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The Human Lawyer in the Age of Artificial Intelligence: Doomed for Extinction or in Need of a Survival Manual

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THE HUMAN LAWYER IN THE AGE OF ARTIFICIAL INTELLIGENCE: DOOMED FOR EXTINCTION OR IN NEED OF A SURVIVAL MANUAL?

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I. INTRODUCTION

Technology has profoundly tested our professional, personal, and spiritual worlds in recent years. Powered by Moore's law, a 'non-statutory' rule of technological reality,[1] these challenges have been exponential. Yet, having already witnessed dramatic shifts, we are now on a new precipice. We are entering the realm where machines are not merely tools, but entities that can create new tools themselves. Machines not only facilitate tasks, but bear responsibility for entire chains of activities. Non-human units 'learn' in defiance of 'Polanyi's Paradox'[2] through algorithms enabling them to design their own hardware and software.[3] Computer-programmed chatbots[4] are evolving at a rapid rate posing a new challenge for the Turing Test,[5] which determines a machine's ability to demonstrate intelligent behavior equivalent to, or indistinguishable from, that of a human.[6] This new role

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[1] *See generally* Gordon E. Moore, *Progress In Digital Integrated Electronics*, INTEL (1975), http://www.eng.auburn.edu/~agrawvd/COURSE/E7770_Spr07/READ/Gordon_Moore_1975_Speech.pdf.

[2] *See generally* Michael D. Gordin, *The Polanyi Puzzle*, SCIENCEHISTORYINSTITUTE (2012), https://www.sciencehistory.org/distillations/magazine/the-polanyi-puzzle (providing a basic overview of British-Hungarian mathematician Michael Polanyi; this rule of cognitive human abilities is in essence expressed by the phrase "Humans know more than they can tell"; the example often given in this regard is that it is nearly impossible to write instructions that would teach another person to learn how to ride a bike. This had historically limited human ability to accord intelligence to machines. However, machine learning is now surmounting this barrier as machines are beginning to learn from examples and to use structured feedback to solve problems through AI evolution).

[3] Max Tegmark, Life 3.0: Being Human in the Age of Artificial Intelligence 72 (Alfred A. Knopf, N.Y. 2017) (describing the technological stage is referred to as Life 3.0 in contrast to Life 1.0 (biological stage) that evolves its hardware and software and Life 2.0 (cultural stage) that evolves its hardware (i.e., it cannot design it) and designs much of its software (i.e., humans can learn complex new skills). Many AI commentators think that AI may lead to the creation of Life 3.0 in the coming century, even during our lifetime).

[4] *See generally*, WOEBOT, https://woebot.io/ (last visited Dec. 9, 2018) (illustrating that Woebot is an artificially intelligent chatbot designed to help people cope with feelings of depression and anxiety)

[5] *See generally, See Computer AI Passes Turing Test 'worlds first'*, BBC (Jun. 9, 2018), https://www.bbc.com/news/technology-27762088 (the Turing Test, proposed by the English mathematician Alan Turing in 1950, involves asking a remote human interrogator, within a fixed timeframe, to distinguish between a computer and a human subject based on their replies to various questions posed by the interrogator. A computer's success at "thinking" can then be measured by its probability of being misidentified as the human subject).

[6] *Id.*

of machines is occurring through a paradigm popularly referred to as "Artificial Intelligence" ("AI").[7]

The field of law is not impervious to this development. Though presently difficult to predict exactly how far AI algorithms will translate into legal capabilities, the law's technological reality will dramatically change over the foreseeable time horizon. While such projection is time-bound to today's AI information, presently there are sufficient data points to serve as indicators. Among others, this is evident in multiple assessments that predict, with varying degrees, which tasks of lawyers and paralegals can, or are likely will be, automated by AI.[8] Projected spending on AI in the next decade and beyond reflects opportunities for productive gains and cost savings.[9]

Therefore, it is imperative for all of us – lawyers, law professors, educational experts, and law students – to examine closely the impact of AI trends on the education and the legal profession. If we anticipate that AI will be able to perform certain activities better than humans, it is incumbent on us to focus on those skills that make us uniquely human.[10] If we do not, we risk an enormous disservice to future generations of lawyers and to society's need for capable human legal experts.

