Protecting and Navigating Intellectual Property for Artificial Intelligence Based Technologies

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Technological advances in Artificial Intelligence (AI) technology are accelerating due to the combination of machine learning breakthroughs, increases in computing power, and the emergence of big data analytics. Cloud based computing has also accelerated AI development, with more readily available and less expensive computing power for increasingly complex manipulations of information and the performance of difficult tasks by computers, such as facial recognition. The advent of big data analytics provides robust data training sets that bring AI technology to life.

A group of high profile technology companies including IBM, Google, Amazon, Microsoft, Samsung, and AT&T have been pioneering and patenting fundamental AI technology directed to machine learning, neural networks, natural language processing, speech processing, expert systems, robotic and machine vision. In turn, this fundamental AI technology is being adapted and utilized within a wide variety of industries including health care, manufacturing, and transportation to create AI-based products that are better, more useable and intuitive than before (e.g. smart surgical tools, warehouse robots, self-driving cars, etc.)

As with any burgeoning field of innovation, companies who develop and sell AI-based technology must assess the risks of doing business in the context of third-party IP rights, and develop strategies to capture and protect their own associated IP rights. At their root, both of these challenges require an assessment of the availability and scope of intellectual property protection. While many of the same considerations that apply to traditional technologies are relevant, there are a number of key aspects specific to developing patent, trade secret, and copyright protection of AI-based products.

Patent Protection

Patents protect the functionality of inventions which are new, non-obvious, useful and which consist of patent eligible subject matter. Patents provide national rights to prevent others from making, using or selling the protected invention in a specific jurisdiction. Patents can be strategically used to achieve or maintain position in the marketplace, increase share value and/or secure investment depending on business needs.

The U.S. Patent Office has been quietly issuing patents in ever-increasing numbers for fundamental AI technology. Over the past five years the number of patents issued under patent class 706[1], a class dedicated to AI data processing systems, has seen an increase of 500%. While increasing numbers of AI technology patents are issuing, as with other kinds of computer-implemented inventions, AI-based inventions are generally vulnerable to being considered ineligible subject matter.

The current subject matter eligibility test in the U.S. requires the invention to be evaluated to determine whether it is directed to a law of nature, natural phenomenon or an abstract idea and if so whether the invention provides "significantly more[2]". Abstract ideas, laws of nature, and natural phenomenon are considered by U.S. courts to be "the basic tools of scientific and technological work" however the term "abstract" is not clearly defined. As a result, patent applications (including applications for computer software) that approach this very blurry line have faced significant challenges during prosecution. U.S courts have consistently expressed concern that monopolizing tools such as abstract ideas by granting patent rights impedes innovation rather than promotes it.

In recent cases, "significantly more" has been found where the inventive solution is necessarily rooted in computer technology in order to overcome a problem specifically arising in the realm of computers[3] , where an inventive feature is an

improvement to computer functionality[4] and where an invention uses limited rules in a process specifically designed to achieve an improved technological result in conventional industry practice[5].

Recent U.S. Patent Appeal Board decisions specifically involving AI-based inventions indicate that eligible inventions are those which have a feature or limitation which produces a "useful, concrete and tangible result without pre-empting an abstract idea like a mathematical algorithm[6]. Further, patent eligible inventions which can be described in terms of structure ("what it is") rather than functionally ("what it does") will have a better chance of allowance. For example, the structural aspects relating to methods of creating, training and/or validating a neural net may be fertile ground for patenting. Also, structural aspects of the final product that results from these methods may also yield patentable eligible subject matter.

Similarly in Canada, computer-related subject matter is generally considered patent eligible if a solution provided to a problem is technical and strictly requires the use of a computer[7] For example, an invention that represents a technical solution that results in a more efficient operation of the computer or is a solution to a technical problem related to the computer may be considered to be of patentable subject matter in Canada.

Fundamental AI technologies appear to be satisfying the currently stringent but evolving patentable eligibility subject matter test for software inventions (i.e. "sufficiently technical" to be patentable) as well as overcoming the usual novelty and obviousness hurdles presented by the prior art (i.e. patents and documents publicly available). In fact, a study recently conducted by Oracle concluded that 87.5% of patent applications directed to fundamental AI technology such as specific technical details of the machine learning or deep learning functionality have received the green light when examined by the U.S. Patent Office.

