Introduction: Intelligent Entertainment: Shaping Policies on The Algorithmic Generation and Regulation of Creative Works

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INTELLIGENT ENTERTAINMENT: SHAPING POLICIES ON THE ALGORITHMIC GENERATION AND REGULATION OF CREATIVE WORKS

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This is an introductory essay prepared for the publication of the Fall 2019 symposium issue of the *FIU Law Review*. The papers to follow in the symposium issue take on three major themes in one of the world's most urgent jurisprudential controversies: how to recognize and to govern the role of artificial intelligence in contributing to creative works. The range of creativity analyzed by the issue's contributors spans from artistic and literary works to devices and business methods to databases and computer graphics.[1]

Beyond the traditional concern of intellectual property doctrines with balancing the rights of creators and infringers or users, artificial intelligence (AI) triggers a larger debate about whether intellectual property will be necessary or practical in an era of ubiquitous and superhuman computers and programs. A nightmare of infinitude seems to recur in fictional representations of a future in which humans live alongside AI beings, whether they be the legions of grimacing Agent Smith programs in *The Matrix: Revolutions*, the white robots of the film *I, Robot*, or Ultron's hordes. As AI goes from hype to omnipresent fact of life, intellectual property may need to adjust to new processes of creation and exhibition.[2] Incentive

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[1]   *See infra* pp. 201–361 of this volume.

[2]   *See, e.g.*, Ryan Abbott, *Everything Is Obvious*, 66 UCLA L. REV. 2 (2019); Samantha Fink Hedrick, *I "Think," Therefore I Create: Claiming Copyright in the Outputs of Algorithms*, 8 NYU J. INTELL. PROP. & ENT. L. 324, 333 (2019); Daryl Lim, *AI & IP: Innovation & Creativity in an Era of Accelerated Change*, 52 AKRON L. REV. 813 (2019); Brenda M. Simon, *The Implications of Technological Advancement for Obviousness*, 19 MICH. TELECOMM. & TECH. L. REV. 331, 350, 362–64, 375 (2013); James Bessen, *AI and Jobs: The Role of Demand* (Nat'l Bureau of Econ. Research, Working Paper No. 24235, 2018), http://www.nber.org/papers/w24235; Ruth Okediji, *Creative Markets and Copyright in the*

structures may need to be adapted as incremental creativity consumes less time and resources. An oversupply of entertaining works—and deflated prices—may result.[3]

The transition from automated recommendations of creative works to new works made with automated means and often customized for their audience will be a watershed.[4] Many of us already enjoy algorithmic recommendations via Netflix, Spotify, Amazon (Prime), or some other platform. Algorithmically created works released by digital platforms could be like commissioned paintings or private performances of music or drama, but produced by AI.[5] AI has proven to be useful in generating trailers out of finished motion pictures, and efforts at writing screenplays with it have begun.[6]

The process by which AI came to dictate the results of many queries to Google's search engine may be indicative of the future of other industries. Machine learning models—presumably drawing on the work of thousands of Google's engineers and executives in creating the world's leading search engine—demonstrated the ability to better predict where a result would land in Google results than the service's own engineers.[7] In the entertainment industry, a comparable trend could materialize as studios and producers

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Fourth Industrial Era: Reconfiguring the Public Benefit for a Digital Trade Economy, INT'L CTR. FOR TRADE AND SUSTAINABLE DEV. Issue Paper No. 43, vii–viii (2018).

3   *See* Okediji, *supra* note 2, at vii–viii; *see also* Camilla A. Hrdy, *Intellectual Property and the End of Work*, 71 FLA. L. REV. 303 (2019).

4   *See Sizing the Prize: What's the Real Value of AI for Your Business and How Can You Capitalise?*, PRICEWATERHOUSE COOPERS (2017), https://www.pwc.com/ai.

5   *Cf.* Martin Skladany, *Bespoke Recordings: The Limits of Intellectual Property and the Revival of the Music Industry*, 2014 U. ILL. J.L. TECH & POL'Y 325, 332–33 (noting that a "private forty-minute performance in one's home by Philip Glass was estimated to fetch $10,000 at a charity auction," and suggesting that "bespoke compositions" and "recordings" could be auctioned off one at a time, and privately).

6   Kim Arlington, *Artificial Intelligence Input into Film Script Aims to Shake up Industry with Impossible Things*, SYDNEY MORNING HERALD (Aug. 28, 2016), http://www.smh.com.au/technology/innovation/artificial-intelligence-input-into-film-script-aims-to-shake-up-industry-with-impossible-things-20160826-gr244l.html; Jordan Cohen, *Lights, Camera, AI: Artificial Intelligence Authorship and Copyright Ownership in the Entertainment Industry of Tomorrow* 1–4 (Center for Legal and Court Technology, Working Paper, 2018), https://legaltechcenter.openum.ca/files/sites/159/2018/04/1.-Lights-Camera-AI-Artificial-Intelligence-and-Copyright-Ownership-in-the-Entertainment-Industry-of-Tomorrow.pdf (citing Annalee Newitz, *Movie Written by Algorithm Turns out to Be Hilarious and Intense*, ARS TECHNICA (July 9, 2016), https://arstechnica.com/gaming/2016/06/an-ai-wrote-this-movie-and-its-stranhttps://arstechnica.com/gaming/2016/06/an-ai-wrote-this-movie-and-its-strangely-moving/).

7   *See* Cade Metz, *AI Is Transforming Google Search. The Rest of the Web Is Next*, WIRED (Feb. 4, 2016), https://www.wired.com/2016/02/ai-is-changing-the-technology-behind-google-searches/.

deploy machine learning and/or neural networks against the accumulated creative labor of thousands or millions of talented individuals and groups.[8]

I.   THE BIRTH OF AI

AI discourse emerged a decade or a decade and a half after the invention of digital computers.[9] Dictionaries have since defined AI as the creation, understanding, and use of computers to complete tasks typically requiring the human mind or groups of minds.[10]

Futurist and novelist Arthur C. Clarke wrote in 1962 that AI would emerge in the mid- to late 1990s, after cyborgs but before global libraries and the colonization of other planets.[11] In the 1960s, Herman Kahn and Anthony J. Wiener developed a list of probable inventions before the year 2000, which included advances in three-dimensional movies, television shows, and photographs and graphics; "pervasive techniques for surveillance"; innovations in propaganda; rapid mail and video content delivery using advanced wired networks; "cyborg techniques" including mechanical augmentation or replacement of human organs, limbs, or senses; automated and computerized manufacturing of unique products; and the "widespread use of computers [. . .] as intellectual collaborators generally." They

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[8]   *Cf.* Cohen, *supra* note 6, at 3–6; Michael Krigsman & Matt Marolda, *Data and Predictive Analytics: Moneyball in Hollywood w Legendary Entertainment*, YOUTUBE (Feb. 12, 2018), https://www.youtube.com/watch?v=9nfA_6d-7hE (describing how *The Dark Knight* Series, *Kong*, and *Godzilla* films could be shaped in their production and marketing by predictive analytics insights on casting, release dates, and other creative or marketing "bets"); Wendy Lee, *Can a Computer Write a Script? Machine Learning Goes Hollywood*, L.A. TIMES (Apr. 11, 2019), https://www.latimes.com/business/hollywood/la-fi-ct-machine-learning-hollywood-20190411-story.html (describing how computers could help compose scripts for advertisements or even rewrite films, such as by moving action sequences to the first scene or catering to other preferences of target audience). The difference between machine learning and neural networks seems to be that the former are AI systems that learn and are trained, whereas the latter learn in a manner that mimics the way that the human brain does, by strengthening connections between concepts or neural nodes. *See* MCKINSEY GLOBAL INSTITUTE, A FUTURE THAT WORKS: AUTOMATION, EMPLOYMENT, AND PRODUCTIVITY 24 (Jan. 2017), https://www.mckinsey.com/mgi.

[9]   *See* Arthur L. Samuel, *Some Studies in Machine Learning Using the Game of Checkers*, 3 IBM J. 535 (1959); 44 SOUTHERN CALIFORNIA METER ASSOCIATION, INSTRUMENTS AND CONTROL SYSTEMS 4 (1971). For centuries prior to that, the phrase "artificial intelligence" had been used for the non-human Creator of matter and the universe as well as of the souls of humans themselves. *See, e.g.*, FRANCIS HUTCHESON, A SHORT INTRODUCTION TO MORAL PHILOSOPHY 82 (1787). Computing discourse goes back a century and a half before digital computers. *See* Annemarie Bridy, *Coding Creativity: Copyright and the Artificially Intelligent Author*, 2012 STAN. TECH. L. REV. 5, 22; Lim, *supra* note 2, at 818–20.