A. Main Objectives of the Article

AI trends are particularly relevant to legal education and training, most notably law schools and other providers of legal training.[11] This article contends that law schools should not only readjust existing curricula, but devise wholly new curricula to equip lawyers with the skills to compete in an AI future. Or in other words, curricula that can resist displacement by AI technology. To use a metaphor, much like the Dutch-educated flood experts in anticipation of the climate change impact on the country's water levels, law schools should prepare lawyers that can and will survive the opening of the 'AI floodgates.'[12]

In preparation for an AI future, this article pursues two main objectives. First, it endeavors to outline the skills and tasks where AI will gain a competitive advantage over human lawyers. Such tasks will likely include assessment of litigation and regulatory risk,

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[7] John McCarthy, *What Is Artificial Intelligence?*, STAN. (Nov. 12, 2007), http://www-formal.stanford.edu/jmc/whatisai/.

[8] Erin Winick, *Lawyer-Bots Are Shaking Up Jobs*, MIT TECH. REV. (Dec. 12, 2017), https://www.technologyreview.com/s/609556/lawyer-bots-are-shaking-up-jobs/ (reporting 22% of lawyers' job and 35% of paralegal jobs can be automated).

[9] *See generally Artificial Intelligence Looms Larger in the Corporate World*, WSJ (Jan. 11, 2017), https://blogs.wsj.com/cio/2017/01/11/artificial-intelligence-looms-larger-in-the-corporate-world/ (stating that spending on AI by companies is estimated to grow by 600% between 2016 and 2020).

[10] *See, e.g.*, Kai- Fu Li, *Ai Superpowers: China, Silicon Valley, and the New World*, (Mifflin Harcourt et. al. eds., 2018); Carmine Gallo, *A Global AI Expert Identifies The Skills You Need To Thrive In The Next 15 Years*, FORBES (Oct. 4, 2018 4:00 AM), https://www.forbes.com/sites/carminegallo/2018/10/04/a-global-ai-expert-identifies-the-skills-you-need-to-thrive-in-the-next-15-years/#523a27f747ab.

[11] *New Legaltech and Project Management Graduate Scheme Launched by Allen & Overy in London*, ALLEN & OVERY, http://www.allenovery.com/news/en-gb/articles/Pages/New-legaltech-and-project-management-graduate-scheme-launched-by-Allen--Overy-in-London.aspx (last visited Dec. 9, 2018) (illustrating author's point that law firms are increasingly investing in training their junior lawyers for the future – e.g., the law firm of Allen & Overy has launched a new tech training program).

[12] Maarten Post, *Dutch climate experts join forces*, UTRECHT UNIV. PRESS (Aug. 31, 2017), https://www.uu.nl/en/news/dutch-climate-experts-join-forces.

contract review, and other due diligence tasks including legal research and contract drafting. It can be argued that legal language of contracts may be more susceptible to AI processing than natural language. Natural language has more variety and is littered with linguistic idiosyncrasies that are less prone to the order-seeking and pattern-finding methodology of AI. In contrast, legal language is highly standardized and subject to somewhat uniform rules of drafting. Moreover, not only is there certain uniformity in text within a contract, but certain types of contracts or other legal documents generally follow a similar structure or format – e.g., non-disclosure agreements, loan agreements, lease agreements, and so on. Thus, this is a prime area for expansive AI intrusion.