An example of a patented fundamental AI technology is Google's US Patent No. 9,406,017 entitled "System and Method for Addressing Overfitting in a Neural Network[8] which covers a system and method for training a neural network that uses a switch linked to feature detectors in at least some of the layers of the neural network. For each training case, the switch randomly selectively disables each of the feature detectors in accordance with a preconfigured probability. The weights from each training case are then normalized for applying the neural network to test data. This U.S. patent issued in 2016 based on a U.S. patent application filed in 2012.

As another example, artificial perception pioneer AEye has recently been awarded a number of foundational patents for solid state Micro Electro Mechanical System based agile LiDAR and embedded AI technology that is core to its iDAR™ perception system. Specifically, US Patent Nos. US9885778B2[9] and US9897689B2[10] cover aspects of their iDAR perception system ranging from a unique approach to dynamic scan and shot pattern for LiDAR transmissions to the ability to control and shape each laser pulse though pulse modulation. AEye states that these aspects improve scanning range by 400% and increase speed by 20 times.

For an AI related innovation to be considered patentable subject matter in the U.S., Canada and elsewhere, it needs to be sufficiently technological. A sufficiently technological AI innovation must therefore be necessarily rooted in computer technology and seen to provide a "technical solution" to a "technical problem" in the realm of computing. Showcasing and describing technical details of an AI invention and its practical application may increase the chances of meeting these subject matter requirements.

Trade Secret Protection

Patents can be an important IP tool to protect the functionality of a new and non-obvious technology. However, they are not well suited to secure other forms of software-related intellectual property such as source code, contents of AI training sets, etc. Further, in the context of the currently restrictive climate for patent eligible subject matter as discussed above, patent protection is not always available or feasible for AI-based technology.

Trade secrets can provide a viable avenue of alternative protection. Trade secrets include any valuable business information that derives its value from the secrecy. Unlike patents, no application or registration is required to obtain trade secret protection, however an innovator must take reasonable steps to establish and maintain secrecy. In turn, the covered information may be protected for an unlimited period of time as long as it is kept secret and has commercial value.

Trade secret law may be particularly applicable to various aspects of AI technology, including: formulae, compilations of information, programs, commercial methods, techniques, processes, designs, patterns, and codes which are not generally known or reasonably ascertainable by others.

Practically speaking, taking "reasonable steps" to maintain the secrecy of a trade secret typically involves logistical and digital mechanisms (e.g. firewalls, encryption and authentication methods, data security measures, password protections, download disabling) to restrict and monitor access to trade secret information. Other safeguards can include restricting employee access to a company's confidential and trade secret information, putting in place nondisclosure agreements with secrecy obligations when sharing trade secrets with business partners, and guarding against reverse engineering. In addition to these "reasonable steps", organizations should consider putting in place processes which identify the most valuable trade secrets and prioritizing protection measures for them.

However, there are also important limitations to the protection that trade secrets can offer AI-based technology. AI-based software typically undergoes continual development by a number of inventive entities through many revisions. This requires continual and proactive steps to identify and prioritize trade secrets (e.g. a valuable training dataset) in order to avoid loss of trade secret protection. It is necessary to commit the necessary resources to ensure that critical trade secrets are identified, protected, and that internal processes prioritize and maintain secrecy. More generally, enforcement of trade secret rights in AI-based software can be limited due to onerous requirements to evidence and establish misappropriation of trade secret rights. Also enforcement of trade secret protections can be ineffective against third parties who independently develop or indirectly obtain the secret subject matter.

Ultimately, the choice of whether to protect AI technology with patent or trade secret protection will depend, on one hand, on the likelihood of patentability, and the possibility of establishing and maintaining secrecy on the other.

Copyright Protection

Copyright may be available to protect those aspects of AI-based technology that are recognized as "literary works" within the meaning of the Canadian *Copyright Act[11] and* corresponding legislation elsewhere. Copyright arises automatically when an original work is created and protects original expressions embodied in software including: computer source code, visual user interface elements, API structure, user documentation and product guides. Copyright however does not extend to the functional aspects of software.

While data itself is not copyrightable, copyright can cover original compilations of data in a database and especially when data has been specifically arranged into structured datasets. This protection is afforded under the concept of a compilation copyright that protects the collection and assembling of data or other materials. Although AI training data sets may be protected as compilations, the underlying data is not automatically granted protection. Some jurisdictions like the U.K. provide specialized IP protection for database rights[12].

