EXPLORING SOFTWARE PATENT AS A POSSIBLE SOLUTION TO ALGORITHM'S LACK OF TRANSPARENCY

IKECHUKWU P. UGWU
Faculty of Law and Administration
University of Silesia in Katowice, Poland
e-mail: ikechukwu.ugwu@us.edu.pl

ABSTRACT

This article examines the possibility of solving the opacity of algorithms through patent law. The opacity of algorithms necessitated attempts at making it more transparent and preventing intentional secrecy, breach of privacy, discriminatory and biased decisions attributed to it, etc. As part of intellectual property rights, patent protection can solve or minimize these issues. The article first looks at algorithms' meaning, the associated issues, and the patentability of algorithms under European laws, the USA, and Asia. Artificial intelligence (AI) and its algorithms are primarily protected under trade secrets. However, protection under trade secrets amplifies this lack of transparency by allowing for the non-disclosure of how an algorithm operates, making it more difficult to solve the problems identified with algorithms. Instead, this article offers the option of patenting as a better alternative, not just as means to solving the issues associated with an algorithm, but as means to promote invention and innovation.

Keywords: Algorithm, Patent, Artificial intelligence, Opacity, Transparency, Sufficiency of disclosure.

A. Introduction

The Internet has been described as a necessary evil[1] and even though it may have negative impacts on our lives, we have been so entangled with it to the extent that one cannot possibly live in a civilized society without the use of the Internet.[2] And so, from the time the Internet was commercialized in the late 1980s by the Advanced Research Projects Agency Network (ARPANET),[3] virtually all known human activity has been linked to the Internet.

Just like any other aspect of the Internet, algorithms have also raised

---

1   Mohan Chandran, "Technology – A "Necessary Evil"?", Boloji (2016) https://www.boloji.com/articles/49084/technology-a-necessary-evil (accessed May 29, 2022); see also Ari Ezra Waldman, "All Those like You: Identity Aggression and Student Speech" *Missouri Law Review* 77 (2013), 653, 667.
2   James Brown, "Could you Survive a Week with no Internet?" *The Telegraph* (2014) https://www.telegraph.co.uk/men/thinking-man/10553634/Could-you-survive-a-week-with-no-internet.html (accessed May 29, 2022).
3   Raphael Cohen-Almagor, "Internet History", *International Journal of Technoethics* 2 (2011), 45, 52.

concerns. Government authorities now make decisions based on an algorithm; decisions that were previously based on human reflection are now taken automatically. In a fraction of a second, the software encodes thousands of rules and instructions,[4] businesses now advertise products based on a customer's previous purchases; Google searches are products of an algorithm, a person is placed on a no-fly list without knowing why,[5] and federal benefits are denied to a single mother algorithmically even when it is not supposed to be so,[6] etc. Just like God, nobody can fully understand how algorithms work.[7] According to Frank Pasquale, this calls for concern[8] as it has begun to have real-world consequences.[9] He further explained that "hidden algorithm can make or ruin a reputation, decide the destiny of entrepreneurs, or even devastate an entire economy."[10] To this end, there is a need for the government to regulate cyberspace.[11]

As a product of intellectual exercise, arguments have arisen about what type of intellectual property protection should be given to algorithms. Again, different jurisdictions give different algorithm protection depending on the legal system, but more importantly, the protections are subject to special requirements different from other inventions. For the traditional patent, the invention must be susceptible to industrial application, that is to say, the invention must be something that can be used in some kind of industry.[12] But for the patentability of algorithms, requirements like "a useful, concrete and tangible result",[13] "not

---

4   Frank Pasquale, *The Black Box Society: The Secret Algorithms That Control Money and Information* (Harvard Press, 2015), 8.

5   Danielle Keats Citron, "Technological Due Process", Washington University Law Review 85 (2008): 1249, 1256–1257.

6   *Ibid*. See also Deven R Desai and Joshua A Kroll, "Trust but Verify: A Guide to Algorithms and the Law", Harvard Journal of Law & Technology 31 (2017): 1, 2.

7   Ian Bogost, "The Cathedral of Computation", The Atlantic (2015) https://www.theatlantic.com/technology/archive/2015/01/the-cathedral-of-computation/384300/ (accessed May 29, 2022).

8   *Ibid*.

9   Angela Adrian, Nobody Knows you are a Dog: Identity and Reputation in Virtual Worlds, in Sylvia Mercado Kierkegaard (ed), *Cyber, Security and Privacy* (International Association of IT Lawyers, 2007), p. 411.

10   Frank Pasquale, *The Black Box Society: The Secret Algorithms That Control Money and Information* (Harvard Press, 2015), 8.

11   Although an earlier attempt by the US Government to control communication via the Internet (by promulgating the Telecommunications Act of 1996, which sought for the first time the inclusion of the Internet in broadcasting and spectrum allotment (see section 301thereof)), met with resistance which even led to the famous "Declaration of the Independence of Cyberspace" by John Perry Barlow. See John Perry Barlow, "Declaration of the Independence of Cyberspace", Electronic Frontier Foundation, (1996) https://www.eff.org/cyberspace-independence (accessed May 29, 2021). See also the case of *Bernstein v United States,* No C-95-0582 MHP (ND Cal filed February 21, 1995), where, in a legal action Dr Daniel Bernstein sought the court to declare unconstitutional provisions of the US policy preventing him from publishing, discussing publicly or circulating a scientific paper, algorithm, or computer program in the field of cryptology.

12   Mario Cisneros, *Patentability Requirements for Nanotechnological Inventions: An Approach from the European Patent Convention Perspective*, (Baden-Baden: Nomos Publishers, 2008), p. 49.

13   *State Street Bank and Trust Company v Signature Financial Group, Inc*, 149 F 3d 1368 (Fed Cir 1998); *AT&T Corp v Excel Communications, Inc*, 172 F 3d 1352 (The United States Federal Cir 1999).

merely an abstract mathematical process",[14] and "technical purpose"[15] was introduced to underscore the fact that patent law does not unnecessarily inhibit inventions. In Europe, programs for computers or software are expressly excluded from protection,[16] but recent judicial interpretations have relaxed this rule to incorporate that for programs for computers to be eligible for patent protection, they must serve a technical purpose.[17] This article will first examine algorithms, how they work, and the issues they raise. Furthermore, it examines the concept of patent and eligibility for a patent, and finally, the patentability of algorithms in the US, EU, and Asia (specifically China and Indonesia). It concludes with the suggestion that since patent, unlike trade secrets, allows for full disclosure before it is granted, countries should allow the patenting of algorithms without strict conditions to make the algorithm transparent.