This paper then proceeds to highlight a specific set of skills where human lawyers will likely continue to hold an edge over AI and recommends that law schools reflect these skill sets in their future curricula. In anticipation of the AI age, future legal training should place an educational premium on (i) methodology over specific, ever-changing substantive matters, (ii) multi-dimensionality and cross-disciplinary over linear legal analysis, (iii) originality and creativity over repetition and processing, (iv) ethical judgement and adaptability requiring complex normative assessment over technical legal provisions, (v) social context understanding and strategic thinking over detailed grasp of each individual transaction, (vii) client management and interpersonal skills over mechanical and isolated due diligence tasks, and (viii) robust mastery of legal technological innovations, such as AI. In particular, the training of future lawyers should concentrate on the ethical considerations of using AI outputs and the need to override AI for ethical reasons.[13] For example, using AI to predict litigation or regulatory risk may lead to manipulation or abuse of the justice system. It is essential to tackle the ethical implications of AI by educating law students and by training junior lawyers adequately before AI's approaching prevalence.

B. Preliminary Caveats

Before embarking on the analysis, the reader should be aware of a couple of preliminary points. First, a clarification on terminology: in describing the current and future capabilities of AI in the legal domain, this article uses the same or similar terms when depicting human activities. However, such vocabulary has a different connotation in the AI and human contexts. For example, when this paper states that AI is capable of drafting, reviewing, analyzing, or understanding a document or a legal issue, such terminology is not intended to imply a perfect equivalency of these terms as applied to humans. When a human analyzes and drafts, he or she does so in a way that is fundamentally different than AI. This reflects the inherent distinction in the way activities are performed by AI as juxtaposed with humans. We are, however, limited by existing vocabulary as we have not yet developed an AI-specific vocabulary for AI tasks that parallel those of humans, but are done intrinsically differently. Therefore, in this respect, the reader is advised to apply the existing human terminology to AI mutatis mutandis.[14]

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[13] *See* David Lat, *The Ethical Implications of Artificial Intelligence*, ABOVE THE LAW, https://abovethelaw.com/law2020/the-ethical-implications-of-artificial-intelligence (last visited Dec. 9, 2018).

[14] *Mutatis Mustandis*, MERRIAM-WEBSTER DICTIONARY (defining "[m]utatis mustandis as: (1) with the necessary changes having been made; or (2) with the respective differences having been considered.").

Another preliminary point is that this paper looks at the future trajectory of AI that can be discerned based on currently available knowledge. Present estimates may vary with the actual pace of AI development. This is unlike the development of computer hardware termed Moore's Law, which allows for a more robust predictive trajectory – i.e., that complexity of integrated circuits is generally forecast to double every two years.[15] There is no perfect equivalent in the field of AI (except to the extent it is affected by computer hardware), though there are terms that generally describe the hypothetical reach of AI into the future, namely "intelligence explosion"[16] and "singularity."[17]

In exploring the subject matters laid out above, this article first examines the nature of AI as a general concept. Then, it proceeds to study in detail AI's key current and future applications in the field of law, outlining some of the tasks and activities that will likely be handled better by AI, while delineating the key future skills of the human lawyer. The article then underscores the legal capabilities that lawyers should seek to cultivate in the AI era as well as the key competencies which law schools, law firms, and other entities that train lawyers should focus on in developing legal professionals.

II. GENERAL OVERVIEW OF ARTIFICIAL INTELLIGENCE

A. Definition

Before delving into the effects of AI on the field of law, it is helpful to understand AI as a general concept and its key underlying principles. AI is a field of research formally established in the 1950s.[18] AI refers to the "capability of a machine to imitate intelligent human behavior."[19] This capacity denotes machines that are learning through algorithms[20] designed by humans to perform tasks traditionally done by human-minds, such as perceiving, reasoning, problem-solving, pattern-finding, and even decision-making.[21] AI is driven by algorithm-based programming rather than an outcome-based one.[22] That is, AI represents

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[15] Moore, *supra* note 1.

