so as to help foster the achievement of a just and attractive culture.²⁷ It is derived broadly from the works of legal and political theorists including Jefferson, early Marx, the Legal Realists, and the various ancient and modern advocates of classical republicanism.²⁸ It is similar to the Utilitarian theory in the sense that they both emphasise upon social good. The distinction, however, is pronounced in the vision of a desirable society that is richer and broader than the conception of 'social welfare'.

Neil Netanel provides a context for this theory by describing a "*robust, participatory and pluralist civil society*" that is replete with "*unions, churches, political and social movements, civic and neighbourhood associations, schools of thought, and educational institutions*". Democratic political institutions can flourish, according to Neil Netanel, through this type of a civil society. It must, however, be nourished by governance, which can be done through copyright



law in two ways: firstly, the production function of copyright, which provides an incentive for creative expression on a wide array of political, social, and aesthetic issues, thus, bolstering the discursive foundations for democratic culture and civic association, and secondly, the structural function— copyright supports a sector of creative and communicative activity that is relatively free from reliance on state subsidy, elite patronage, and cultural hierarchy.²⁹

It is argued that AI-generated works obviate the existence of both these functions for various reasons. Intelligent robots produce original works of art, music or literature, not as a means of creative expression but in the performance of a pre-programmed function. Within creative expression, an element of individuality is inherent of which a person is consciously possessed, and which is expressed through an outward performance of such thoughts and emotions. AI is devoid of such an individuality or sense of 'personhood' which is inherent in human beings.

On the other hand, the structural attributes of reliance on state subsidy, elite

patronage and cultural hierarchy— in the case of AI-generated works— can be eliminated by providing intellectual property ownership of AI-generated works to the creators of AI technologies, instead of giving it to the AI technology itself.

'Creators' or 'Tools for Creation'?

The basic question of determining precise ownership rests at the centre of the debate in intellectual property rights for machine created works. Contradictory laws regarding the intellectual property protection for AI-generated works are already emerging among countries that are significant players in robotics development such as.

AI-GENERATED WORKS ACROSS JURISDICTIONS

As early as 1965, the Registrar of Copyrights at the US Copyright Office had recognised this problem: The crucial question appears to be whether the 'work' is basically one of human authorship, with the computer merely being an assisting instrument, or whether the traditional elements of authorship in the work (literary, artistic, or musical expression or elements of selection, arrangement, etc.) were actually conceived and executed not by man but by a machine.³⁰



In the UK, the Copyright Designs and Patents Act, 1988, for example, provides that for literary, dramatic, musical or artistic work which is computer-generated, the author shall be taken to be the person by whom the arrangements necessary for the creation of the work are undertaken.³¹

Moreover, New Zealand law grants protection to original works even if created by AI systems, software or robots. The Interpretation Clause (Section 2) of the Copyright Act, 1994, defines 'computer-generated', in relation to a work, as one generated by a computer in circumstances such that there is no human author of the work (emphasis supplied).³² However, similar to English law, section 5(2)(a) while clarifying the meaning of author as the person who creates the work, states, that in the case of a literary, dramatic, musical, or artistic work that is computer-generated, it is the person by whom the arrangements necessary for the creation of the work are undertaken.³³

US law, on the other hand, takes a sharply contrasting position. Established by years of jurisprudence on 'authorship' in cases of computer-generated works, the dominant legal opinion in the US holds that authorship is a uniquely human process that cannot be replicated by intelligent machines. A similar view is maintained in the case of patentability for inventions. Section 100(f) of the US Code Title 35 defines 'inventor' as "*the individual or, if a joint invention, the individuals collectively who invented or discovered the subject matter of the invention.*"³⁴ Further, the Manual for Patent Examining Procedure (MPEP) in the US, provides that the threshold question in determining inventorship is who conceived the invention. Unless a person contributes to the conception of the invention, he is not an inventor.³⁵ The explicit reference to the 'individual' in the US Code and the 'person' in the MPEP as inventors poses barriers to conceptualisation of computers as possible inventors. When computers play a more substantive role in the inventive process, such as by analysing data in an automated fashion, retrieving stored knowledge, or by recognizing patterns of information, the computer may still fail to contribute to conception.³⁶

In *Townsend v. Smith*³⁷, 'conception' has been defined as "*the complete performance of the mental part of the inventive art,*" and it is "*the formation in the mind of the inventor of a definite and permanent idea of the complete and operative*

invention as it is thereafter to be applied in practice." The 'mental



Page: 112

part' and 'formation in the mind of the inventor' can't therefore, be applied to robots in the basic absence of personhood.