B. Research Method

At the core of this article is the analysis of algorithm and how it affects lives. It also proffers the solution to the transparency issues through patent protection. In the first instance, the doctrinal research is used to explain present legal protection granted to algorithm and decisions of courts. This type of research method asks what law governs a particular issue and the development and application of the law.[18] The primary aim of this method, also called the library-based approach, is to make specific inquiries in order to identify existing problems.[19] The article looks at software patents in the US, EU, and Asia (specifically China and Indonesia) and the eligibility requirements using this research method.

C. Discussion

1. Understanding Algorithms.

Defining what an algorithm is has presented some problems since it can only be adequately specified in the context of programming language.[20] Even though it is challenging to define algorithms, they are real mathematical objects that can be represented.[21] A hidden algorithm has been defined as "an

---

14   *Alice Corp v CLS Bank International* 573, 208, 134 United States Supreme Court 2347 (2014).

15   Case T-1358/09 *Classification/BDGB Enterprise Software* [European Patent Office 2014] ECLI: EP: BA: 2014: T135809.

16   Convention on the Grant of European Patents of October 5, 1973, article 52.

17   Case T-1358/09 *Classification/BDGB Enterprise Software* [European Patent Office 2014] ECLI: EP: BA: 2014: T135809.

18   Salim Ibrahim Ali, Zuryati Mohamed Yusoff, and Zainal Amin Ayub, "Legal Research of Doctrinal and Non-Doctrinal", *International Journal of Trend in Research and Development* 4 (2017) 493 http://www.ijtrd.com/ papers/IJTRD6653.pdf

19   Ibid, 493.

20   Donald E Knuth, *Selected Papers on Computer Science* (Cambridge: Cambridge University Press 1996), 1.

21   Nonson S Yanofsky, "Towards a Definition of an Algorithm", *Journal of Logic and Computation* 21 (2011), 253.

information processing method, a step-by-step process that turns a certain set of data into something else— perhaps a smaller, filtered set of data, a result that is more useful than the original for the algorithm user".[22] The classical meaning of an algorithm is that the device is a list of instructions that leads its user to a specific response or output based on the available data.[23]

a. How algorithm operates.

An algorithm works by collecting data about a person over some time and using the same to make predictions. This process has been described much better by Betsy Anne Williams and others thus:

> When traces of people's lives are recorded as "data," and pieced together into "big data," the resulting mesh is densely packed with correlations—personal characteristics that tend to show up together. These patterns can exist within a single person's data, revealing themselves as autocorrelations, when a single aspect of a person's life is measured repeatedly over time

(e.g., last year's income helps predict this year's income).[24]

This collection of data is called big data, which could be defined as "datasets beyond the scale of a typical database, which are held and analysed using computer algorithms"[25] and since no one fully understands how these datasets are analysed, it has been described as a black box.[26] The underlining here is the issue of secrecy.

b. Issues Associated with Algorithmic Decisions.

In this part, the article looks at some of the issues associated with algorithmic decisions that could be said to be part of the general secrecy or transparency concerns regarding algorithms.

1) Internet discrimination

Algorithmic activities, in many cases, have shown that they could be discriminatory. Skewed information, false rationale or simply the preferences of their software engineers mean that algorithms and other artificial intelligence very effectively imitate and even enhance

---

22 Kyle Chayka, "5 Hidden Algorithms That Rule Your World: From the NSA to OKCupid", *Pacific Standard* (2013) https://psmag.com/social-justice/nsa-okcupid-5-algorithms-rule-world-69709 (accessed May 29, 2022).

23 Christopher Steiner, Automate This: How Algorithms came to Rule our World (Penguin Groups, 2012), 10. Joshua A Kroll et al., "Accountable Algorithms" *University of Pennsylvania Law Review* 165 (2017), 633, 640.

24 Betsy Anne Williams et al., "How Algorithms Discriminate Based on Data They Lack: Challenges, Solutions, and Policy Implications" JI Policy 8 (2018), 78, 82.

25 Turnbull Mahoney, "Navigating New Zealand's Digital Future: Coding our way to Privacy in the age of Analytics", NZLSJ 3 (2015), 420, 423.

26 Frank Pasquale, *The Black Box Society: The Secret Algorithms That Control Money and Information* (Harvard Press, 2015).

human prejudice.[27] In the US, the judicial system has developed to the extent that judges now depend on the outcome of algorithms to determine if an offender should be convicted or not.[28] In the case of State v Loomis[29] the US Supreme court, while relying on COMPAS, an algorithm used by the US courts which predicts the likelihood of an offender committing another offense, held that "[i]f used properly with an awareness of the limitations and cautions, a circuits court's consideration of a COMPAS risk assessment sentencing does not violate a defendant's right to due process."[30]

In research conducted by Jeff Larson and others, COMPAS was discovered to be racially biased. According to the analysis, the system predicts that black defendants present a greater risk of offense recurrence than white defendants.[31] But this is not so as both the commission of offenses and reoffending go beyond colour.[32] These issues of discrimination form part of the transparency paradox associated with algorithms.[33]

Instances can be given where the search for black-sounding names produces ads that suggest arrest records instead of the actual thing being searched.[34] There is also discrimination based on Google ads searches. In research recently carried out,[35] it was found that Google's algorithm targeted ads, show ads for jobs that pay more to men than they show to women.[36] It is suggested that this may be a result of what women usually search for on the Internet, which makes algorithms filter results to suit the

---

27   Daniel Cossins, "Discriminating Algorithms: 5 Times AI showed Prejudice" New Scientist (2018) https://www.newscientist.com/article/2166207-discriminating-algorithms-5-times-ai-showed-prejudice/ (accessed May 29, 2022).

28   Robert Brauneis and Ellen P Goodman, "Algorithmic Transparency for the Smart City" YJLaw Tech 20 (2018),103, 107.

29   *State v Loomis* 88 NW 2d 749, 770 (Wisconsin Supreme Court, United States of America 2016).

30   *Ibid*.

31   Jeff Larson et al., "How We Analysed the COMPAS Recidivism Algorithm", ProPublica (2016) https://www.propublica.org/article/how-we-analyzed-the-compas-recidivism-algorithm (accessed May 29, 2022).

32   Timothy Revell, "Algorithms that Change Lives should be Trialled like New Drugs", New Scientist (2018) https://www.newscientist.com/article/2158755-algorithms-that-change-lives-should-be-trialled-like-new-drugs/ (accessed May 29, 2022). (The writer found out that when it comes to predicting accurately who is likely to commit another offence, it is generally random, untrained people on the Internet, and not necessarily black defendants).

33   Neil M Richards and Jonathan H King, "Three Paradoxes of Big Data", SLR 66 (2013), 41.

34   Deven R Desai and Joshua A Kroll, "Trust but Verify: A Guide to Algorithms and the Law", Harvard Journal of Law & Technology 31 (2017),1, 3.

35   Tom Simonite, "Probing the Dark Side of Google's Ad-Targeting System" MIT Technology Review (2015) https://www.technologyreview.com/s/539021/probing-the-dark-side-of-googles-ad-targeting-system/ (accessed May 29, 2022).