[10]   *See, e.g.*, *Artificial intelligence*, MERRIAM-WEBSTER'S STUDENT DICTIONARY (2019), http://www2.m-w.com/cgi-bin/student?book=Student&va=artificial%20intelligence.

[11]   ARTHUR C. CLARKE, PROFILES OF THE FUTURE: AN INQUIRY INTO THE LIMITS OF THE POSSIBLE 233 (1962).

suggested that "direct" thought control and "'true'" AI might follow in the twenty-first century and be "important," perhaps putting it mildly.[12]

Depending on how one defines AI, it has been in use for many decades.[13] The programmable calculators of the nineteenth century and, prior to that, the mechanical calculators of the seventeenth century and punch-card programs of the nineteenth century replicated the operations of the human mind.[14] In the 1950s, software programmers dreamed of "automatic programming," which later software engineers regarded as a forbearer to AI research of subsequent decades. Assemblers and compilers, by automatically transforming source code into object code, outsource to programs some aspects of machine programming roles traditionally performed by humans.[15] During six international AI conferences between 1969 and 1979, researchers began to describe graphical representations of programming tasks.[16]

Also in the 1970s, Hanon Sinay and others invented methods to help diagnose medical disorders.[17] By 2015, there were more than 160,000 apps on medical and personal health topics in the Android (Google Play) and App

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[12]   *Establish a Select Senate Committee on Technology and the Human Environment; Hearing on S. Res. 78 Before the S. Subcomm. on Intergovernmental Relations of the Committee on Government Operations*, 91st Cong. 36–38 (1969).

[13]   Recently, it has become more common to distinguish specific AI from general AI and to equate the latter with a capacity for all-purpose cognition at human levels, which OpenAI believes could be achieved by 2025 (OpenAI is the California-based research outfit backed by Microsoft, Elon Musk, LinkedIn's Reid Hoffman, and Palantir's Peter Thiel). *See* Madhumita Murgia, *Who's Using Your Face? The Ugly Truth About Facial Recognition*, FIN. TIMES (Sept. 18, 2019), https://www.ft.com/content/c96e43be-b4df-11e9-8cb2-799a3a8cf37b.

[14]   Jürgen Schmidhuber, *Konrad Zuse (1910–1995)*, http://people.idsia.ch/~juergen/zuse.html (last visited Feb. 23, 2020).

[15]   *See* Charles Rich & Richard C. Waters, *Introduction*, *in* READINGS IN ARTIFICIAL INTELLIGENCE AND SOFTWARE ENGINEERING xi, xii, xviii (Charles Rich & Richard C. Waters eds., 2d ed. 2014); *see also* SCIENCE & TECHNOLOGY: FOR THE TECHNICAL MEN IN MANAGEMENT, 85–94 (1969).

[16]   *See, e.g.*, P.D. Rovner & D.A. Henderson, Jr., *On the Implementation of AMBIT/G: A Graphical Programming Language*, *in* PROCEEDINGS OF THE INTERNATIONAL JOINT CONFERENCE ON ARTIFICIAL INTELLIGENCE 9–20 (1969).

[17]   *See* U.S. Patent No. 4,290,114 (filed July 1, 1976) ("The paramedic uses a keyboard to enter the numerical codes into a fixed purpose computer. The computer compares the findings with a number of disease definitions stored in its memory. . . . The system of the present invention utilizes a dedicated computer to diagnose the patient's illness and to indicate a treatment for it. As distinguished from prior art systems, the present invention does not merely aid diagnosis, it performs the diagnosis and issues specific treatment instructions."); Katie Hafner, *For Second Opinion, Consult a Computer?*, N.Y. TIMES (Dec. 3, 2012), https://www.nytimes.com/2012/12/04/health/quest-to-eliminate-diagnostic-lapses.html; *see also* U.S. Patent No. 4,945,476 (filed July 31, 1990); Jon Hupp et al., *DXplain—A Computer-Based Diagnostic Knowledge Base*, *in* PROCEEDINGS OF FIFTH WORLD CONFERENCE ON MEDICAL IN-FORMATICS (MEDINFO) 117–21 (North-Holland 1986); Randolph A. Miller & Fred E. Masarie, Jr., *Quick Medical Reference (QMR): An Evolving, Microcomputer-Based Diagnostic Decision-Support Program for General Internal Medicine*, *in* PROCEEDINGS OF THE ANNUAL SYMPOSIUM ON COMPUTER APPLICATION IN MEDICAL CARE 947 (1989); G. Octo Barnett et al., *DXplain: An Evolving Diagnostic Decision-Support System*, 258 J. AM. MED. ASS'N. 67 (1987).

Stores; many claimed to diagnose, monitor, or plan treatments for illnesses or medical conditions.[18] In July of 2018, AI bested elite doctors in a competition relating to conducting sophisticated diagnoses.[19] The Food and Drug Administration has asserted the authority to regulate how applications or services, such as 23andMe, utilize genetic data and testing kits to predict or monitor for conditions.[20] Accenture has estimated that by 2026, AI could avert $150 billion in U.S. health care costs each year.[21]

II. ALGORITHMIC GENERATION OF CREATIVE WORKS

An algorithm is any stepwise solution to a problem or progress towards a goal, so all creativity involves a general algorithm of sorts.[22] A mathematical algorithm is a procedure for solving a mathematical problem.[23] The "mathematical algorithm exception" to the patentability of any "process" would imply that mathematical algorithms are in patent law's public domain as "abstract ideas" unless they are applied in a concrete, practical, useful, and perhaps tangible way to a business, machine, or profession, and manifest the novelty, specificity, and other indicia of "inventions."[24]

More complex algorithms generally require more processing power to solve.[25] AI has been growing in computing power more rapidly than other

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18   *See* W. Nicholson Price II, *Regulating Black-Box Medicine*, 116 MICH. L. REV. 421, 429 (2017).

19   *See* Aliya Ram, *DeepMind Develops AI to Diagnose Eye Diseases*, FIN. TIMES (Feb. 4, 2018), https://www.ft.com/content/84fcc16c-0787-11e8-9650-9c0ad2d7c5b5; *see also* Nick Summers, *DeepMind AI Matches Health Experts at Spotting Eye Diseases*, ENGADGET (Aug. 13, 2018), https://www.engadget.com/2018/08/13/deepmind-ai-moorfields-eye-hospital-disease.

20   *See* Price, *supra* note 18, at 448 (citing Cyrus Farivar, *FDA Allows 23andMe to Use Its Genetic Kits to Test for Bloom Syndrome*, ARS TECHNICA (Feb. 20, 2015, 2:09 PM), https://arstechnica.com/science/2015/02/fda-allows-23andme-to-use-its-genetic-kits-to-test-for-bloom-syndrome/).

21   *Artificial Intelligence: Healthcare's New Nervous System*, ACCENTURE (Dec. 2017), https://www.accenture.com/t20171215t032059z__w__/us-en/_acnmedia/pdf-49/accenture-health-artificial-intelligence.pdf.

22   *See In re* Chatfield, 545 F.2d 152, 156 n.5 (C.C.P.A. 1976).

23   *Cf.* Gottschalk v. Benson, 409 U.S. 63, 65 (1972).

24   State St. Bank & Tr. Co. v. Signature Fin. Grp., 149 F.3d 1368, 1373 (Fed. Cir. 1998) (citing Arrhythmia Research Tech. Inc. v. Corazonix Corp., 958 F.2d 1053 (Fed. Cir. 1992)). *But see* Burnett v. Panasonic Corp., 741 F. App'x 777 (Fed. Cir. 2018) (this standard no longer governs patentability of algorithms under 35 U.S.C. § 101).