[16] *See Intelligence Explosion*, MIRI FAQ, https://intelligence.org/ie-faq/ (last visited Dec. 9, 2018) (quoting Irving Good, "[l]et an ultraintelligent machine be defined as a machine that can far surpass all the intellectual activities of any man however clever. Since the design of machines is one of these intellectual activities, an ultraintelligent machine could design even better machines; there would then unquestionably be an 'intelligence explosion,' and the intelligence of man would be left far behind. Thus the first ultraintelligent machine is the last invention that man need ever make, provided that the machine is docile enough to tell us how to keep it under contro.l").

[17] Vernor Vinge, *Technological Singularity*, TECH SING, http://cmm.cenart.gob.mx/delanda/textos/tech_sing.pdf (last visited Dec. 9, 2018).

[18] *See e.g.*, Ipke Wachsmuth, *The Concept of Intelligence in AI*, SPRINGER LINK https://link.springer.com/chapter/10.1007/978-94-010-0870-9_5 (last visited Dec. 9, 2018).

[19] *Artificial Intelligence*, MERRIAM-WEBSTER DICTIONARY ("[T]he capability of a machine to imitate intelligent human behavior.").

[20] Amir Husain, *The Sentient Machine: The Coming Age of AI* SCRIBNER (2017) ("The instructions processed by a computer are the programs, inside these programs there are codified ideas that solve problems – e.g., sorting numbers, searching text or transforming images. These ideas are algorithms.").

[21] Konstantin Grebelsky et al., *Artificial Intelligence: Should we, and if we should, how?*, http://vis-www.cs.umass.edu/~dima/mytexts/aipaper.html (last visited Dec. 9, 2018).

[22] Jahanzaib Shabbir & Tarique Anwer, *Artificial Intelligence and Its Role in the Near Future*, 14 J. OF LATEX CLASS FILES 1, 9 (2015) (stating "AI bases its operation on accessing huge amounts of information, processing it, analyzing it and, according to its operation algorithms, executing tasks to solve certain problems.").

"the machine's ability to keep improving its performance without humans explaining exactly how to accomplish all the tasks it is given. This is a wholly different approach to developing software where a machine learns from examples, rather than being explicitly programmed for a particular outcome."[23]

B. Conceptual Aspects and Terminology

Several key aspects of AI are briefly summarized below, along with a short outline of some recent terminology. From a historical perspective, AI is a general-purpose technology in that it will have implications for a whole host of industries.[24] Examples of previous technologies are the steam engine, electricity, and most recently, the internet.[25] The key factors behind the current pace of AI evolution, generally are (i) the increasing availability of digital data, (ii) the design of better algorithms enabling machines to learn from fewer examples, and (iii) much improved computer hardware that accelerates learning and diffusion by machines.[26]

The terms 'machine learning' and 'deep learning' are often used in association with AI analyses.[27] Machine-learning algorithms "detect patterns and learn how to make predictions and recommendations by processing data and experiences, rather than by receiving explicit programming instruction."[28] The concept of 'deep learning' denotes the basic idea that "software can simulate the neocortex's large array of neurons in an artificial "neural network."[29] In other words, a type of machine learning based on neural network algorithms that use markedly larger data sets.[30]

Machine learning is generally divided into two comprehensive categories: supervised learning and unsupervised learning.[31] Supervised learning is, in essence, the

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[23] Erik Brynjolfsson & Andrew Mcafee, *The Business of Artificial Intelligence*, HARV. BUS. REV. (2017), https://hbr.org/cover-story/2017/07/the-business-of-artificial-intelligence.

[24] *Id.*

[25] Timothy F. Bresnahan & Manuel Trajtenberg, *General Purpose Technologies "Engines of Growth*, 65 J. OF ECONOMETRICS, ANNALS OF ECONOMETRICS 83-108 (1995).

[26] *See* Erik Brynjolfsson & Andrew Mcafee, *What is Driving the Machine Learning Explosion*, HARV. BUS. REV. (July 18, 2017), https://hbr.org/2017/07/whats-driving-the-machine-learning-explosion.