36   *Ibid*. See also Matt Southern, "Google's Ad-Targeting Algorithms Accused of Discrimination", Search Engine Journal, (2015) https://www.searchenginejournal.com/googles-ad-targeting-algorithms-accused-of-discrimination/136280/ (accessed May 29, 2022).

datasets that a particular algorithm holds about a woman.[37]

2) Algorithm and its Threats to Identity.

Inasmuch as big data identifies, it also threatens identity.[38] Identity is about our privacy, making choices, and electing what to buy or not to buy – an instinctive desire over our being.[39] With the continued reliance on big data and algorithms, the pooled data on what we buy, whom we chat with, what we search online, etc., threaten our right to privacy. The companies that control these data may end up knowing us more than we do ourselves and would eventually control, against our will, what we should do and where to go.[40] In other words, they can modify our behavior.[41]

The fear of how these companies manage our personal data was manifested when Cambridge Analytica harvested the profile data of millions of Facebook users for political gains without their consent.[42] This event led many people to become more aware of how vulnerable they could be in an algorithm-controlled age.[43]

3) Financial and Price Algorithm – the Wall Street Experience

Algorithms that help investors analyze and buy or sell stocks and other instruments have been created. The experience of the Wall Street where shares crashed has been attributed partly to the effect of algorithms.[44] Also, the flash crash of the British Pound in 2016 was attributed to 'software gone haywire',[45] as the trading machine was accused of overacting "to tweets about the French president's comments on Brexit".[46] These events show that overreliance on algorithms may lead to financial trading without real value for the money.

A corollary to this is the issue of price discrimination. Online sellers and service providers have been found to discriminate

---

37   Anja Lambrecht and Catherine Tucker, "Algorithmic Bias: An Empirical Study into Apparent Gender-Based Discrimination in the Display of STEM Career Ads", SSRN Electronic Journal (2018) https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2852260 (accessed May 29, 2022). (The writers hold contrary views).

38   Neil M Richards and Jonathan H King, "Three Paradoxes of Big Data", SLR 66 (2013), 43.

39   *Ibid*; see also Julie E Cohen, "What Privacy is for", HARV L REV 126 (2013). 1904, 1906.

40   Andrew Leonard, "How Netflix Is Turning Viewers into Puppets", Salon (2013) https://www.salon.com/2013/02/01/how_netflix_is_turning_viewers_into_puppets/ (accessed May 29,2022). See also Sarah Arnold, Netflix and the Myth of Choice/Participation/Autonomy in Kevin McDonald and Daniel Smith-Rowsey (eds) *The Netflix Effect: Technology and Entertainment in the 21st Century* (Bloomsbury, 2016), 90.

41   Mireille Hildebrandt, "Algorithmic regulation and the rule of law", Phil Trans R Soc 376 (2018), 2.

42   Jim Isaak and Mina J Hanna, "User Data Privacy: Facebook, Cambridge Analytica, and Privacy Protection" CSDL 51 (2018), 56.

43   *Ibid*.

44   Jill Treanor, "The 2010 'Flash Crash': How it Unfolded", The Guardian (2015) https://www.theguardian.com/business/2015/apr/22/2010-flash-crash-new-york-stock-exchange-unfolded (accessed May 29, 2022).

45   Jamie Condliffe, "Algorithms Probably Caused a Flash Crash of the British Pound" MIT Technology Review (2016) https://www.technologyreview.com/s/602586/algorithms-probably-caused-a-flash-crash-of-the-british-pound/ (accessed May 29, 2022).

46   *Ibid*.

prices by geographic location and time of the day.[47] This form of discrimination is based on consumers' willingness to pay.[48]

4) Algorithm and Faulty Decisions by Government.

Some governmental decisions are based on algorithms, and this, on some occasions, has resulted in some faulty decisions. Because of the opacity of automated decisions, nobody questions this, as people even hardly understand the variables considered by the machine before arriving at a decision.[49] This leads to the question of accountability and transparency. Due to the rise in terrorism and the need to combat it, governments now rely on face recognition algorithms to determine whom to allow in a country. The "No Fly" list by the US government has been reported to erroneously label up to 1,500 innocent travelers as terrorists.[50] A single mother was reported to have been erroneously denied federal benefits[51] buttressing the point that "automated systems also make incorrect judgments that escape judicial review".[52] Automation threatens due process

values, falsifies central administrative law assumptions[53] and reduces transparency in policymaking. In the next section, this article looks at existing attempts at curtailing some of these concerns regarding algorithms different from patent protection.

2. Existing Solution to the Opacity of Algorithm

a. Transparency and Accountability of Data

Big data is meant to make the world easier and more transparent, but its mining is invisible, opaque, and shrouded in a series of physical, legal and privacy design.[54] To curb these concerns, there should be algorithmic transparency and accountability.

While algorithmic transparency means that the algorithmic inputs and the use of the algorithm itself must be known but not necessarily fair,[55] algorithmic accountability means that organizations using algorithms must be responsible for the decisions taken by these algorithms,

---

47 Oren Bar-Gill, "Algorithmic Price Discrimination When Demand is a Function of Both Preferences and (Mis) perceptions", Uni Chi Law Review 86 (2018), 1.
48 *Ibid.*
49 Charles Vincent and Jean Camp, "Looking to the Internet for Models of Governance", Ethics Info Tech 6 (2004), 161.
50 Danielle Keats Citron, "Technological Due Process", *Washington University Law Review* 85 (2008), 1249, 1257.
51 *Ibid.*
52 *Ibid,* 1300.
53 *Ibid.*
54 Neil M Richards and Jonathan H King, "Three Paradoxes of Big Data", SLR 66 (2013), 42 – 43.
55 Nicholas Diakopoulos, "Algorithmic Accountability: Journalistic Investigation of Computational Power Structures", *Digital Journalism* 3 (2015), 398, 400.

even if the decisions are taken by a machine and not by a human being.[56]

b. Testing and Evaluating Algorithms

Algorithms could be monitored through the black-box and white-box settings.[57] The analyst has access to the source code in the White- box settings, but in Black- box settings, the analyst is limited to seeing only the system inputs and outputs, but not its internal function.[58] Kroll believes that although these measures are inadequate, they go a long way in enhancing the technical solution.[59]

c. Legal Framework.