25   *See* Audet v. Fraser, 332 F.R.D. 53 (D. Conn. 2019); BEHROOZ PARHAMI, INTRODUCTION TO PARALLEL PROCESSING: ALGORITHMS AND ARCHITECTURES 8–21 (2006); Rodric Rabbah, *Beyond Gaming: Programming the PLAYSTATION® 3 Cell Architecture for Cost-Effective Parallel Processing*, *in* PROCEEDINGS OF THE 5TH IEEE/ACM INTERNATIONAL CONFERENCE ON HARDWARE/SOFTWARE CODESIGN AND SYSTEM SYNTHESIS (2007), https://dl.acm.org/citation.cfm?id=1289819; Christopher R. Nigro, Evaluation of the PlayStation 2 as a Cluster Computing Node 1 (May 2, 2004) (unpublished M.S. thesis, Rochester Institute of Technology), https://scholarworks.rit.edu/cgi/viewcontent.cgi?referer=.

aspects of computers, such as storage capacity or battery life.[26] From programs that can play checkers, AI has evolved into programs that can play chess, Go, Starcraft, or Dota, involving many complex decisions to reach an overall goal.[27] Recursive processes of machine learning mean that once given the parameters of a game or other task, software can develop pattern-detection and rule-exploitation skills in a shorter time than human beings.[28] As Aghion, Jones, and Jones explain:

> [In] a "Type II" growth explosion, . . . infinite output is achieved in finite time. . . . [Growth explosions] . . . can also be read as creating "superintelligence" as an artifact of automation . . . . Typically, the AI is seen as "self-improving" through a recursive process. . . . [Eventually, however,] the positive effect of AI on productivity growth may be counteracted by another effect . . . in which . . . the private return to research and development (R&D) falls down to zero and as a result innovation and growth taper off.[29]

The Copyright Office reportedly began receiving applications to register "computer-generated works" in the mid-1960s.[30] In an important article, Pamela Samuelson defended the conclusion of the National Commission on New Technological Uses of Copyrighted Works that the *user* of the computer that generated works at the user's suggestion, instigation, or command would be the copyright owner of such a work.[31] She cited an example drawn by Butler from *Omni Magazine*, a sort of prose poem about a "quantum logician" and "electrons," generated by a computer in or before 1981.[32] Her article fended off potential challenges to the user's copyright in a program's output from the author of the program, who might argue that the program's output was simply one or more derivative works of the program, ineligible for copyright under 17 U.S.C. § 103, or who might seek to license resulting works and share in its royalties as a joint author; meanwhile, the program or

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26   *See* Murgia, *supra* note 13; *see generally* Lim, *supra* note 2.

27   *See generally* Samuel, *supra* note 9; Waters, *supra* note 13.

28   *See* Samuel, *supra* note 9, at 211.

29   Phillippe Aghion, Benjamin F. Jones & Charles I. Jones, *Artificial Intelligence and Economic Growth*, *in* THE ECONOMICS OF ARTIFICIAL INTELLIGENCE: AN AGENDA 237, 253, 257–58, 260–61 (Ajay Agrawal, Joshua Gans & Avi Goldfarb eds., 2017).

30   *See* Pamela Samuelson, *Allocating Ownership Rights in Computer-Generated Works*, 47 U. PITT. L. REV. 1185, 1192 (1985) (citing U.S. COPYRIGHT OFFICE, SIXTY-EIGHTH ANNUAL REPORT OF THE REGISTER OF COPYRIGHTS 5 (1965)).

31   *See id.* at 1193–94.

32   *See id.* at 1195 (citing Timothy L. Butler, *Can a Computer Be an Author? Copyright Aspects of Artificial Intelligence*, 4 HASTINGS COMM. & ENT. L.J. 707, 707 (1982) (citing RACTER, *Soft Ions*, OMNI, Apr. 1981, at 96, 96–97)).

computer itself might claim to be an author under §§ 101–2.[33] Annemarie Bridy and Stephen Hewitt propose solutions based on the employer-employee and joint author concepts, respectively, of U.S. and Commonwealth law.[34]

James Grimmelman rightly asks whether denying authorship to software would or should be followed by exempting them from infringement and poses the further question of whether this encourages delegation of all manner of liability-risking tasks to automated processes, from invading privacy to manipulating securities or commodities markets.[35]

It is likely that the number of works generated by AI, driven by large datasets and machine learning, will grow rapidly in the coming years. As Bridy explains:

> Narrow AIs that generate art, literature, music, and audiovisual works are now in wide enough circulation that the time is upon us to consider their relationship to copyrights and the legal construction of authorship on which copyrights depend.
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> . . . .
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> In 2003, . . . Raymond Kurzweil was granted United States Patent No. 6,647,395 for a "computer-implemented method of generating a poet personality including reading poems, . . . generating analysis models, . . . and storing the analysis models in a personality data structure." . . . The program is "provided with an input file of poems written by a human author or authors. It analyzes these poems and creates a word-sequence model based on the poems it has just read. It then writes original stanzas of poetry using the model it has created." . . .
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> In the popular media, the most well-known example is probably that of Scott French, a programmer who published a novel in 1993 written by his Macintosh IIcx, Hal, in the

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[33]   *See id.* at 1197–1228.

[34]   Annemarie Bridy, *supra* note 9, at 26–28; Stephen Hewitt, *Protection of Works Created by the Use of Computers*, 133 NEW L.J. 235 (1983). *But see* James Grimmelmann, *There's No Such Thing as a Computer-Authored Work—And It's a Good Thing, Too*, 39 COLUM. J.L. & ARTS 403, 403 (2016) (reasons to doubt joint authorship capacity).

[35]   James Grimmelmann, *Copyright for Literate Robots*, 101 IOWA L. REV. 657, 674–78 (2016).

> style of romance novelist Jacqueline Susann. . . . Another popular example is Racter, a program by William Chamberlain and Thomas Etter, which purportedly wrote a collection of poetry and prose called *The Policeman's Beard is Half Constructed*, which was published in 1984. . . . According to Chamberlain, Racter was written in compiled BASIC on a Z80 Micro with 64 KB of RAM.[36]

Painting, music, and film witness similar developments to prose and poetry. Software can digitally paint pictures that its programmers could not and might not even predict.[37] Google's AI, Duet, produces piano notes to accompany those of the program's player.[38] Jukedeck makes music composition and recording easy by churning out potential songs and providing interfaces for users to change the tempo or other song components.[39] Spotify has hired the founder of a laboratory that uses machine learning to algorithmically generate digital music, which one commentator heralds (sardonically) as promising:

> [A]n online theater in which [each musical] group knocks out new tunes on the fly, [in] an endless set, a stretch of infinite pop . . . a whole new species of fandom, new addicts and priests, an online academy of interpreters, delirious rabbis of the ever-expanding . . . *oeuvre* . . . parsing rivers of numbers.[40]

In 1997, a piece composed by a computer in the style of Bach was judged by an audience at Stanford University to be less computer-sounding than one by a university-level music professor.[41]

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36   Bridy, *supra* note 9, at 2–3 n.5, 15, 16 n.121 (emphasis in original).

37   *See* Jane C. Ginsburg & Luke Ali Budiardjo, *Authors and Machines* 56–57, COLUMBIA PUBLIC LAW RESEARCH PAPER NO. 14-597 (2018), https://scholarship.law.columbia.edu/faculty_scholarship/2323/?utm_source=scholarship.law.columbia.edu%2Ffaculty_scholarship%2F2323&utm_medium=PDF&utm_campaign=PDFCoverPages.

38   *See id.* at 78.

39   *See id.* at 56 (citing Alex Marshall, *From Jingles to Pop Hits, A.I. Is Music to Some Ears*, N.Y. TIMES (Jan. 22, 2017), https://www.nytimes.com/2017/01/22/arts/music/jukedeck-artificial-intelligence-songwriting.html); *see also* Jacob Kastrenakes, *TikTok Owner May Have Bought Jukedeck, an AI Music Startup*, THE VERGE (July 23, 2019, 3:04 PM), https://www.theverge.com/2019/07/23/20707371/tiktok-jukedeck-ai-music-startup-acquisition.

40   Paul Grimstad, *In Stargoon's Car*, PARIS REV. BLOG (June 29, 2017) (emphasis in original), https://www.theparisreview.org/blog/2017/06/29/in-stargoons-car/; *see also* John Paul Titlow, *Why Did Spotify Hire This Expert in Music-Making AI?*, FAST COMPANY (July 13, 2017), https://www.fastcompany.com/40439000/why-did-spotify-hire-this-expert-in-music-making-ai; *Create | 2030: Artificial Intelligence for Creativity?*, UNESCO, https://en.unesco.org/creativity/events/create-2030-artificial-intelligence-creativity (last visited Jan. 18, 2020).