In the context of copyright, in its updated requirement of 'human authorship', the Compendium of US Copyright Office states that the Office will not register works produced by a machine or mere mechanical process that operates randomly or automatically without any creative input or intervention from a human author.³⁸

The classic conundrum that emerges in questions of intellectual property ownership by AI is assigning credit between its programmer, operator, server, and data provider. For example, Company A develops an AI program or machine, which it sells to Company B. Company B operates that AI on resources owned by Company C, such as servers in a cloud computing environment. Company B also obtains data from Company D that is used to train the AI. After training, the AI produces an invention—so who is the inventor?³⁹

It is observed that the two emergent issues are:

- The questions of authorship and conception in AI-generated works and inventions, and
- The existence of multiple stakeholders in the creation processes of AI-generated works.

The former is addressed directly by legislation in the US. The US Copyright Compendium explicitly excludes machine-produced works without any human intervention from the purview of copyrights. American jurisprudence also necessitates a 'mental part' and other attributes that are exclusive to humans, such as individuality and personhood in the inventorship process, as an outcome of which, machines are excluded from the purview of possible inventors. Unlike humans, machines are not sentient beings that can be said to think and create independent of human intervention.

The second is an ongoing debate in addressing the concerns of various parties that may possibly claim intellectual property rights for AI-generated works. The "*arrangements necessary for the creation of the work*" is an open-ended phrase that leaves unaddressed the involvement of different entities. It is argued that due to the multiplicity of parties involved at various levels in AI technology, the ownership of intellectual property, even if it were recognised for AI-generated works, would rest with these various stakeholders. The machine-processes cannot be regarded as the primary creator, as it is the



Page: 113

programmer, developer, operator, server, investor and data-input provider who make (s) the 'arrangements necessary for the creation of the work'. The question of authorship would also be squarely addressed as the final intellectual property rights would be vested with the human inventors and authors of AI technology. By recognising the innovation of the human inventor in producing AI technology capable of generating copyrightable and patentable works, IP laws would succeed in fulfilling their original functions of boosting innovation and encouraging creative expression.

AI-Generated Works: Inherently 'Infringed'?

In order to completely explore the question of intellectual property protection for AI-generated works, it is necessary to understand the processes involved in their creation. Machine learning is the key driver of AI technology at the pace that it is advancing today. It is conceived from pattern recognition and the theory that computers can learn without being programmed to perform specific tasks. Researchers interested in AI wanted to see if computers could learn from data.⁴⁰

One of the important factors that have led to machine learning techniques forming the backbone of AI innovation is the explosion in the amount of digital information that is created, stored and made available for access.⁴¹ With these innovations in place, engineers realized that rather than teaching computers and machines how to do everything, it would be far more efficient to code them to think like human beings, and then plug them into the internet to give them access to all of the information in the world.⁴² For instance, Google Magenta uses techniques for learning by example to generate something new.

Machine learning as an operational technique, however, raises concerns about the infringement of existing intellectual property by AI technology. Machine learning entails learning from existing creative works such as art, literature or music. These works are often picked up from the internet, from sources that are susceptible to copyright violation. The issue with intellectual property ownership for AI-generated works is that these may not be original works in the purest sense but highly dependent on access to works created by others and require massive amounts of input -data (which can be subject to varying intellectual property regimes).⁴³



There are multiple scientific theories linking human artistic expression to the performance of specific functions— such as communication, mating and social bonding, among others.⁴⁴ Humans engage with their natural environment in certain cognitive ways to produce artistic output that achieves specific results— both for the creator and the observer. Modern IP Laws recognise this intellectual aspect in extending protection to creative works.

It is argued that the neural networks relied upon by AI technology, although mimic the human brain, do not create artistic works for the fulfilment of any cognitive function, rather the performance of a pre-programmed function that is an end in itself. Whereas artists seek inspiration from their natural environment, AI need to 'train' themselves through existing art to produce something meaningful. This makes the creative works of humans and machines different in a fundamental sense. Any recognition of intellectual property for the works created by AI technology would be incomplete without recognising the creative contribution of the input data, and by implication, the original authors.