The law on trade secrets is now increasingly used to protect the rights of algorithm inventors and programmers. Although the TRIPs Agreement[60] makes provisions for the protection of undisclosed information,[61] such protection must be subject to measures to "protect the public".[62] To

make algorithms more transparent, the government should always endeavour to force companies to disclose the secrecy behind their algorithm when the public interest requires it. Companies that do not properly use the data they store should be punished for lack of transparency where such data has been mined and used for other reasons.[63]

The General Data Protection Regulation (GDPR)[64] is specifically on data protection in Europe, and it requires that those who are into automated decision making and profiling can only do so if necessary for the entry of contracts or has been authorized by the EU or any Member state or the person profiled already consented.[65] The data controller has the burden of providing "measures to safeguard the data subject's rights and interests".[66] Similarly, a data subject has the right to be forgotten, i.e., to have their data erased if they withdraw their consent; the data are no longer necessary, if the data has been unlawfully obtained, etc.[67]

---

56 Dickey Megan Rose, "Algorithmic Accountability", TechCrunch (April 30 2017) https://techcrunch.com/2017/04/30/algorithmic-accountability/ (accessed May 29, 2022)

57 Deven R Desai and Joshua A Kroll, "Trust but Verify: A Guide to Algorithms and the Law", *Harvard Journal of Law & Technology* 31 (2017) 1, 36.

58 *Ibid.*

59 Joshua A Kroll et al., "Accountable Algorithms" *University of Pennsylvania Law Review* 165 (2017), 633, 647.

60 Agreement on Trade-Related Aspects of Intellectual Property Rights April 15 1994) (UNTS 299, 33 ILM 1197) (1994).

61 *Ibid,* art 39.

62 *Ibid*, art 39 (3).

63 Alex Hern and David Pegg, "Facebook fined for data breaches in Cambridge Analytica Scandal", The Guardian (2018) https://www.theguardian.com/technology/2018/jul/11/facebook-fined-for-data-breaches-in-cambridge-analytica-scandal (accessed May 29, 2022).

64 EU General Data Protection Regulation [2016] OJL119/1.

65 *Ibid*, art 22.

66 *Ibid*, art 22(3).

67 *Ibid*, art 17; Case C-131/12 *Google Spain SL, Google Inc v Agencia Española de Protección de Datos, Mario Costeja González* (2014) ECLI:EU:C:2014:317.

But some have doubts whether the GDPR has finally addressed these concerns.[68]

3. Patent and Patentability

Intellectual property rights are a type of property that includes intangible creations of the human intellect[69] and they confer a form of monopoly on the rights holders as an economic incentive for their creation. There are various types of intellectual property rights, but the most common are trademarks, copyrights, trade secrets, industrial design, and patents. This work will only discuss patents but will make reference to trade secrets as a form of protection granted to algorithms. According to the World Intellectual Property Organisation (WIPO), "a patent is an exclusive right granted for an invention, which is a product or a process that provides, in general, a new way of doing something, or offers a new technical solution to a problem".[70] This protection, lasting twenty years,[71] can only be granted subject to the full disclosure of the technical information about the invention,[72] otherwise called the sufficiency of disclosure or enablement. The essence of this sufficient disclosure is to give persons knowledgeable in the art of the invention the opportunity to work on that invention after the exclusivity period.[73]

On the other hand, patentability refers to the requirements or substantive conditions an invention must meet before it could be protected under a patent. These requirements are that the invention must be a patentable subject matter, novel, non-obvious (as in the US or involve an inventive step as used in the EU), useful (as in the US or susceptible of industrial application as in EU law). In the context of patentability, computer programs and algorithms are either expressly excluded from protection or included for protection with some special conditions. Bearing this in mind, the article will examine how computer programs, business methods, and algorithms are protected or excluded from patentability. This article will do so

---

68   Howard Yu, "GDPR isn't Enough to Protect us in an Age of Smart Algorithms", The Conversation (2018) https://theconversation.com/gdpr-isnt-enough-to-protect-us-in-an-age-of-smart-algorithms-97389 (accessed May 29, 2022).

69   World Intellectual Property Organisation, "Understanding Industrial Property", World Intellectual Property Organisation, https://tind.wipo.int/record/28945 (accessed May 29 2022).

70   World Intellectual Property Organisation, "Patents", WIPO, https://www.wipo.int/patents/en/ (accessed May 29 2022).

71   Most national and international patent laws grant twenty years of exclusivity to patent rightsholders. See, for instance, article 33 of the General Agreement on Trade-Related Aspects of Intellectual Property 1869 UNTS 299, 33 ILM 1197; article 22 of the Law of the Republic of Indonesia, Number 13 of 2016 on Patent; section 7 of the Nigerian Patents and Designs Act, Cap P2, Laws of the Federal Republic of Nigerian, 2004.

72   World Intellectual Property Organisation, "Patents", WIPO, https://www.wipo.int/patents/en/ (accessed May 29 2022).

73   Poliana Belisário Zorzal et al., "Sufficiency of Disclosure and Genus Claims for Protection of Biological Sequences: A Comparative Study among the patent Offices in Brazil, Europe and the United States" *Biotechnology Research and Innovation* 3 (2019), 92.

by looking at the laws in the US, EU, and Asia (specifically China and Indonesia).

a. Patentability of Computer Programs and Algorithms

Algorithms now constitute a large chunk of software patent applications in some jurisdictions.[74] Before analysing the legal regime in some jurisdictions, it is essential to look at what the WIPO says about the patentability of computer software. Patenting software has taken numerous ways. Some countries award patents for all software, but many exclude computer programs. In many of these nations, computer programs are not patentable "as such," allowing patent protection for computer programs with "technical character.[75]As a rationale for excluding software from patentability, it is often said that invention in this field involves cumulative, sequential development and re-use of others' work. Another reason for the exclusion is that the need to preserve interoperability

between programs, systems and network components does not fit with the patent system because the options available for subsequent inventors may be limited.[76] Some argue that patenting computer software is vital to encourage investment in this field and stimulate innovation in other technological areas developing alongside computer technology.[77]

Business methods have traditionally been in the public domain or under trade secret protection. Today, information technology enables new business models by processing and transferring technical, commercial, and financial data.[78] Due to the enormous economic risks of novel business methods and the growth of e-commerce, the debate over patenting business methods continues.[79] It is also important to note that the General Agreement on Trade-Related Aspects of Intellectual Property (TRIPs Agreement) does not exclude the patentability of algorithms, computer programs, or business methods.[80]

---

74 Richard N Stern, "Analysis of US PTO Data Showing Number of Software and Non-Software Patents Issued Each Year From 1991 to 2011" http://docs.law.gwu.edu/facweb/claw/ch-8D3.htm (accessed May 29, 2022), where the author says that the absolute number of software application increased as at 2011, to 125, 000 as against 25, 00 when the courts had not determined the patentability of algorithms. See also Doug Laney, "Algorithm Patents Increased 30x The Past Fifteen Years", Gartner Blog Network (2016) https://blogs.gartner.com/doug-laney/patents-for-algorithms-have-increased-30x-the-past-fifteen-years/ (accessed May 29, 2022); where the writer observed that 'nearly 17,000 patents applications in 2015 mention "algorithm" in the title or description, versus 570 in 2000' in the US.

75 World Intellectual Property Organisation, "Patent Expert Issues: Computer Programs and Business Methods", WIPO, https://www.wipo.int/patents/en/topics/computer_programs.html (accessed May 29 2022).