41   *See* George Johnson, *Undiscovered Bach? No, a Computer Wrote It*, N.Y. TIMES (Nov. 11, 1997), https://www.nytimes.com/1997/11/11/science/undiscovered-bach-no-a-computer-wrote-it.html;

Animated motion pictures are well-known use cases for AI creativity.[42] AI can prepare animated images that manifest the requisite degree of creativity to justify a copyright and the concrete and inventive conception to justify one or more patents.[43] AI can write computer code, including enhancements to its own code.[44] The result could be a digital works "crisis" as human authors get replaced.[45]

Some AI authorship would appear to have a significant derivative-work problem under 17 U.S.C. § 103.[46] While Samuelson and Bridy dispel this possibility by emphasizing how AI does not necessarily "incorporate" the prior works upon which its works are "based" in order to be a "substantially similar" adaptation or transformation, it is possible that enough paraphrasing or structural imitation will occur to create a § 103 issue.[47]

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see also Frida Garza, *The Quest to Teach AI to Write Pop Songs*, GIZMODO (Apr. 19, 2018, 9:50 AM), https://gizmodo.com/the-quest-to-teach-ai-to-write-pop-songs-1824157220.

42   Daniel J. Gervais, *The Machine as Author*, 105 IOWA L. REV. nn. 9–10 (forthcoming 2020).

43   *Id.*

44   *Id.* By the 2060s, AI will be able to code itself better than humans could, as well as perform all other intellectual activities as well or better, or so most attendees at and/or contributors to two 2015 AI conferences reported to researchers conducting a survey. *See* Katja Grace, John Salvatier, Allan Dafoe, Baobao Zhang, & Owain Evans, *When Will AI Exceed Human Performance? Evidence from AI Experts*, 62 J. ARTIF. INTEL. RES. 729 (2017). Presumably, surgery would be more difficult for many AI "doctors" than coding AI would be for AI "programmers," but there is also a prediction that AI surgeons will perform at a higher level than human ones by the 2060s. *See* Alexander L. Fogel & Joseph C. Kvedar, *Benefits and Risks of Machine Learning Decision Support Systems*, 318 J. AM. MED. ASS'N 2356 (2017).

45   Ginsburg & Budiardjo, *supra* note 37, at 57.

46   *See* Hedrick, *supra* note 2, at 331 (citing NAT'L COMM'N ON NEW TECHN. USES OF COPYRIGHTED WORKS, Final Report 45 (1979)).

47   *See* Bridy, *supra* note 9, at 15 (Kurzweil invention "'creates a word-sequence model based on the poems it has just read'" and "'will have a similar style to the poem(s) originally analyzed and contained in the author analysis model.'"); *id.* at 16 (French invention "analyzed several hundred plot and style elements" from Susann to help ensure that "her actual personality comes out" in program's new plots.); *id.* at 18 (while Kurzweil invention prevents reuse of sequences of three or more consecutive words, suggesting that more than three words from original might appear nonconsecutively); Ginsburg & Budiardjo, *supra* note 37, at 56–57 n.210 ("A team at JWT, a marketing agency, created a machine to create the 'Next Rembrandt'—a painting in the style of the artist. . . . 'To teach Rembrandt's style to the computer, the team *gathered enormous amounts of data about his paintings*—the geometries, the composition patterns, even the height of the brush strokes off the canvas—and fed it into the machine. This gathering process took months and involved getting as much visual information about the originals as possible, and then resizing them to match each other. Then they wrote deep learning algorithms and used facial recognition techniques to get the computer to recognize all the different patterns—everything that goes into a painting—and be able to *create a similar one on its own*. . . . The team had the computer generate a portrait of a male between 30 and 40 years old, looking to the right.'") (emphasis added) (quoting Tim Nudd, *Inside 'The Next Rembrandt': How JWT Got a Computer to Paint Like the Old Master*, AD WEEK (June 27, 2016), https://www.adweek.com/brand-marketing/inside-next-rembrandt-how-jwt-got-computer-paint-old-master-172257)); *id.* at 57 n.214 ("[W]hile many companies claim to provide AI-driven solutions, in reality they're leveraging machine learning techniques at best, . . . technologies [that] are more data-driven than ever but aren't yet advanced enough to think for themselves.") (quoting Nick Ismail, *True AI Doesn't Exist Yet. . . It's Augmented Intelligence*, INFO. AGE (Sept. 11, 2017), http://www.information-age.com/true-ai-doesnt-exist-augmented-intelligence-

The U.S. Copyright Office has taken the position that it is not authorized by existing law to issue copyrights to non-human authors.[48] Similarly, courts have declared that patents are reserved for human inventors,[49] although the U.S. Patent & Trademark Office opened an inquiry in 2019 into AI inventors and inventions.[50] Several authors in this symposium issue take on questions relating to AI creators and their works.

III. INTELLIGENT ENFORCEMENT AMIDST ARTIFICIAL DISTINCTIONS

The use of AI to enforce legal or social norms represents a growing market and a controversial public policy question. Governments and industry look to AI to detect and limit the spread of illegal digital content in particular, ranging from terrorist threats or organizing to copyright infringement, hate speech, or child pornography.[51] The Veteran's Administration seeks to roll out AI across more of its public functions, from scanning medical records for

123468452/) (internal quotation marks omitted). Of course, many authors like Rembrandt, whose copyrights had expired, would have no valid copyright to assert against AI-generated derivative works.

48   *See* COMPENDIUM OF THE US COPYRIGHT OFFICE PRACTICES §§ 306, 313.2 (3d ed. 2014); *see also* Inhale, Inc. v. Starbuzz Tobacco, Inc., 755 F.3d 1038, 1041 (9th Cir. 2014) ("When interpreting the Copyright Act, [the courts] defer to the Copyright Office's interpretations in the appropriate circumstances."); Naruto v. Slater, No. 15-cv-04324-WHO, 2016 WL 362231, at *4 (N.D. Cal. Jan. 28, 2016) (noting that "the Copyright Office agrees that works created by animals are not entitled to copyright protection"), *aff'd*, 888 F.3d 418 (9th Cir. 2018).

49   *See, e.g.*, Bd. of Trs. of Leland Stanford Junior Univ. v. Roche Sys., Inc., 563 U.S. 776, 785 (2011) ("'The presumptive owner of the property right in a patentable invention is the single human inventor.'") (quoting 8 DONALD CHISUM ET AL., CHISUM ON PATENTS § 22.01, 22–2 (2011)).

50   *See Request for Comments on Patenting Artificial Intelligence Inventions*, 84 Fed. Reg. 44,889 (Aug. 27, 2019); *Request for Comments on Intellectual Property Protection for Artificial Intelligence Innovation*, 84 Fed. Reg. 58,141 (Oct. 30, 2019); *see also* Nigel Cory & Daniel Castro, *RE: Request for Comments on Intellectual Property Protection for Artificial Intelligence Innovation (Federal Registry Notice 84 Fed. Reg. 58141)*, ITIF: INFORMATION TECHNOLOGY & INNOVATION FOUNDATION (2020), http://www2.itif.org/2020-ustpo-ip-ai.pdf (arguing, in response to request for comments, that AI inventions should be owned by the individual or company that controls the AI processes or software); Carl A. Kukkonen III, Emily J. Tait & Eli Temkin, *When Innovation Invents: Artificial Intelligence Issues at the U.S. Patent and Trademark Office*, JONES DAY (Aug. 2019), https://www.jonesday.com/en/insights/2019/09/when-innovation-invents (arguing that the PTO could make AI innovation more lucrative by securing its follow-on inventions to the AI's creator(s)); Daniel Shulman, *The U.S. Patent and Trademark Office Takes on Artificial Intelligence*, VEDDERPRICE (Jan. 2, 2020), https://www.vedderprice.com/the-u-s-patent-and-trademark-office-takes-on-artificial-intelligence?professionals (providing background to PTO process and describing the second request for comments).