It seems likely that most of the questions raised by automated creations will arise as issues of ownership and infringement rather than as issues of originality and authorship.⁴⁵ Striking similarities between two works that today provide evidence of copying may in the future be evidence of no more than two computers executing the same instruction in similar ways.⁴⁶

Courts have traditionally treated authorship as combing the requirements of originality— implying that the copyrighted work was created independently and not from another source—and the contribution of expressive content.⁴⁷ Under this

formulation, if a writer dictates a short story to a stenographer, the resulting work is one of authorship, but the writer, not the stenographer, is the author⁴⁸. Similarly, elements incorporated into an architectural work at the specific instance of a client will constitute the client's, not the architect's original expression, and if the work contains no copyrightable expression of the architect, he will not be a co-owner.⁴⁹



Page: 115

'Authorship' v. 'Generation'

It is argued that the existing scholarship advocating for authorship rights of robots and AI⁵⁰ do not recognise the fundamental difference between 'authorship' and 'generation'. As explained above, there is a difference in the way humans and computers interact and engage with the existing environment to produce artistic works. Owing to the vast amounts of 'raw data' that is required in the form of existing copyrighted and copyrightable works for machines to learn and produce newer creative material, AI technology can, at best, 'generate' rather than 'author' creative works.

Legislations in the three countries discussed above have recognised this in theory. US laws have placed noteworthy emphasis on the human authorship requirement, while its patent laws emphasise on the mental aspects of conception. Together, both these concepts render the patent and copyright registration of AI-generated works impossible. To bypass this legal requisite, many patent applicants also conceal the involvement of computing technology from the Patent Office.⁵¹

This distinction assumes great importance in understanding the nature of the machine creativity process. Traditional IP Law, in granting protection to creative and inventive works of human authors, recognizes the originality and innovation inherent in intellectual property. An individual creator produces or invents a totally new and original artwork, theory, idea or invention. Innate to this finished product is an element of individuality that renders this product unique and useful to the greater social landscape— by improving an existing system through a new invention or enriching the cultural and aesthetic landscape by creating a new work of art, music or literature. Human creativity and inventiveness is, therefore, spontaneously possessed of the authorship and mental aspect that are the prerequisites of IP law.

The UK and New Zealand laws, while recognising the copyright ability of computer-generated works, also emphasise on the above distinction (between 'authorship' and 'generation') by providing that the 'author', even in computer-generated works, "*is the person by whom the arrangements necessary for the creation of the work are undertaken.*"⁵² In other words, even while allowing for copyright of these works, 'generation' rather than 'authorship' of computers is recognised. Hence, computers— creating based on training, data and instruction— cannot be authors.



Page: 116

CONCLUSION

Issues that need clarification in legal research and practice are, for example, what exactly is a computer-generated work, who is the initial rights-holder of such a work, and how the criterion of an 'own intellectual creation' can be applied to computer-

generated works.⁵³

Humans have always improved life through innovation. From the discovery of fire to electricity, the Internet and beyond, new thinking is fundamental to social progress and economic growth. At its most effective, innovation is an inherently human endeavour.⁵⁴

On observing the philosophical underpinnings of IP law, it is seen that traditional theories perform in different ways in the context of AI-generated works than in the case of works produced by human inventors and authors. The system has allocated rights only to humans for a very good reason: it simply does not make any sense to allocate intellectual property rights to machines because they do not need to be given incentives to generate output.⁵⁵ A machine programmed to perform certain functions, even if it does so through machine learning techniques, is not driven by the motivation of economic considerations. Additionally, in the absence of personhood, a machine cannot be said to have a 'personality' that needs outlets of creative expression. For similar reasons, machine-created works and inventions can contribute to social planning even when intellectual property ownership is not granted to the machines itself. Extending intellectual property ownership for AI-generated works to robots and AI, thus, lacks a jurisprudential basis.

Machine learning techniques as the primary process for producing original works by AI creates a grey zone of infringement vs ownership. Claims of the latter by proponents of intellectual property rights for AI ignore the very real possibility of intellectual property infringement that is risked when intelligent robots access and 'learn' from large amounts of existing creative works. The heavy reliance on access to works created by others cast a shadow of doubt on the claims of originality for the works created by AI. Deeper questions of infringement and originality are raised when the creative processes between man and machine are compared. Whereas human beings create copyrightable works and patentable inventions due to natural motivations and urges for innovation, machines do so as a result of programming and by mechanised techniques of 'learning' from existing creations.