76 *Ibid.*

77 *Ibid.*

78 *Ibid.*

79 *Ibid.*

80 See article 27 (2 and 3), where the TRIPs Agreement allows Members to exclude only diagnostic, therapeutic and surgical methods for the treatment of humans or animals, plants and animals other than micro-organisms, and essentially biological processes for the production of plants or animals other than non-

1) Patentability of Computer Programs in the EU

Under the EU patent law, computer programs and methods of doing business are expressly excluded from patent protection. Article 52 (2) of the European Patent Convention (EPC)[81] provides that:

The following, in particular, shall not be regarded as inventions within the meaning of paragraph 1:

(a) discoveries, scientific theories and mathematical methods;

(b) aesthetic creations;

(c) schemes, rules and methods for performing mental acts, playing games or doing business, and programs for computers;

(d) presentations of information.

Even though computer programs, mathematical models, and algorithms are expressly excluded from patent protection, the 2022 Guidelines for Examination in the European Patent Office (EPO) gives an instance where such inventions could be protected. In other words, protection would be given to such invention if there is proof that it has "technical character".[82] If a claim is directed to a method with technical means (e.g., a computer) or to a device, and its subject matter has a technical character, then it is patentable under Article 52(2 and 3). The exclusion applies if a claim is about a mathematical method that is entirely abstract and does not require any technical means.[83] The Claim by the Applicants in the case of Classification/BDGB Enterprise Software,[84] was "[a] method for the computerized classification of an unclassified text document into one of a plurality of predefined classes based on a classification model obtained from the classification of a plurality of pre-classified text documents which respectively have been classified as belonging to one of said plurality of classes, said document and said documents respectively comprising a plurality of terms which respectively comprise one or more symbols of a finite set of symbols".[85] The Boards of Appeal of the EPO held that "a mathematical algorithm contributes to the technical character of a computer-implemented method only in so far as it serves a technical purpose" and that "[i]n the present case, the algorithm serves the general purpose of classifying text documents".[86] So, for an algorithm to be patentable under the EU Patent law, it must contribute to the technical character of a computer method. In IBM/Computer

---

biological and microbiological processes, and where exclusion is necessary to protect public order and morality.

81 Convention on the Grant of European Patents – (European Patent Convention) [1973] OJ EPO/01.

82 European Patent Office, "Guidelines for Examination in the European Patent Office, 2022", https://www.epo.org/law-practice/legal-texts/html/guidelines/e/g_ii_3_3.htm (accessed May 29, 2022).

83 Ibid.

84 Case T-1358/09 *Classification/BDGB Enterprise Software* [European Patent Office 2014] ECLI: EP: BA: 2014: T135809.

85 Ibid, 2.

86 Ibid, 4.

Program, the Technical Board of Appeal (TBA) of the EPO refused a patent application in full because 'it was directed to a computer program product' without technical effect. This technical effect is a material effect or as

2) Patentability of Computer Programs in the USA

In 1972, the US Supreme Court held in the case of Gottschalk v Benson[87] that a process claim involving a mathematical algorithm, as such, was not eligible for patent protection because "the patent would wholly pre-empt the mathematical formula and in practical effect would be a patent on the algorithm itself."[88] The law governing patents in the US Code Title 35 - Patents includes a "new and useful process" as an invention eligible for patent protection. It provides that "[w]hoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title".[89] In Alice Corp v CLS Bank International,[90] the question for the Supreme Court was whether some patent claims for a computer-implemented, electronic escrow service involved abstract ideas. The court established two steps that must be followed to determine if such inventions would qualify for protection – 1) the court must evaluate if the examined patent claim comprises an abstract idea, such as an algorithm, method of calculation, or other general principles[91] and 2) the court would assess if the patent added "something extra" to the idea that constitutes an "inventive concept."[92] To this extent, the court ruled that the electronic escrow service involved abstract ideas and was ineligible for protection. This ruling followed the previous Supreme Court decision in State Street Bank and Trust Company v Signature Financial Group, Inc, where the court observed that for an algorithm to be eligible for a patent, the said algorithm must produce "a useful, concrete and tangible result".[93]

3) Patentability of Computer Programs in Asia.

In this subheading, this article will be looking at two Asian countries – China and Indonesia. The Patent Law of the People's Republic of China[94] is the main patent

---

87 *Gottschalk v Benson*, 409 US 63 (United States Supreme Court 1972).
88 Ibid, 72.
89 35 United States Code 101 – Inventions patentable.
90 *Alice Corp v CLS Bank International*, 573 US 208 (United States Supreme Court 2014).
91 *Ibid*, 2355.
92 *Ibid*.
93 *State Street Bank and Trust Company v Signature Financial Group, Inc*, 149 F 3d 1368 (United States Federal Cir 1998). See AT&*T Corp v Excel Communications, Inc*, 172 F 3d 1352 (United States Federal Cir 1999).
94 The Patent Law of the People's Republic of China (Adopted at the Fourth Meeting of the Standing Committee of the Sixth National People's Congress on March 12, 1984, and amended in accordance with the Decision

law in China and it defines invention as "inventions, utility models and designs".[95] It excludes the following inventions from protection: 1. Scientific discoveries; 2. Rules and methods for mental activities; 3. Methods for the diagnosis or treatment of diseases; 4. Animal and plant varieties; 5. Substances obtained by means of nuclear transformation.[96]

The law does not define what rules and methods for mental activities entail, but the amendment of the People's Republic of China's Guidelines for Patent Examination, which became effective on January 15, 2021, explains what could form part of these rules and methods. Under the Guidelines, when drafting claims for patent applications containing algorithms, each step of the algorithm must be "closely related" to the technical issue to be solved. Simply put, it relates to the following four correlation levels:

a. The data processed by the algorithm must have a specific technical meaning instead of being an abstract data concept;

b. The processing should reflect that the data is processed in accordance with the laws of nature;

c. The output data of the processing by the algorithm must have specific

technical meaning rather than being an abstract data concept; and

d. The execution of the algorithm can solve a certain technical problem and achieve corresponding technical effects.[97]

From the preceding, it is clear that a direct method for determining whether a solution containing algorithm features is a technical solution as defined by patent law is to examine whether the algorithm steps in the technical solution are closely tied to specific technologies.[98]

In Indonesia, Law No 13 Year 2016 guides patent protection. It defines an invention as "an idea of an inventor embodied into a specific problem-solving activity in the field of technology in the form of product or process or refining and developing product or process".[99] The law excludes the following inventions from protection:

a. esthetical creation;

b. scheme;

c. rules and methods in conducting activity of:
   1. involving mental activity;
   2. games; and
   3. business.

d. rules and methods containing only computer programs;

---

by the 27th Meeting of the Standing Committee of the Seventh National People's Congress on Amending the Patent Law of the People's Republic of China on September 4, 1992).