51   *See* Giancarlo Frosio, *Artificial Intelligence and Intellectual Property: Mapping Legal Challenges for the European Digital Single Market*, EUR. COMMISSION PROVISION EXTERNAL EXPERTISE SERIES (2018); Giancarlo Frosio, *Why Keep a Dog and Bark Yourself? From Intermediary Liability to Responsibility*, 26 OXFORD J. INT'L L. & INF. TECH. 1 (2017); Daniel Terdiman, *Here's How Facebook Uses AI to Detect Many Kinds of Bad Content*, FAST COMPANY (May 2, 2018), https://www.fastcompany.com › heres-how-facebook-uses-ai-to-detect-many-kinds-of-bad-content.

suicide prevention and interventions to matching drug treatments to cancer diagnoses, or mapping test results and genomic patterns to medication options.[52]

Courts and legislators have known for some years that the volume and diversity of communications in the age of computers and the Internet would make it difficult to enforce laws designed for the age of typeface, newsprint, paintbrush, and canvas. The Communications Decency Act's section 230 or "digital platform immunity" recognizes that it would be impractical for an interactive computer service such as America Online or Google to exercise the kind of care and attention that print publishers devote to the accuracy and legality of the books and articles that they edit and/or publish.[53] A similar concern may underlie the "wire service" or "conduit" defense under the common law or First Amendment in libel and privacy invasion cases because the sheer number of statements broadcast by television network affiliates due to their carrying the network "feed" would be difficult for affiliates to review in the same way that the network or its producers do.[54] Congress enacted the Digital Millennium Copyright Act to provide safe harbors for broadband Internet "conduit" providers and purveyors of directories and storage space to Internet speakers, after case law questioned whether Internet service providers could be treated like other entities held secondarily liable in copyright, like employers or some landlords who assist or have control over the ultimate infringers.[55]

The contemporary AI boom arrived upon a scene of disorder in intellectual property enforcement. There are many false positives when it

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[52]   *See* Mitch Mirkin, *VA Aims to Expand Artificial-Intelligence Research, Appoints Inaugural AI Director* (July 10, 2019), https://www.research.va.gov/currents/0719-VA-aims-to-expand-artificial-intelligence-research.cfm.

[53]   *See* Zeran v. Am. Online, Inc., 129 F.3d 327, 333 (4th Cir. 1997) (While pre-publication review for libel or other sources of civil liability "might be feasible for the traditional print publisher, the sheer number of postings on interactive computer services would create an impossible burden in the Internet context.").

[54]   *See, e.g.*, Med. Lab. Consultants v. ABC (In re Med. Lab. Mgmt. Consultants), 931 F. Supp. 1487, 1492 (D. Ariz. 1996) (collecting cases); David Ardia, *Reputation in a Networked World: Revisiting the Social Foundations of Defamation Law*, 45 HARV. C.R.-C.L. L. REV. 261 (2010); Matthew D. Bunker & Clay Calvert, *"Defamation Live": The Confusing Legal Landscape of Republication in Live Broadcasting and a Call for a "Breaking News Doctrine,"* 39 COLUM. J.L. & ARTS 497 (2016); Madeline Byrd & Katherine J. Strandburg, *CDA 230 for a Smart Internet*, 88 FORDHAM L. REV. 405 (2019); Jeff Kosseff, *Defending Section 230: The Value of Intermediary Immunity*, 15 J. TECH. L. & POL'Y 123 (2010).

[55]   *See* CoStar Grp., Inc. v. LoopNet, Inc., 373 F.3d 544, 555 (4th Cir. 2004) (observing that section 512 of DMCA "was meant to incorporate all of *Netcom*'s protections" of providers from liability under secondary infringement doctrines, "whereas the final law reflected [an additional negotiated legislative] compromise between the earlier version [of the DMCA safe harbor draft] and the concerns of copyright-holders"); Religious Tech. Ctr. v. Netcom On-Line Commc'n Servs., Inc., 907 F. Supp. 1361, 1372–73 (N.D. Cal. 1995) (noting that it is more difficult for Internet service providers to "screen out" infringement than it might be for the owner of a relatively fixed amount of real property or employer of fixed number of workers).

comes to copyright, trademark, patent, and trade secret assertions. Henry Jenkins claimed that a "scorched earth" approach to copyright has been taken, resulting in the criminalization of ordinary fan or creator activities, at least in theory.[56] Meanwhile, trademark bullies have threatened fair and descriptive uses of parts of our languages, while they have increased litigation costs.[57] The number of patents has mushroomed alongside the number of copyrights, while both patent scope and trademark scope have expanded significantly.[58]

As machine learning makes automated enforcement of rights more sophisticated, lawyers, lawmakers, and judges will look to it as a preferred alternative to time-consuming manual review. Automated content detection Audible Magic has been a leader in this regard. In 2010–2012, Viacom and Audible Magic contended that YouTube failed to filter out types of infringing videos of which YouTube's founders were aware and that this failure plus the awareness of infringement should have deprived the video-sharing site of the defense for storage at the behest of users provided by the Digital Millennium Copyright Act.[59] Audible Magic cited a series of principles announced by Disney, Fox, Microsoft, MySpace, NBC Universal, and other corporations in 2007, which would require user-generated content services to automatically delete copyrighted material from being displayed or streamed

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56   HENRY JENKINS, CONVERGENCE CULTURE: WHERE OLD AND NEW MEDIA COLLIDE 134 (2006).

57   *See* Lisa P. Ramsey, *Reconciling Trademark Rights and Free Expression Locally and Globally*, *in* INTERNATIONAL INTELLECTUAL PROPERTY: A HANDBOOK OF CONTEMPORARY RESEARCH 341 (Daniel J. Gervais ed., 2015); William E. Ridgway, *Revitalizing the Doctrine of Trademark Misuse*, 21 BERKELEY TECH. L.J. 1547, 1574–87 (2006).

58   *Compare, e.g.*, Graver Tank & Mfg. Co. v. Linde Air Prods. Co., 339 U.S. 605, 613–14 (1950) (Black & Douglas, JJ., dissenting) (arguing that using the "doctrine of equivalents," a majority of the Supreme Court de facto abrogated the traditional doctrine that what "is not specifically claimed [by a patent] is dedicated to the public" as free for all to use), *with* White v. Dunbar, 119 U.S. 47, 52 (1886) ("The [patent] claim is a statutory requirement, prescribed for the very purpose of making the patentee define precisely what his invention is; and it is unjust to the public, as well as an evasion of the law, to construe it in a manner different from the plain import of its terms. This has been so often expressed in the opinions of this court that it is unnecessary to pursue the subject further."), *and* Mark A. Lemley & Mark P. McKenna, *Scope*, 57 WM. & MARY L. REV. 2197 (2016) (trademark scope has expanded), *and* Bos. Prof'l Hockey Ass'n, v. Dall. Cap & Emblem Mfg., Inc., 510 F.2d 1004, 1010 (5th Cir. 1975) (while traditional scope of trademarks was geared to preventing use of marks to sell products or services, not licensed merchandise that is standard or fungible other than use of distinctive marks, the law was changing).

59   *See* Viacom Int'l, Inc. v. YouTube, Inc., 718 F. Supp. 2d 514, 528 (S.D.N.Y. 2010), *aff'd in part*, *vacated in part*, *remanded*, 676 F.3d 19 (2d Cir. 2012); Andrew Baum & David Copland, *YouTube Wins Safe Harbor in Viacom Copyright Suit*, MONDAQ (June 29, 2010), https://www.mondaq.com/Article/104056 ("Although Viacom analogized YouTube to Grokster (which had distributed software to facilitate copyright infringement via file sharing after the early Napster site was closed down), the District Court noted that Viacom did not disagree with YouTube's position that YouTube's purpose is *not* 'solely to provide the site and facilities for copyright infringement.'").

without authorization on their services.[60] Similarly, in 2007 the High Court of First Instance of Paris concluded that storage of videos by MySpace, accompanied by increasing warnings of infringing uploads, gave rise to the duty on the part of MySpace to implement effective technical measures to prevent infringing uploads.[61] In Belgium, a court found that an Internet service provider should use filtering technology to prevent infringement of recorded music.[62] The Supreme Court declined to impose a strict requirement at the request of Audible Magic and other interested firms back in 2005 but did regard a failure to use filtering technology as relevant to the inducement of copyright infringement.[63] By 2015, Audible Magic pointed out to an inquiry into the operation of copyright's safe harbors that "user-generated-content sharing and cloud file-sharing networks [including Facebook, Dailymotion, SoundCloud, and Twitch] . . . dramatically reduce copyright-infringing media sharing using Audible Magic software and hosted services [to] . . . detect[] registered audio and video content in the user upload stream."[64]

Content ID from Google and YouTube is regarded as an industry-leading technological measure for automatically detecting and filtering out potential copyright violations. The system, however, was designed for some purposes other than reducing infringement, such as enabling YouTube to monetize with advertisements videos that incorporate music copyrighted by other songwriters, publishers, or record companies.[65]

At the 2015–2016 inquiry on the Digital Millennium Copyright Act's safe harbors for, *inter alia*, storage and information location tools provided at the direction of users, there was a debate concerning whether automated technical analysis of online infringement increased or decreased the

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60   Brief for Audible Magic Corp. as Amicus Curiae Supporting Neither Party, at 15–17, Viacom Int'l, Inc. v. YouTube, Inc., 676 F.3d 19 (2d. Cir. 2012) (No. 10-3270), 2011 WL 4541964; *see also The Role of Technology in Reducing Illegal Filesharing: A University Perspective: Hearing Before H. Comm. on Sci. and Tech*., 110th Cong. 21–26 (2007) (statement of Vance Ikezoye, President and CEO, Audible Magic Corporation).