To adequately address these concerns— it is proposed that the creators of copyrightable works used as training samples by robots also have a stake in the final intellectual property produced by robots. To this end, a creative platform that operates as a marketplace of original works is proposed. Authors can put up their inventions and works on this platform for access by creative robots at a fixed fee. These would serve as creative data banks, except the authors of this data would also have a stake by getting a fair compensation for providing access. This creative platform could have structural demarcations between artistic, musical and literary works— and have specific regulatory provisions for serving as a cross-jurisdiction platform — whereby the fees payable to authors would be larger in the case of geographical or legally remote jurisdictions. The illustrator of a digital print in Toronto, for example, could put up her work for digital access by a robot in Beijing, and collect a higher fee than she would by putting it up for access by a creative robot in her own country.

Such a creative platform would serve multiple ends by encouraging AI-creativity and ensure a democratised creative-AI industry by enlarging the stakeholder net. It would also strengthen existing intellectual property by providing due royalty to authors.

Enriching the stakeholder net needs to go a longer way as existing legislation regards the person who 'makes the necessary arrangements' for the creation of these works as authors, creating sufficient ambiguity. As such, programmers, operators, servers, data-owners (authors of existing works) and data-providers can all be said to 'make necessary arrangements', so pinning the exact authorship as also its extent, remains a grey area. It is proposed that existing legislation to this end be expanded to specify human intervention at various technical levels in the invention of creative-AI, as well as in the generation of works by them. Statutes must be amended to include specific definitions of 'programmer', 'developer', 'operator', 'server', 'data-author', 'data-provider', and so on. The statutes must also be amended to enable contractual arrangements in sharing intellectual property ownership so that the above parties could decide the extent of their respective ownership by contract.

Existing legislation to an extent recognises the difference between human-authorship and machine-generation, to which it regards the humans making 'necessary arrangements' as the authors of these works. The jurisprudence around 'authorship' and 'generation' is expected to strengthen with time as courts begin dealing with their initial cases pertaining to these provisions. While American intellectual property jurisprudence has sufficiently explained the scope of its 'authorship' requirement, the newer legislation in countries such as the UK is expected to touch upon newer questions pertaining to the extent of human involvement at different levels of machine-generated works, the rationale behind human authorship of machine-generated works, and so on.



Page: 118

The innovation of creative-robots have raised compelling questions about the philosophical underpinnings of the creative process, as well as existential debates about the rights of machines and the future of human creativity. While it is tempting to engage in apocalyptic predictions about humanity's future in the light of creative and powerful machines, it is important to recognise that the philosophical and legal foundations of our existing rights-system provide for enduring solutions. Although the question of innovation and creativity being unique to human inventors and authors can now be negated with the emergence of creative robots, we are yet to see a single AI technology that can be said to truly 'innovate' or 'create' in the sense understood and recognised by science, society and the law. At a time when human technological advancement is fast outpacing its supporting legal framework, it is imperative for governments and lawmakers to realise the urgency of up-to-date technological legislation and create an informed public discourse around the emerging intellectual property challenges in the Fourth Industrial Revolution.

* Student, LLB, Campus Law Centre, Faculty of Law, Delhi University.

¹ 'Artificial Intelligence' (*OED Online*, 4 June 2013) <<http://oed.com/view/Entry/271625?redirectedFrom=artificial+intelligence#eid>> accessed 20 December 2018.

² *ibid.*

³ Jake Frankenfield, 'Artificial Intelligence — AI' (*Investopedia*, 13 March 2018) <<http://www.investopedia.com/terms/a/artificial-intelligence-ai.asp>> accessed 23 December 2018.

⁴ Dimitrios Siganos and Christos Stergiou, 'Neural Networks' 96(4) *Surprise Journal* <<http://www.doc.ic.ac.uk/~nd/surprise96/journal/vol4/cs11/report.html>> accessed 29 December 2018.