[27] Husain, *supra* note 20 (illustrating that machine learning and cognitive computing are frequently popularly used synonymously with AI; however, it is important to differentiate between these terms "[a]rtificial Intelligence is the overarching science that is concerned with intelligent algorithm, whether or not they learn from data. Machine learning is a subfield of AI devoted to algorithms that learn from data.").

[28] *An Executives Guide to AI*, MCKINSEY & COMPANY, https://www.mckinsey.com/business-functions/mckinsey-analytics/our-insights/an-executives-guide-to-ai (last visited Dec. 9, 2018) (according to this analysis, machine learning runs along the following key modes: a. descriptive – process data to describe facts and circumstances that have taken place; b. predictive – based on previous facts and trends that have transpired, predict what is likely to happen in the future; and c. prescriptive – provide recommendations on what to do to pursue an objective).

[29] Robert D. Hof, *Deep Learning With Massive Amounts of Computational Power, Machines Can Now Recognize Objects and Translate Speech in Real Time*, MIT TECH. REV., https://www.technologyreview.com/s/513696/deep-learning/ (last visited Dec. 9, 2018).

[30] *See* Tegmark, *supra* note 3.

[31] Bernard Marr, *Supervised V Unsupervised Machine Learning -- What's the Difference*, FORBES (Mar. 16, 2017), https://www.forbes.com/sites/bernardmarr/2017/03/16/supervised-v-unsupervised-machine-learning-whats-the-difference/#6280a33b485d.

process of 'input-output' mapping of data. These are some examples of 'input-output' mapping: (i) the input is street addresses and the output is directions of how to get there; (ii) the input is individual photos and the output is the identity of the person; (iii) the input is voice recordings and the output is a transcript; and (iv) the input is historical market data and the output is future market data.[32] This process is heavily reliant on the availability of sufficient data in the input category in order to sufficiently 'teach' the machine to enable its output capabilities (e.g., a machine may need one million examples of a type of flower in order to be able to recognize it).[33] The machine learning process is categorically different from human learning in that a person does not need such vast initial input.[34] However, once the hurdle of sufficient digital data is surmounted and such data is labelled and categorized accordingly, which can be an immense task,[35] the machine can process large data incomparably faster. A machine does not have the biological hardware limitations of humans,[36] such as stamina and limited memory or perception.[37]

In contrast, under the unsupervised learning model, the machine is accorded the capacity to learn on its own, with much less data available.[38] The machine algorithm explores the input without being given an explicit output variable.[39] Unlike humans, who are much better unsupervised learners, it is challenging to apply a purely unsupervised learning model to machines.[40] As an example, the human brain can operate well with 'thin-slicing' – i.e., the human brain can discern patterns based only on thin slices, or narrow portions of available knowledge or information.[41] AI, on the other hand, is not yet a natural thin-slicer.[42]

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[32] Brynjolfsson, *supra* note 23.

[33] *Understanding Artificial Intelligence, Machine Learning and Data*, BUCKHAM & DUFFY (Nov. 17, 2017), http://www.buckhamduffy.com/blog/artificial-intelligence-machine-learning-and-data.

[34] Lacey-Williams McGhee, *What Are the Pros and Cons of Machine Learning?*, SEVEN TABLETS, https://seventablets.com/blog/what-are-the-pros-and-cons-of-machine-learning/ (last visited Dec. 9, 2018) (discussing the pros and cons of machine learning, speaking specifically about how machine learning takes time because of the large amount of input data required to be processed).

[35] *See An Executives guide to AI: Machine Learning, supra* note 28 ("For example, companies developing self-driving-car technologies are hiring hundreds of people to manually annotate hours of video feeds from prototype vehicles to help train these systems. At the same time, promising new techniques are emerging, such as in-stream supervision.").