61   *See* Nicolas Jondet, *The Silver Lining in Dailymotion's Copyright Cloud*, JURISCOM (Apr. 19, 2008.

62   *See* Jeremy Kirk, *Belgian ISP Appeals Content-Filtering Mandate*, INFOWORLD (July 23, 2007), www.infoworld.com/d/security-central/belgian-isp-appeals-content-filtering-mandate-338; Lionel Thoumyre, *Les intermédiaires du Web 2.0 sont-ils hébergeurs ou éditeurs [Are Web 2.0 Intermediaries Hosting or Publishers?]*, ZDNET (Dec. 18, 2007), https://www.zdnet.fr/actualites/les-intermediaires-du-web-20-sont-ils-hebergeurs-ou-editeurs-39376675.htm.

63   *See* Metro-Goldwyn-Mayer Studios Inc. v. Grokster, Ltd., 545 U.S. 913, 939–40 (2005); Brief for Audible Magic Corp., Digimarc Corp. & Gracenote as Amici Curiae Supporting Neither Party, Metro-Goldwyn-Mayer Studios Inc. v. Grokster, Ltd., 545 U.S. 913 (2005) (No. 04-480).

64   Audible Magic Corp., Comments Submitted in Response to U.S. Copyright Office's Dec. 31, 2015 Notice of Inquiry at 4 (Mar. 21, 2016).

65   *See* Google, Inc., Response to U.S. Dep't of Commerce Internet Policy Task Force Request for Comments (Nov. 13, 2013), http://www.ntia.doc.gov/files/ntia/google_comments.pdf.

likelihood of erroneous copyright infringement notices. Several commentators charged that human-generated infringement claims, particularly those from individuals or small enterprises, were more likely to reflect misjudgments.[66] On the other hand, book publishers, movie studios, and record labels have effectively admitted that fair use is a multi-factor judgment call that cannot, at present, be automated.[67] Still, publishers suggest that Audible Magic, Gracenote, and/or Sandvine could serve as the basis for "standard technical measures" developed in a multi-stakeholder process to make infringement notices and responses more "efficient."[68] Google has only been able to identify a small fraction of DMCA notices, many of which are automated as their volume soars into the millions, as being potentially erroneous.[69] While stopping short of endorsing the publishers' call, the Internet Policy Task Force associated with the U.S. Department of Commerce and U.S. Patent & Trademark Office suggested that as infringement detection and filtering services become more "granular," they may serve as the basis for a consensus mechanism for expeditious responses.[70]

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[66]   *Compare, e.g.*, *Section 512 Study: Request for Additional Comments*, 81 Fed. Reg. 78636, 78637 (2016) (observing that "some expressed the view that the quality of takedown notices often varies depending on the identity and size of the content creator, with notices from individuals and smaller entities often being less sophisticated and/or *[less] accurate than notices sent by large corporations employing automated processes*") (emphasis added); Tr. at 146:8-20 (May 2, 2016) (Brianna Schofield, Univ. of Cal., Berkeley Sch. of Law) (individuals and small businesses were more likely to erroneously file DMCA complaints for defamation, privacy issues, or potentially lawful criticism or commentary), *and* Tr. at 36:3-37:9 (May 12, 2016) (Jennifer Urban, Univ. of Cal., Berkeley Sch. of Law) (similar), *and* Kernochan Ctr. for Law, Media & the Arts, Columbia Law Sch., Comments Submitted in Response to U.S. Copyright Office's Dec. 31, 2015 Notice of Inquiry at 7 (Apr. 1, 2016) (distinguishing large corporations from "[i]ndependent creators" on this issue), *with* Jonathan Bailey, Comments Submitted in Response to U.S. Copyright Office's Dec. 31, 2015 Notice of Inquiry at 2 (Feb. 16, 2016), https://www.plagiarismtoday.com/2016/04/04/my-comments-to-the-copyright-office-on-dmca-safe-harbor/ (automated notices result in false positives concerning infringement and false negatives on fair use).

[67]   *See, e.g.*, Ass'n of Am. Publishers, Reply Comments Submitted in Response to Request for Comment on Green Paper, Copyright Policy, Creativity, and Innovation in the Digital Economy, No. 130927852–3852–01, USPTO (Jan. 2014); 78 Fed. Reg. 61,337 (citing Brief for Motion Picture Association of America, Inc. as Amicus Curiae Supporting Appellant, Lenz v. Universal Music Corp., 801 F.3d 1126 (9th Cir. 2015) (No. 13-16106); Brief for Recording Industry Association of America as Amicus Curiae Supporting Appellant, Lenz v. Universal Music Corp., 801 F.3d 1126 (9th Cir. 2015) (No. 13-16106)).

[68]   *See* Ass'n of Am. Publishers, *supra* note 67, at 12 (collecting filtering companies' idealistic claims of efficiency or effectiveness).

[69]   Brief for Google Inc. et al. as Amici Curiae Supporting Appellee, Lenz v. Universal Music Corp., 801 F.3d 1126 (9th Cir. 2015) (No. 13-16106).

[70]   U.S. Dep't of Com. Internet Policy Task Force, Copyright Policy, Creativity, and Innovation in the Digital Economy (July 2013).

IV. GLOBAL INTELLIGENCE CONFRONTS COMPLEX ENFORCEMENT

Over the last half-decade in Europe, publishers and other rightsholders have asked the European Commission and European Parliament to mandate that European Union members automate and privatize online infringement prevention using algorithms.[71] The resulting Directive on Copyright in the Digital Single Market, as modified and approved by the Commission and the Parliament in 2019, contains a controversial "upload filter" or "meme ban" provision, which would require that something like Audible Magic or Content ID is used by online content-sharing platforms of a certain size, e.g. the U.S. giants.[72] As an analysis stated regarding one version of the proposed directive:

> [The directive's Article 13 for online content-sharing platforms] is impossible to achieve without the provision of identification "hashes" (or other fingerprinting data) of copyrighted content, in line with Google's ContentID. The "appropriate and proportionate" wording has no meaning, as neither party (the rightsholder and the service provider) would be expected to agree to measures which they did not consider to be appropriate or proportionate. There is no clarity about for whom or to what the measures are meant to be appropriate or proportionate. It certainly seems highly unlikely that third parties that are not parties to the contract (the users) would be covered by this wording.

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[71] *See* European Commission of Aug, 28, 2015, The EU Copyright Legislation, https://ec.europa.eu/digital-single-market/en/eu-copyright-legislation; European Parliament, *Questions and Answers on Issues about the Digital Copyright Directive*, EUR. PARLIAMENT NEWS (Mar. 27, 2019), https://www.europarl.europa.eu/news/en/press-room/20190111IPR23225/questions-and-answers-on-issues-about-the-digital-copyright-directive; *see also* Giancarlo F. Frosio, *Reforming Intermediary Liability in the Platform Economy: A European Digital Single Market Strategy*, 112 NW. U. L. REV. 19 (2017).