- ⁵ Bernard Marr, 'What is the difference between Deep Learning, Machine Learning and AI?' (*Forbes*, 8 December 2016) <<http://www.forbes.com/sites/bernardmarr/2016/12/08/what-is-the-difference-between-deep-learning-machine-learning-and-ai/#4881efd326cf>> accessed 24 December 2018.
- ⁶ Yann LeCun and others, 'Deep Learning' (2015) 521 *Nature International Journal of Science* <<https://cs.toronto.edu/~hinton/absps/NatureDeepReview.pdf>> accessed 19 December 2018.
- ⁷ Maggie Fox, 'Brain Chip helps Paralyzed Man Feel his Fingers' (*NBC News*, 14 October 2016) <<https://nbcnews.com/health/health-news/brain-chip-helps-paralyzed-man-feel-his-fingers-n665881>> accessed 24 December 2018.
- ⁸ Shiraishi Junji and others, 'Computer-aided Diagnosis and Artificial Intelligence in Clinical Imaging' (2011) 41 *Seminars in Nuclear Medicine* 449, 462.
- ⁹ Anthony R Lanfranco and others, 'Robotic Surgery — A Current Perspective' (2004) 239 *Annals of Surgery* 14, 21.
- ¹⁰ Todd R Reed and others, '*Heart Sound Analysis for Symptom Detection and Computer-Aided Diagnosis*' (2004) 12 *Simulation Modelling Practice Theory* 129, 146.
- ¹¹ Agence France, 'World's Best Go Player Flummoxed by Google's 'Godlike' AlphaGo AI' (*The Guardian*, 23 May 2017) <<http://www.theguardian.com/technology/2017/may/23/alphago-google-ai-beats-ke-jie-china-go>> accessed 24 December 2018.
- ¹² Adam Gabbatt, 'IBM Computer Watson Wins Jeopardy Clash' (*The Guardian*, 17 February 2011) <<http://www.theguardian.com/technology/2011/feb/17/ibm-computer-watson-wins-jeopardy>> accessed 24 December 2018.
- ¹³ Mark Purdy and Paul Daugherty, 'How AI Boosts Industry Profits and Innovation' (*Accenture*, 31 October 2017) <http://www.accenture.com/us/en/_acnmedia/36DC7F76EAB444CAB6A7F44017CC3997.ashx?la=en> accessed 24 December 2018.
- ¹⁴ Jacqui Cheng, 'Virtual Composer Makes Beautiful Music — and Stirs Controversy' (*Ars Technica*, 30 September 2009) <<https://arstechnica.com/science/2009/09/virtual-composer-makes-beautiful-musicand-stirs-controversy/>> accessed 25 December 2018.
- ¹⁵ Philip Ball, 'Iamus, Classical Music's Computer Composer, Live from Malaga' (*The Guardian*, 1 July 2012) <<http://www.theguardian.com/music/2012/jul/01/iamus-computer-composes-classical-music>> accessed 25 December 2018.
- ¹⁶ 'AIVA: The AI that Composes Classical Music' (*Intel*, 29 November 2016) <<https://iq.intel.fr/aiva-lia-qui-compose-de-la-musique-classique/>> accessed 25 December 2018.
- ¹⁷ Aaron Souppouris, 'Google's 'Magenta' Project will See if AIs can Truly Make Art' (*Engadget*, 23 May 2016) <<http://www.engadget.com/2016/05/23/google-magenta-machine-learning-music-art/>> accessed 25 December 2018.
- ¹⁸ Andrew Keisner and others, 'Breakthrough Technologies — Robotics and IP' (*World Intellectual Property Organisation*, 6 December 2016) <http://www.wipo.int/wipo_magazine/en/2016/06/article_0002.html> accessed 25 December 2018.
- ¹⁹ Pamela Samuelson, '*Allocating Ownership Rights in Computer-Generated Works*' (1985) 47 *University of Pittsburgh Law Review* 1185, 1196-97.
- ²⁰ Erica Palmerini and others, '*Regulating Emerging Robotic Technologies in Europe: Robotics facing Law and Ethics*' (2014) *RoboLaw* <http://www.techandlaw.net/wp-content/uploads/2014/02/TechLaw_Milano.pdf> accessed 25 December 2018.
- ²¹ Peter S Menell, 'Intellectual Property: General Theories' in Bouckaert, Boudewijn and De Geest (eds), *Encyclopedia of Law and Economics* (Edward Elgar 2000).
- ²² William Fisher, 'Theories of Intellectual Property' in Stephen Munzer (ed), *New Essays in the Legal and Political Theory of Property* (Cambridge University Press 2001).
- ²³ William M Landes and others, 'An Economic Analysis of Copyright Law' (1989) 18 *The Journal of Legal Studies* 325, 363.
- ²⁴ Justin Hughes, 'The Philosophy of Intellectual Property' (1988) 77 *Georgetown Law Journal* 287, 299-330.