[36] *See generally* Tegmark, *supra* note 3 ("All life forms we know of remain fundamentally limited by their biological hardware.").

[37] Lance Whitney, *Are Computers Already Smarter Than Humans*, TIME MAGAZINE (Sept. 29, 2017), http://time.come/4960778/computers-smarter-than-humans/ ("Computers can take in and process certain kinds of information much faster than we can. They can swirl that data around in their "brains," made of processors, and perform calculations to conjure multiple scenarios at superhuman speeds.").

[38] Marr, *supra* note 31.

[39] *An Executives guide to AI: Machine Learning, supra* note 28 (explaining process as follows: the algorithm receives unlabeled data; it infers a structure from the data; the algorithm identifies groups of data that exhibit similar behavior).

[40] Marr, *supra* note 31.

[41] Malcolm Gladwell, *Blink: The Power of Thinking Without Thinking*, MOSTACHINFO (Oct. 14, 2012), http://www.lequydonhanoi.edu.vn/upload_images/S%C3%A1ch%20ngo%E1%BA%A1i%20ng%E1%BB%AF/Blink-%20The%20Power%20of%20Thinking%20Without%20Thinking.pdf.

[42] Nick Ismail, *The success of artificial intelligence depends on data*, INFORMATION/AGE (April 23, 2018), https://www.information-age.com/success-artificial-intelligence-data-123471607/ (stating "[s]uccessful machine learning depends on large and broad data sets.").

As a result, the prevalent model today is the one associated with supervised learning techniques.[43]

Commentaries on AI make the conceptual distinction between Artificial Narrow Intelligence ("ANI")[44] and Artificial General Intelligence ("AGI").[45] Most of the current reference to AI implies ANI, given the shorter evolutionary time horizon of its evolution.[46] In contrast, AGI posits a radically different concept of machine intelligence – one where the machine exhibits the key aspects of sentience associated with humans, such as intention, ability to set goals, self-awareness, ability to generalize, and capacity to generate new knowledge.[47] While achieving AGI is not beyond the realm of possibility at some juncture in the future, this paper, in line with current commentaries, largely speaks of AI in the context of ANI.[48]

C. Current Trends

The discourse on the recent evolution of AI encompasses diverse lines of analysis. First, as a general-purpose technology, the chief obstacles to utilizing AI in any given industry will be customization.[49] Any application of AI will involve tailoring it to an industry's specific challenges and needs.[50] Second, most opportunities for customization and AI application have not been tapped into yet. The effects will be magnified in the coming decade when "virtually every industry will transform its core processes and business models to take advantage of machine learning."[51] Third, the discourse on AI is distinguishing between complete automation[52] of tasks, as compared with the augmentation[53] of human activities in the implementation of such activities with the aid of, but without replacement, by

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[43] Marr, *supra* note 31.

[44] Ben Dickson, *What is Narrow, General and Super Artificial Intelligence*, TECH TALKS (May 12, 2017), https://bdtechtalks.com/2017/05/12/what-is-narrow-general-and-super-artificial-intelligence/ (defining General AI, also known as human-level, as the type of AI that can understand and reason its environment as a human would).

[45] *Id.*

[46] Ben Goertzel, *Artificial General Intelligence*, SPRINGER PUBLISHING https://pdfs.semanticscholar.org/782a/ceec18dd97923ea8d1eb93c326133ba980c2.pdf (last visited Dec. 9, 2018) ("The vast bulk of the AI field today is concerned with what might be called "narrow AI.").

[47] Husain, *supra* note 20.

[48] Goertzel, *supra* note 46 ("AGI appears by all known science to be quite possible.").

[49] *Id.*

[50] *15 Business Applications for Artificial Intelligence and Machine Learning*, FORBES MAGAZINE (Sep. 27, 2018), https://www.forbes.com/sites/forbestechcouncil/2018/09/27/15-business-applications-for-artificial-intelligence-and-machine-learning/#4ce91732579f. (quoting Brandon Carl, the Senior Director of Artificial Intelligence at Digital Reasoning, as saying "Using AI to spot bad behavior is something we use to empower customers across various industries.