95 *Ibid*, art 2.

96 *Ibid*, art 25.

97 See Peter Zhang, "Eligibility of Chinese Patent Applications in the Field of Algorithms (software)", JD Supra (2022) https://www.jdsupra.com/legalnews/eligibility-of-chinese-patent-8011341/ (accessed May 29, 2022).

98 *Ibid*.

99 The Law of the Republic of Indonesia, Number 13 of 2016 on patent, art 1(2).

e. presentation of information; and

f. discovery in the form of:

1. new use of existing and/or known product; and/or

2. new forms from an existing compound which does not generate significantly enhanced efficacy and contains different relevant known chemical structures to compound.[100]

The above expressly excludes patent protection for methods of doing business and methods containing computer programs only, but if the computer program involves a character that has technical effect and function to remedy an intangible or tangible issue, the invention is patentable.

b. Sufficiency of Disclosure During Patent Application and Opacity of Algorithm.

At the core of patent protection is the requirement for the applicant to sufficiently disclose the technical aspect and the literal description of the invention so that a person skilled in that field of the invention could repeat the invention after the patent period must have expired.[101] By this principle, patents are granted in exchange for disclosing the innovation (rather than keeping the information private, as with trade secrets) as quid pro quo.[102] Regarding patents for computer programs and algorithms, a question could be asked on how sufficient disclosure of the invention's technical aspect could help address the algorithm opacity issue. Each jurisdiction has its requirements for sufficient disclosure. Article 83 of the EPC[103] defines the sufficiency of disclosure requirements. It provides that "the European patent application shall disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art" and that "the claims shall define the matter for which protection is sought. They shall be clear and concise and be supported by the description".[104] In Äquivalenter Aortendruck/ARC SEIBERSDORF,[105] the EPO Board of Appeals rejected a patent application based on machine learning that claimed an "artificial neural network" since the patent specification did not sufficiently disclose how the artificial neural network was created.

Similarly, the US Patent Act provides sufficient disclosure as a formal require-

---

100 *Ibid*, art 4.

101 Poliana Belisário Zorzal et al., "Sufficiency of Disclosure and Genus Claims for Protection of Biological Sequences: A Comparative Study among the patent Offices in Brazil, Europe and the United States" *Biotechnology Research and Innovation* 3 (2019), 92.

102 Lisa Larrimore Ouellette, "Do Patents Disclose Useful Information?", Harvard Journal of Law & Technology 25 (2012), 532.

103 European Patent Convention (n 81).

104 Ibid, art 84.

105 *Äquivalenter Aortendruck/ARC SEIBERSDORF*, ECLI: EP:BA:2020: T016118.20200512 (European Patent Office 2020).

ment during patent application. It requires that an application should be accompanied by "a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor or joint inventor of carrying out the invention".[106] Three elements have been read into this provision[107] to include written description, enablement (this is to enable a person skilled in the art, for instance, a "computer engineer or computer programmer, to make or use the related software-related invention without undue experimentation",[108] and best mode. In Vasudevan Software, Inc v MicroStrategy, Inc[109], the question was raised on whether sufficient written description was made. "The patents-in-suit are directed to different features of an online analytical processing ("OLAP") cube capable of collecting and processing "live" data from multiple incompatible

databases".[110] The court observed that the test for the sufficiency of the written description "is whether the disclosure of the application relied upon reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date"[111] and this "requirement is not met if the specification merely describes a "desired result"".[112] Also, in the Trustees of Boston University v Everlight Electronics Co, Ltd,[113] the test for enablement was reaffirmed thus: "[t]o be enabling, the specification of a patent must teach those skilled in the art how to make and use the full scope of the claimed invention without 'undue experimentation'". In other words, the question is whether the invention's specification teaches a person skilled in the art, as of the effective filing date of the patent, how to manufacture such a device without undue experimentation.[114]

The same sufficiency of disclosure is also at the core of patent grants in Indonesia. As part of the application for a patent, apart from the full details of the inventor or applicant,[115] the application

---

106 United States Code Title 35 – Patents, section 112.

107 Poliana Belisário Zorzal et al., "Sufficiency of Disclosure and Genus Claims for Protection of Biological Sequences: A Comparative Study among the patent Offices in Brazil, Europe and the United States" *Biotechnology Research and Innovation* 3 (2019), 97.

108 Ryan N Phelan, "Why including an "Algorithm" is Important for Software Patents (Part 2)", PatentNext (2021) https://www.patentnext.com/2021/09/why-including-an-algorithm-is-important-for-software-patents-part-2/ (accessed May 30 2022).

109 *Vasudevan Software, Inc v MicroStrategy, Inc*, 782 F.3d 671 (United States Federal Cir 2015).

110 *Ibid*, 4.

111 *Ibid*, 18.

112 *Ibid*; *Ariad Pharm, Inc v Eli Lilly & Co*, 598 F.3d 1336, 1351 (United States Federal Cir 2010).

113 *Trustees of Boston University v Everlight Electronics Co, Ltd* 896 F.3d 1357, 1364 (United States Federal Cir 2018), 8 – 9.

114 *Ibid*, 12.

115 The Law of the Republic of Indonesia, Number 13 of 2016 on patent, art 25 (1).

must be accompanied by the full details of the invention.[116] The essence of this full disclosure is to "clearly and completely describe how an Invention may be implemented by a person skilled in the art".[117] This is also the situation in China where the following must be submitted for patent grant – "written request, a specification and an abstract thereof, and a patent claim".[118] The meanings of these three requirements are given by the Chinese Patent Law in the following wordings:

> The specification shall describe the invention or utility model in a manner sufficiently clear and complete that a person skilled in the relevant field of technology can accurately produce it; where necessary, drawings shall be appended. The abstract shall describe briefly the technical essentials of the invention or utility model. The patent claim shall, on the basis of the specification, state the scope of the patent protection requested.[119]

The requirement for sufficient disclosure, even though it is to enable a person skilled in the art of the invention to repeat the invention after the patent period must have expired, also has the advantage of disclosing how an invention

functions. Regarding algorithms, the requirement discloses, both to the public and government, the technical aspects of how an algorithm receives, processes, and stores private information and how it aids in decision making. In other words, the more patent is granted to algorithms and computer programs, the more these inventions are made more transparent. This is unlike trade secret that operates to hide such details, and unfortunately, trade secrets are highly used by firms wishing to protect their algorithm.[120] According to Katarina Foss-Solbrekk, this results in less overall algorithmic transparency, as trade secrets are unregistered rights, and any information regarding the algorithm itself, how it operates, or the personal data on which its findings are based may be kept on trade secret grounds. Therefore, trade secret law obscures access to the algorithm and explanations underlying automated decisions, diminishing the system's overall transparency.[121]

D. Closing

Algorithm no doubt makes life easier and impacts life positively but could be misused to produce bias and discriminatory results or breach privacy rights. When such results are produced, because an algorithm itself is shrouded