- ²⁵ Margaret Jane Radin, 'Reinterpreting Property' in Jeremy Waldron (ed), *The Right to Private Property* (Clarendon Press 1988).
- ²⁶ Michael A Kanning, 'A Philosophical Analysis of Intellectual Property: In Defence of Instrumentalism' (Scholar Commons Graduate Theses and Dissertations, PhilPapers 2012).
- ²⁷ William Fisher (n 415).
- ²⁸ James Harrington, *The Commonwealth of Oceana* (Westport, Conn: Hyperion Press, 1979); Thomas Jefferson, *Notes on the State of Virginia* (New York: Norton, 1972); Karl Marx, *Economic and Philosophic Manuscripts of 1844* (New York: International Publishers, 1964).
- ²⁹ William Fisher (n 415).
- ³⁰ The Library of Congress, Report of the Register of Copyrights for the Fiscal Year Ending June 30, 1965 (*sixty-eighth report*) <<https://copyright.gov/reports/annual/archive/ar-1965.pdf>> accessed 25 December 2018.
- ³¹ Copyrights Designs and Patents Act 1988, s 9(3).
- ³² Copyright Act 1994, s 2.
- ³³ Copyright Act 1994, s 5(2)(a).
- ³⁴ 35 United States Code, s 100.
- ³⁵ Manual of Patent Examining Procedure 2137, s 2 (USA).
- ³⁶ Ryan Abbot, 'I Think, Therefore I Invent: Creative Computers and the Future of Patent Law' (2016) 57 Boston College Law Review 1079.
- ³⁷ 36 F2d 292, 295 (CCPA 1929).
- ³⁸ US Copyright Office Practices, *Compendium*, (2017) s 312 (3).
- ³⁹ Jason Lohr, 'Artificial Intelligence Drives New Thinking on Patent Rights' (*LimeGreen IP News*, 15 July 2016) <<http://www.limegreenipnews.com/2016/07/artificial-intelligence-drives-new-thinking-on-patent-rights/>> accessed 26 December 2018.
- ⁴⁰ 'Machine Learning: What it is and Why it Matters' (SAS) <www.sas.com/en_us/insights/analytics/machine-learning.html> accessed 28 December 2018.
- ⁴¹ Bernard Marr, 'What is the Difference between Artificial Intelligence and Machine Learning?' (*Forbes*, 6 December 2016) <<http://www.forbes.com/sites/bernardmarr/2016/12/06/what-is-the-difference-between-artificial-intelligence-and-machine-learning/#5f17d6342742>> accessed 26 December 2018.
- ⁴² *ibid.*
- ⁴³ 'Artificial Intelligence (AI) and Intellectual Property (IP), a Call for Action' (*IPKM Blog*, 9 June 2017) <<https://law.maastrichtuniversity.nl/ipkm/artificial-intelligence-ai-and-intellectual-property-ip-a-call-for-action/>> accessed 28 December 2018.
- ⁴⁴ Colin Barras, 'Did Early Humans, or Even Animals, Invent Music?' (*BBC Earth*, 7 September 2014) <<http://www.bbc.com/earth/story/20140907-does-music-pre-date-modern-man>> accessed 28 December 2018.
- ⁴⁵ Paul Goldstein, *Goldstein on Copyright* (3rd edn, Loose Leaf 2005).
- ⁴⁶ *ibid.*
- ⁴⁷ *ibid.*
- ⁴⁸ *ibid.*
- ⁴⁹ *ibid.*
- ⁵⁰ William Fisher (n 415).
- ⁵¹ *ibid.*
- ⁵² UK Copyright, Designs and Patents Act 1988, s 9(3); New Zealand Copyright Act 1994, s 5(2)(a).
- ⁵³ Palmerini (n 413).

⁵⁴ Ken Hu, 'Human-Centric Innovation: Inspired Talent is the Engine of Innovation' (*The Global Innovation Index*, 14 February 2018) <http://wipo.int/edocs/pubdocs/en/wipo_pub_gii_2014-intro2.pdf> accessed 29 December 2018.

⁵⁵ Timothy L Butler, 'Can a Computer Be an Author? Copyright Aspects of Artificial Intelligence' (1982) 4 *Hastings Communications and Entertainment Law Journal* 707, 741-42.

Disclaimer: While every effort is made to avoid any mistake or omission, this casenote/ headnote/ judgment/ act/ rule/ regulation/ circular/ notification is being circulated on the condition and understanding that the publisher would not be liable in any manner by reason of any mistake or omission or for any action taken or omitted to be taken or advice rendered or accepted on the basis of this casenote/ headnote/ judgment/ act/ rule/ regulation/ circular/ notification. All disputes will be subject exclusively to jurisdiction of courts, tribunals and forums at Lucknow only. The authenticity of this text must be verified from the original source.