Finally, there are new and evolving challenges involving copyright ownership of AI-generated works. For example, the U.S. Copyright Office clarified in the now infamous "Monkey-Selfie" that "to qualify as a work of authorship a work must be created by a human being"[13]. The decision was recently upheld by the US Ninth Circuit Court of Appeals[14]. This case illustrates that legislative changes will be required to extend copyright protection to works created by non-human beings and this will be an issue to watch closely.

Industrial Designs

Industrial designs, **also known design patents,** protect novel and non-functional, aesthetic aspects of products. Industrial designs can protect the appearance of AI-based technology products, such as the physical devices (e.g. household robotic devices) novel shape of graphical user interfaces or a graphical animation.

Design protections are evolving in the U.S., Canada and elsewhere. For example, the Canadian Intellectual Property Office (CIPO) announced in early 2017 that a sequence of graphics within computer-generated animated designs (i.e. animated GUIs) can create a unique and dynamic visual effect and that this is protectable subject matter under industrial design practice[15]. This acceptance of animated designs follows similar practice in the U.S. Patent and Trademark Office and elsewhere.

Finally, design protection can strategically complement other IP protections for AI-based technology with product features that have a unique look and feel. For example, it can be useful from an enforcement point of view, to have the ability to prevent importation of competing AI-based products on the basis on how similar the products look to a registered design without the need to consider technical functionality as would be required under a patent infringement analysis.

Looking Ahead

There are many developing patent, trade secret, and copyright law aspects specific to AI technology, a very exciting new frontier. While these legal issues are complex and will continually evolve, it is important for companies who are building and selling AI-based products to put in place a proactive and complete strategy for IP protection and risk evaluation. Such a strategy should include not only measures to secure patent, trade secret, copyright and design protection where available but also measures to monitor third party IP rights and assess associated risks.

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[1] USPTO, "CLASS 706, DATA PROCESSING - ARTIFICIAL INTELLIGENCE" (May 10th, 2018), *USPTO – Class Definition*, online: https://www.uspto.gov/web/patents/classification/uspc706/defs706.htm.

[2] *Bilski v. Kappos*, 561 U.S. 593, 612-13 (2010), *Mayo Collaborative Services v. Prometheus Labs,* 132 S. Ct. 1289 (2012), and *Alice v CLS Bank*, 134 S. Ct. 2347 (2014).

[3] *DDR Holdings, LLC v. Hotels.com, L.P.*, 773 F.3d 1245 (Fed. Cir. 2014).

[4] *Enfish, LLC v. Microsoft Corp.,* 2016 U.S. App. LEXIS 8699, 2016 WL 2756255 (Fed. Cir. May 12, 2016).

[5] *McRO, Inc. v. Bandai Namco Games America, Inc. et al*. (Fed. Cir. Sept 13, 2016).

[6] *Ex Parte Kirshenbaum* (Patent App. No. 2009/896,036, Appeal 2007-3223].

[7] *Amazon.com Inc. v. Canada (Commissioner of Patents), 2010 FC 1011.*

[8] Google Patents, "System and method for addressing overfitting in a neural network" (2016-08-02),   *Google Patents*, https://patents.google.com/patent/US9406017B2/en.

[9] Google Patents, "Method and system for scanning ladar transmission with pulse modulation" (2018-02-06),   *Google Patents*, https://patents.google.com/patent/US9885778B2/en.

[10] Google Patents, "Method and system for ladar transmission with interline skipping for dynamic scan patterns" (2018-02-20), *Google Patents*, https://patents.google.com/patent/US9897689B2/en.

[11] *Copyright Act*, *RSC 1985, c C-42.*

[12] *The Data Protection Act* 1998 (c 29) United Kingdom Act of Parliament and follows the EU Data Protection Directive 1995 protection, processing and movement of data.

[13] *Naruto v. Slater*, No. 15-cv-4324, 2016 WL 362231 (N.D. Cal. Jan. 28, 2016).

[14] *Naruto v. Slater*, D.C. No. 3:15-cv-04324-WHO (9th Cir. 2018).

[15] Matthew Graff, "Animated GUI Designs – Who's Registering in Canada?" (April 10, 2018),   *Bereskin & Parr LLP*, online: http://www.bereskinparr.com/doc/animated-gui-designs-who-s-registering-in-canada.