---

116 *Ibid*, art 25(2).
117 *Ibid*, art 25 (3).
118 The Patent Law of the People's Republic of China (n 94), art 26 (para 1).
119 *Ibid*, art 26 (para 3).
120 Katarina Foss-Solbrekk, "Three Routes to Protecting AI Systems and their Algorithms Under IP Law: The Good, the Bad and the Ugly", Journal of Intellectual Property Law & Practice 16 (2021), 256.
121 *Ibid*, 258.

in secrecy and encoded, it is almost impossible to know what happened unless by someone with prior knowledge of how the said algorithm functions. In conclusion, patent protection for algorithms and computer programs will increase algorithmic transparency. This is primarily through the sufficiency disclosure requirement of an invention before being granted a patent; this requires that a patent application discloses all the information about the invention. The stringent conditions for patent grants in the EU, US, and Asian countries examined in this article should be removed to increase the patentability of many AI systems and their algorithms. In the EU, for instance, an algorithm is expressly excluded from patent protection unless it has a "technical character" or produces technical effects. On the other hand, in the US, it must produce "a useful, concrete and tangible result" to qualify for protection. Again, the protection of AI systems and their algorithms under trade secrets or undisclosed information should be discouraged in favour of patent protection. Solutions through patent protection should be allowed for all AI systems and their algorithms if humanity is to avoid the risk of remaining pawns and puppets in the hands of hidden algorithms.

Bibliography

A. Books

Adrian, Angela, "Nobody Knows you are a Dog: Identity and Reputation in Virtual Worlds, in Sylvia Mercado Kierkegaard" (ed), Cyber, Security and Privacy (International Association of IT Lawyers, 2007).

Arnold, Sarah, "Netflix and the Myth of Choice/Participation/Autonomy" in Kevin McDonald and Daniel Smith-Rowsey (eds) The Netflix Effect: Technology and Entertainment in the 21st Century (Bloomsbury, 2016).

Cisneros, Mario, Patentability Requirements for Nanotechnological Inventions: An Approach from the European Patent Convention Perspective, (Baden-Baden: Nomos Publishers, 2008).

Knuth, Donald, Selected Papers on Computer Science (Cambridge: Cambridge University Press 1996).

Pasquale, Frank, The Black Box Society: The Secret Algorithms That Control Money and Information (Harvard Press, 2015).

Steiner, C., Automate This: How Algorithms came to Rule our World (Penguin Groups, 2012).

B. Paper/Article/Proceeding/ Research Result

Betsy Anne Williams et al., "How Algorithms Discriminate Based on Data They Lack: Challenges, Solutions, and Policy Implications" JI Policy 8 (2018).

Charles Vincent and Jean Camp, "Looking to the Internet for Models of Governance", Ethics Info Tech 6 (2004).

Danielle Keats Citron, "Technological Due Process", Washington University Law Review 85 (2008), 1249.

Deven R Desai and Joshua A Kroll, "Trust but Verify: A Guide to Algorithms and the Law", Harvard Journal of Law & Technology 31 (2017).

Jim Isaak and Mina J Hanna, "User Data Privacy: Facebook, Cambridge Analytica, and Privacy Protection" CSDL 51 (2018)

Joshua A Kroll et al., "Accountable Algorithms UPLR 165 (2017): 633.

Julie E Cohen, "What Privacy is for", Harvard Law Review 126 (2013).

Katarina Foss-Solbrekk, "Three Routes to Protecting AI Systems and their Algorithms Under IP Law: The Good, the Bad and the Ugly", Journal of Intellectual Property Law & Practice 16 (2021).

Lisa Larrimore Ouellette, "Do Patents Disclose Useful Information?", Harvard Journal of Law & Technology 25 (2012).

Mireille Hildebrandt, "Algorithmic regulation and the rule of law", Phil Trans R Soc 376 (2018).

Neil M Richards and Jonathan H King, "Three Paradoxes of Big Data", SLR 66 (2013).

Nicholas Diakopoulos, "Algorithmic Accountability: Journalistic Investigation of Computational Power Structures", Digital Journalism 3 (2015).

Nonson S Yanofsky, "Towards a Definition of an Algorithm", Journal of Logic and Computation 21 (2011).

Oren Bar-Gill, "Algorithmic Price Discrimination When Demand is a Function of Both Preferences and (Mis)perceptions", Uni Chi Law Review 86 (2018).

Poliana Belisário Zorzal et al., "Sufficiency of Disclosure and Genus Claims for Protection of Biological Sequences: A Comparative Study among the patent Offices in Brazil, Europe and the United States" Biotechnology Research and Innovation 3 (2019).

Raphael Cohen-Almagor, "Internet History", International Journal of Technoethics 2 (2011): 45.

Robert Brauneis and Ellen P Goodman, "Algorithmic Transparency for the Smart City" YJLaw Tech 20 (2018).

Salim Ibrahim Ali, Zuryati Mohamed Yusoff, and Zainal Amin Ayub, "Legal Research of Doctrinal and Non-Doctrinal", International Journal of Trend in Research and Development 4 (2017).

Turnbull Mahoney, "Navigating New Zealand's Digital Future: Coding our way to Privacy in the age of Analytics", NZLSJ 3 (2015) 420.

C. Internet

Alex Hern and David Pegg, "Facebook fined for data breaches in Cambridge Analytica Scandal", The Guardian (2018) https://www.theguardian.com/technology/2018/jul/11/facebook-fined-for-data-breaches-in-cambridge-analytica-scandal (accessed May 29, 2022).

Andrew Leonard, "How Netflix Is Turning Viewers into Puppets", Salon (2013) https://www.salon.com/2013/02/01/how_netflix_is_turning_viewers_into_puppets/ (accessed May 29, 2022).

Anja Lambrecht and Catherine Tucker, "Algorithmic Bias: An Empirical Study into Apparent Gender-Based Discrimination in the Display of STEM Career Ads", SSRN Electronic Journal (2018) https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2852260 (accessed May 29, 2022).

Ari Ezra Waldman, "All Those like You: Identity Aggression and Student Speech" Missouri Law Review 77 (2013): 653.

Daniel Cossins, "Discriminating Algorithms: 5 Times AI showed Prejudice" New Scientist (2018) https://www.newscientist.com/article/2166207-discriminating-algorithms-5-times-ai-showed-prejudice/ (accessed May 29, 2022).

Dickey Megan Rose, "Algorithmic Accountability", TechCrunch (April 30 2017) https://techcrunch.com/2017/04/30/algorithmic-accountability/ (accessed May 29, 2022)

Doug Laney, "Algorithm Patents Increased 30x The Past Fifteen Years", Gartner Blog Network (2016) https://blogs.gartner.com/doug-laney/patents-for-algorithms-have-increased-30x-the-past-fifteen-years/ (accessed May 29, 2022).