[72] *See* Directive 2019/790, 2019 O.J. (L 130/92); Directive 52016PC0593 (Mar. 26, 2019), http://www.europarl.europa.eu/doceo/document/A-8-2018-0245-AM-271-271_EN.pdf; European Commission, *Proposal for a Directive of the European Parliament and of the Council on Copyright in the Digital Single Market* (Sept. 14, 2016); Frosio, *supra* note 71, at 19–21; *see also Copyright Law Could Put an End to Net Memes*, BBC NEWS (June 8, 2018), https://www.bbc.com/news/technology-44412025; *Open Letter: The EU Copyright Directive Is Failing*, CREATE BLOG (Apr. 26, 2018), https://www.create.ac.uk/blog/2018/04/26/eu_copyright_directive_is_failing/; Wikimedia France Board of Directors, *Réforme européenne du droit d'auteur: menaces sur les projets* [*European Copyright Reform: Threats to Wikimedia Projects*], WIKIMEDIA (June 11, 2018), https://www.wikimedia.fr/2018/06/11/reforme-europeenne-droit-dauteur/.

[The obligation to ensure the non-availability of copyright or related-right infringing works or other subject matter using proportionate measures] is imposed on virtually all internet services. Providers that do not have a licensing agreement cannot meet this obligation without implementing upload filters, while those who do have licenses must implement filters to monitor usage of the licensed content. The reference to "appropriate and proportionate" has no particular meaning in relation to how private companies manage their services.

[There is a related transparency obligation to inform rightsholders as to how the proportionate measures to ensure non-availability are working.]

As filtering technology is imperfect and continues to evolve, this text places an obligation on service providers to provide data on how the particular text, image, audio, audiovisual and other filters that have been implemented are working, and, by extension, statistics on works shared by their users. It is foreseeable that this will in practice allow rightsholders to continually coerce service providers to invest in more and more invasive filters.[73]

Text-and-data mining is an area of particular uncertainty, despite promising aspirations to make our accumulated data speak more concretely to our pressing social problems. Machine learning requires large data sets to achieve its full potential; early efforts at AI and computer vision struggled due to small data sets.[74] A report on copyright reform for the British government emphasized that text-and-data mining should be allowed because, while it involves reproducing and displaying some or all of the texts or images that are mined, it is an alternative to normal consumption.[75] As a

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[73] European Digital Rights (EDRi), *Re-Deconstructing Article 13 Proposal as Amended by the JURI Committee: Revision 3*, 3–4 (June 26, 2018), https://edri.org/files/copyright/20180626-ReDeconstructing_Article13.pdf.

[74] *See* ANDREW MCAFEE & ERIK BRYNJOLFSSON, MACHINE, PLATFORM, CROWD: HARNESSING OUR DIGITAL FUTURE 75 (W.W. Norton & Co. 2017); Matthew Sag, *The New Legal Landscape for Text Mining and Machine Learning*, 66 J. COPYRIGHT SOC'Y U.S. 1 (2019); Gabriel Li, *Alibaba's Chairman Daniel Zhang: "Data Is the Petroleum, Computing Power Is the Engine,"* PAN DAILY (Sept. 29, 2019), https://pandaily.com/alibabas-new-ceo-daniel-zhang-data-is-the-petroleum-computing-power-is-the-engine/ (suggesting that data is the gasoline and computing power is the engine of the AI car).

[75] IAN HARGREAVES, DIGITAL OPPORTUNITY: A REVIEW OF INTELLECTUAL PROPERTY AND GROWTH 47 (2011).

European inquiry notes, high levels of research and development activity in the United States and parts of East Asia are aided by interpretations of text-and-data mining as fair use. The GoogLeNet, which is solving all manner of incredibly complex problems and promising solutions to some medical and other problems, was trained in part on Google Images, which was declared to be a fair use for the most part in 2003 and 2007.[76] In addition, section 108 of the Copyright Act makes text-and-data mining "permissionless" in many fair-use cases; even broader research and library exceptions to copyright in other countries may do the same thing.[77] The U.S. Copyright Office has suggested, however, that text-and-data mining makes such a commercially significant or exploitative use of copyrighted work that it would probably need to be licensed, probably on a mass or "extended collective" level to achieve scale.[78] The DSM Directive contains a text-and-data mining exception at the behest of digital and scholarly research interests seeking a more flexible environment.[79] Although much future AI research will require a text-and-data mining exception to avoid copyright restrictions, a draft version of the Directive falls short of reassuring researchers and developers in several respects: (1) it is optional; (2) it permits only a temporary reproduction, etc.; and (3) it is reserved to non-commercial research groups,

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[76] *See* Dave Gershgorn, *These Are What the Google Artificial Intelligence's Dreams Look Like*, POPULAR SCI. (June 19, 2015), https://www.popsci.com/these-are-what-google-artificial-intelligences-dreams-look/ (GoogLeNet trained as artificial neural network on Google Images as big data); Rhenn Anthony Taguaim, *GoogLeNet: Google Turns to Artificial Intelligence to Diagnose Cancer*, NATURE WORLD NEWS (Mar. 22, 2017), https://www.natureworldnews.com/articles/36587/20170322/googlenet-google-turns-artificial-intelligence-diagnose-cancer.htm (GoogLeNet is more than 20 percent more accurate in diagnosing cancers than pathologists.); *see also* Kelly v. Arriba Soft, Corp., 336 F.3d 811 (9th Cir. 2003); Perfect 10, Inc. v. Amazon.com, Inc.*, 487 F.3d 701 (9th Cir. 2007).

[77] 17 U.S.C. § 108(a)–(e) (2019); *see also* David Murray & Bethany Sewell, *The Effects of Targeted Instruction and Other Interventions on the Interlibrary Loan Use Patterns of Historians and Their Students*, 28 J. OF INTERLIBRARY LOAN, DOCUMENT DELIVERY & ELECTRONIC RES. 47, 47–48 (2019), https://dr.tcnj.edu/bitstream/handle/2900/3423/murray-the-effects-of-targeted-instruction-on.pdf ("As interest mounts to blend old with new, physical with digital resources, and traditional close reading with data and text mining, historians' reliance on interlibrary loan (ILL) might well increase. That is, historians' need for ready access to information in both printed and online formats could usher in an era of greater reliance on efficient systems of peer-to-peer library resource sharing . . . .").

[78] U.S. COPYRIGHT OFFICE, ORPHAN WORKS AND MASS DIGITIZATION 85–86 n.355 (2015).

[79] *See* Christophe Geiger, Giancarlo Frosio & Oleksandr Bulayenko, *Crafting a Text and Data Mining Exception for Machine Learning and Big Data in the Digital Single Market*, *in* INTELLECTUAL PROPERTY AND DIGITAL TRADE IN THE AGE OF ARTIFICIAL INTELLIGENCE AND BIG DATA 97–111 (Xavier Seuba, Christophe Geiger & Julien Pénin eds., 2018).

museums, and the like.[80] The European Parliament seems to have corrected each of these three problems.[81]

Platform liability for social-media content may be global. Algorithmic enforcement of copyrights or trademarks could replace a default rule that creative works are available until a court rules that they infringe valid rights and that the standards for injunctive relief are met. The rule of AI would ensure inaccessibility of creative works assuming a given quantum of similarity at the level of raw data with a work protected by a right and uploaded into some database or perhaps assuming some more sophisticated formulaic assessment of infringement of such a work, if rightsholders could agree on the formula. In content censorship, there may be an obligation not to make works available if they match a work in a database subject to previous complaints or otherwise protected.[82]

Many lawyers and academics find the rise of AI enforcement tools troubling. Human values may be lost as machines act against what can be measured, rather than taking into account more nuanced rules or standards developed over decades of jurists' work. Doctors are experiencing some of the worst levels of burnout in U.S. history as the demands of computerized insurance and quality-control databases occupy their time and attention at the expense of the more uplifting and human-centered parts of their careers.[83] Some doctors feel like they are wasting many hours that could be spent on patient care on digital tasks: logging in, browsing, uploading files, reporting, tabulating, and checking boxes.[84] In some of the worst-case scenarios for AI and "lawtech," lawyers might be reduced to tending to the machinery of imperfect justice—indifferent, generalizing, and cold.

A more altruistic reason for the legal profession to resist routine automation is that AI regulation could create democratic deficits in governance. Writing in the 1990s, Neil Postman called the surrender of

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[80] *See* Bernt Hugenholtz, *The New Copyright Directive: Text and Data Mining (Articles 3 and 4)*, WOLTERS KLUWER: KLUWER COPYRIGHT BLOG (July 24, 2019), http://copyrightblog.kluweriplaw.com/2019/07/24/the-new-copyright-directive-text-and-data-mining-articles-3-and-4/.