European Patent Office, "Guidelines for Examination in the European Patent Office, 2022", https://www.epo.org/law-practice/legal-texts/html/guidelines/e/g_ii_3_3.htm (accessed May 29, 2022).

Howard Yu, "GDPR isn't Enough to Protect us in an Age of Smart Algorithms", The Conversation (2018) https://theconversation.com/gdpr-isnt-enough-to-protect-us-in-an-age-of-smart-algorithms-97389 (accessed May 29, 2022).

Ian Bogost, "The Cathedral of Computation", The Atlantic (2015) https://www.theatlantic.com/technology/archive/2015/01/the-cathedral-of-computation/384300/ (accessed May 29, 2022).

James Brown, "Could you Survive a Week with no Internet?" The Telegraph (2014) https://www.telegraph.co.uk/men/thinking-man/10553634/Could-you-survive-a-week-with-no-internet.html (accessed May 29, 2022).

Jamie Condliffe, "Algorithms Probably Caused a Flash Crash of the British Pound" MIT Technology Review (2016) https://www.technologyreview.com/s/602586/algorithms-probably-caused-a-flash-crash-of-the-british-pound/ (accessed May 29, 2022).

Jeff Larson et al., "How We Analysed the COMPAS Recidivism Algorithm", ProPublica (2016) https://www.propublica.org/article/how-we-analyzed-the-compas-recidivism-algorithm (accessed May 29, 2022).

Jill Treanor, "The 2010 'Flash Crash': How it Unfolded", The Guardian (2015) https://www.theguardian.com/business/2015/apr/22/2010-flash-crash-new-york-stock-exchange-unfolded (accessed May 29, 2022).

John Perry Barlow, "Declaration of the Independence of Cyberspace", Electronic Frontier Foundation, (1996) https://www.eff.org/cyberspace-independence (accessed May 29, 2021).

Kyle Chayka, "5 Hidden Algorithms That Rule Your World: From the NSA to OKCupid", Pacific Standard (2013) https://psmag.com/social-justice/nsa-okcupid-5-algorithms-rule-world-69709 (accessed May 29, 2022).

Matt Southern, "Google's Ad-Targeting Algorithms Accused of Discrimination", Search Engine Journal, (2015) https://www.searchenginejournal.com/googles-ad-targeting-algorithms-accused-of-discrimination/136280/ (accessed May 29, 2022).

Mohan Chandran, "Technology – A "Necessary Evil"?", Boloji (2016) https://www.boloji.com/articles/49084/technology-a-necessary-evil (accessed May 29, 2022).

Peter Zhang, "Eligibility of Chinese Patent Applications in the Field of Algorithms (software)", JD Supra (2022) https://www.jdsupra.com/legalnews/eligibility-of-chinese-patent-8011341/ (accessed May 29, 2022).

Richard N Stern, "Analysis of US PTO Data Showing Number of Software and Non-Software Patents Issued Each Year From 1991 to 2011" http://docs.law.gwu.edu/facweb/claw/ch-8D3.htm (accessed May 29, 2022).

Ryan N Phelan, "Why including an "Algorithm" is Important for Software Patents (Part 2)", PatentNext (2021) https://www.patentnext.com/2021/09/why-including-an-algorithm-is-important-for-software-patents-part-2/ (accessed May 29, 2022).

Timothy Revell, "Algorithms that Change Lives should be Trialled like New Drugs", New Scientist (2018) https://www.newscientist.com/article/2158755-algorithms-that-change-lives-should-be-trialled-like-new-drugs/ (accessed May 29, 2022).

Tom Simonite, "Probing the Dark Side of Google's Ad-Targeting System" MIT Technology Review (2015) https://www.technologyreview.com/s/539021/probing-the-dark-side-of-googles-ad-targeting-system/ (accessed May 29, 2022).

World Intellectual Property Organisation, "Patent Expert Issues: Computer Programs and Business Methods", WIPO, https://www.wipo.int/patents/en/topics/computer_programs.html (accessed May 29, 2022).

World Intellectual Property Organisation, "Patents", WIPO, https://www.wipo.int/patents/en/ (accessed May 29 2022).

World Intellectual Property Organisation, "Understanding Industrial Property", World Intellectual Property Organisation https://tind.wipo.int/record/28945 (accessed May 29, 2022).

D. Regulations

The United States of America's Patent Act, 35 USC.

Agreement on Trade-Related Aspects of Intellectual Property Rights April 15 1994) (UNTS 299, 33 ILM 1197) (1994).

Convention on the Grant of European Patents – (European Patent Convention) [1973] OJ EPO/01.

EU, General Data Protection Regulation [2016] OJL119/1.

The Law of the Republic of Indonesia, Number 13 of 2016 on Patent.

The Nigerian Patents and Designs Act, Cap P2, Laws of the Federal Republic of Nigeria, 2004.

The Patent Law of the People's Republic of China 1984

E. Cases

Alice Corp v CLS Bank International, 573 US 208 (2014).

Äquivalenter Aortendruck/ARC SEIBERSDORF, ECLI: EP:BA:2020: T016118.20200512 (2020).

Ariad Pharm, Inc v Eli Lilly & Co, 598 F.3d 1336, 1351 (Fed Cir 2010).

AT&T Corp v Excel Communications, Inc, 172 F 3d 1352 (Fed Cir 1999).

Bernstein v United States, No C-95-0582 MHP (ND Cal filed Feb 21, 1995)

Case C-131/12 Google Spain SL, Google Inc v Agencia Española de Protección de Datos, Mario Costeja González (2014) ECLI:EU:C:2014:317.

Case T-1358/09 Classification/BDGB Enterprise Software [2014] ECLI: EP: BA: 2014: T135809.

Gottschalk v Benson, 409 US 63 (1972).

State Street Bank and Trust Company v Signature Financial Group, Inc, 149 F 3d 1368 (Fed Cir 1998).

State v Loomis 88 NW 2d 749, 770 (Wis 2016).

Trustees of Boston University v Everlight Electronics Co, Ltd 896 F.3d 1357, 1364 (Fed. Cir. 2018).

Vasudevan Software, Inc v MicroStrategy, Inc, 782 F.3d 671 (Fed Cir 2015).

Curriculum Vitae of Author

Ikechukwu is a doctoral researcher at the University of Silesia in Katowice, Poland. He has two master's degrees – LL.M Public International Law from Bournemouth University, UK (Distinction) 2019 under the Commonwealth Shared Scholarship and LLM Intellectual Property Law, 2018. In 2014, he obtained an LL. B from the University of Nigeria, Nsukka. He is a qualified advocate and solicitor in Nigeria. His PhD research which seeks a new approach to multinational corporations' accountability and the protection of the rights of indigenous peoples, is funded by the Polish National Science Centre, with grant number UMO-2021/41/N/HS5/01227.