[81] *See id.*

[82] *See* Court of Justice of the European Union, Press Release, 03/10/2019: Judgment in Case C-18/18 Eva Glawischnig-Piesczek v. Facebook Ireland Ltd., https://curia.europa.eu/jcms/p1_2434826/en/; Kevin Benish, *Whose Law Governs Your Data? Takedown Orders and "Territoriality" in Comparative Perspective*, 55 WILLIAMETTE L. REV. 599 (2019); Céline Castets-Renard, *Algorithmic Content Moderation on Social Media in EU Law: Illusion of Perfect Enforcement*, 2020 U. ILL. J. L. TECH. & POL'Y (forthcoming 2020); Johanna K. P. Dennis, *Temperamental or Transient as a Tesseract? Analyzing Process Patent Eligibility Post-Alice*, 14 FIU L. REV 233 (2020).

[83] *See* THE PHYSICIANS FOUND., 2018 SURVEY OF AMERICA'S PHYSICIANS: PRACTICE PATTERNS & PERSPECTIVES 7–20, 28–35, 38–53 (2018).

[84] *See, e.g.*, Linda Girgis, *Why Doctors Hate Their EHRs*, PHYSICIANS PRAC. (July 20, 2017), https://www.physicianspractice.com/blog/why-doctors-hate-their-ehrs.

culture to technology—the loss of sovereignty over public institutions due to technological innovation—a situation of "Technopoly." By technology, he meant not only devices but also techniques, including social innovations like bureaucratic management techniques, opinion polling, statistics, and formalized thinking.[85] Ironically, given today's focus on the Constitution versus "code," or legal accountability versus technological "black boxes," legal statutes and precedents could also be included within the techniques that Postman argued constrain and limit thinking about social problems.[86] Technologies remove people from public fora and secret them in their homes with computer and television screens, where they entertain themselves, shop, and even vote from home.[87] The Agora became the Simulacra, it might be said.[88] Political debates were replaced with short, televised soundbites and town halls.[89] For similar reasons, the legal profession may find itself organizing efforts to resist the computerization of its role in resolving disputes using socially-acceptable explanations and face-to-face interactions.

Among other concerns raised during the symposium, the role of big data in AI could mean that one or two companies become dominant in the field, which could translate into dominance of regulation of expressive works and brands, especially internationally because jurisdictional and choice-of-law gaps disempower some domestic courts. On the other hand, the independent creation defense could free subsequent authors or inventors from some forms of liability or enhanced damages, and big data/the cloud already vastly expands access to public-domain sources of creativity from which to draw without infringing valid rights. On the other hand, dominant companies could leverage this independent creation defense to avoid buying the output of humans, potentially drying up licensing markets for books, articles, music, or software and impoverishing creators.

V.   THE ORGANIZATION AND OUTCOMES OF THE INTELLIGENT ENTERTAINMENT SYMPOSIUM

This Symposium convened on November 8, 2019, in the Grand Courtroom of the Rafael-Diaz Balart building on the FIU campus in Miami,

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[85]   *Booknotes: Neil Postman* (C-SPAN television broadcast July 10, 1992).

[86]   *Id.*

[87]   *See id.*

[88]   *See generally* JEAN BAUDRILLARD, SIMULACRA AND SIMULATION (Sheila Faria Glaser trans., Univ. of Mich. Press ed. 1994) (1981); Nicholas Diakopoulos, *Reporting in a Machine Reality: Deepfakes, Misinformation, and What Journalists Can Do About Them*, COLUM. JOURNALISM REV. (May 15, 2018), https://www.cjr.org/tow_center/reporting-machine-reality-deepfakes-diakopoulos-journalism.php.

[89]   *See generally* JEFFREY SCHEUER, THE SOUND BITE SOCIETY: HOW TELEVISION HELPS THE RIGHT AND HURTS THE LEFT 98–107 (2013).

Florida. After introductory remarks, the first panel began the symposium with an analysis of AI as legal actors, human inventions, and creative beings. The panelists—Professor Jorge Roig, Touro Law School; Professor Yvette Joy Liebesman, St. Louis University School of Law; and Professor Johanna Dennis, Golden Gate University School of Law—discussed the lack of standing of computer programs to sue or be sued or to own money or property and the abstract-idea doctrine in patent law that places many algorithms in the public domain.[90] Our keynote address—by Professor Matthew Eric Bassett, Barcelona Graduate School of Economics—focused on the centrality of big data to AI and touched on implications for intellectual property law and competition policy. The second panel—composed of Professor Peter K. Yu, Texas A&M University School of Law; Professor Saurabh Vishnubhakat, Texas A&M University School of Law; and Professor Clark Asay, Brigham Young University Law School—reflected on how AI could limit intellectual property, both at the registration stage, where algorithms could detect properties that are unregistrable for various reasons, including similarities to existing works, trademarks, or patent claims or disclosures, and at the enforcement stage, where AI could promote fair use or other IP exclusions by encoding predictions of judicial decisions into code.[91] Patent examiners are using machine learning to comb through massive troves of data for actionable prior art or other factual findings, and trademark examiners, social media platforms, and AI authors might do the same.[92] Finally, our third panel contained a wide-ranging discussion of AI in the international context, as Professor Matthew Sag, Loyola University School of Law; Professor Martin Senftleben, VU University Amsterdam; and Dr. Christian Mammen, partner at Womble Bond Dickinson, examined text-and-data mining, AI works in the United States and Europe, and algorithmic enforcement of IP in global markets for content and inventions.[93] To close with a reflection from the keynote address, delivered soon after the European Commission announced that it would be proposing new rules on the subject, the

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[90] *See* Johanna K. P. Dennis, *Temperamental or Transient as a Tesseract? Analyzing Process Patent Eligibility Post-Alice*, 14 FIU L. REV. 233 (2020); Yvette Joy Liebesman & Julie Cromer Young, *Litigating Against the Artificially Intelligent Infringer*, 14 FIU L. REV. 259 (2020).

[91] *See* Clark D. Asay, *Independent Creation in a World of AI*, 14 FIU L. REV. 201 (2020); Saurabh Vishnubhakat, Professor of Law, Tex. A&M Univ. Sch. of Law, Address at the FIU Law Review Symposium: Intelligent Entertainment: Algorithmic Generation and Regulation of Creative Works (Nov. 8, 2019) (transcript available with the FIU Law Review); Peter K. Yu, *Can Algorithms Promote Fair Use?*, 14 FIU L. REV. 329 (2020).

[92] *See* Vishnubhakat, *supra* note 91; Yu, *supra* note 91.

[93] *See* Matthew Sag, *Copyright Law's Impact on Machine Intelligence in the United States and the European Union*, 14 FIU L. Rev. 293; Christian E. Mammen & Carrie Richey, *AI and IP: Are Creativity and Inventorship Inherently Human Actions?*, 14 FIU L. REV. 275 (2020); Martin Senftleben, *Institutionalized Algorithmic Enforcement: The Pros and Cons of the EU Approach to UCG Platform Liability*, 14 FIU L. REV. 299 (2020).

deployment of AI in the media industry may affect diverse human and ethical interests in data, property, and business investments.[94]

To conclude, the articles and keynote address that make up this Symposium analyze a broad range of cutting-edge legal issues involving AI and the creative industries. Led by its very engaged and diligent student editors, the *FIU Law Review* has produced a first-rate collection of scholarship on an important topic that will shape the future of entertainment, labor, and society.

The participants I spoke to uniformly shared their praise for the organization of the Symposium and for the *FIU Law Review*'s student editors and assistant editors for their efforts in hosting it. Although the entire law review contributed to the Symposium, I would particularly like to thank Annabelle González, Symposium Editor, and Sarah Morgado, Editor-in-Chief. Finally, I thank Dean Antony Page, *FIU Law Review* advisor Professor Eric Carpenter, panel moderator Professor Janewa Osei-Tutu, and office assistant Connie Giffuni for their support of the Symposium.

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[94] *See* Matthew Eric Bassett, *Future of Copyright & Competition Law in Media*, 14 FIU L. REV. 223 (2020).