[51] *See* Brynjolfsson, *supra* note 23.

[52] Dave Evans, *So, What's the Real Difference Between AI and Automation?*, A MEDIUM CORP (Sep. 26, 2018), https://medium.com/@daveevansap/so-whats-the-real-difference-between-ai-and-automation-3c8bbf6b8f4b (describing automation as "software that follows pre-programmed 'rules').

[53] Aaron Masih, *Why businesses must focus on intelligence augmentation over artificial intelligence*, CIO DIVE (Sept. 24, 2018), https://www.ciodive.com/news/why-businesses-must-focus-on-intelligence-augmentation-over-artificial-inte/532471/ ("IA is the use of technology to supplement and support human intelligence, with humans remaining at the center of the decision making process.").

a machine. The prevalent view in many fields of human endeavor is that complete automation would not be the norm. Rather, there would be a new division of labor with humans focusing on certain tasks and machines over others.[54]

A wide range of AI applications is already found in a variety of industries, sectors and activities.[55] The chief current applications of AI fall within two streams - perception[56] and cognition.[57] Under the perception stream, AI is enabled to recognize and analyze patterns – e.g., voice recognition (Apple's Siri[58] and Amazon's Alexa[59]), image recognition,[60] and medical diagnosis (e.g., AI can be used to diagnose cancer[61]). Under cognition and problem solving, AI has excelled at beating humans in chess and poker;[62] IBM technology has automated claims processing at an insurance company;[63] a cybersecurity company uses AI to detect malware;[64] and PayPal employs AI to prevent money laundering.[65] Everyday activities, such as Google search and map directions, involve AI.[66]

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[54] *See* Klaus Schwab, *The Future of Jobs*, WORLD ECONOMIC FORUM (Sept. 17, 2018), http://reports.weforum.org/future-of-jobs-2018/preface/ (describing the future of the job market and discussing the divide between what jobs humans will do and what jobs robotics will do in the future and how they will affect each other). *See also* Arjun Kharpal, *A.I. will be 'billions of times' smarter than humans and man needs to merge with it, expert says*, CNBC NEWS (Feb. 13, 2018), https://www.cnbc.com/2018/02/13/a-i-will-be-billions-of-times-smarter-than-humans-man-and-machine-need-to-merge.html ("[T]hat some jobs that don't require humans will disappear.").

[55] *Non-tech Businesses are Beginning to Use Artificial Intelligence at Scale*, THE ECONOMIST (Mar. 31, 2018) https://www.economist.com/news/special-report/21739431-artificial-intelligence-spreading-beyond-technology-sector-big-consequences ("Johnson & Johnson, a consumer-goods firm, and Accenture, a consultancy, use AI to sort through job applications and pick the best candidates. AI helps Caesars, a casino and hotel group, guess customers' likely spending and offer personalized promotions to draw them in. Bloomberg, a media and financial-information firm, uses AI to scan companies' earnings releases and automatically generate news articles. Vodafone, a mobile operator, can predict problems with its network and with users' devices before they arise.").

[56] Z. Duric, et. al, *Integrating perceptual and cognitive modeling for adaptive and intelligent human-computer interaction*, IEEE (Nov. 7, 2002), https://ieeexplore.ieee.org/abstract/document/1032808.

[57] *Id.*

[58] Buster Hein, *Apple reveals AI magic behind 'Hey Siri'*, CULT OF MAC (Oct. 18, 2017), https://www.cultofmac.com/509163/apple-reveals-ai-magic-behind-hey-siri/.

[59] Blake Morgan, *How Amazon Has Reorganized Around Artificial Intelligence And Machine Learning*, FORBES (Jul. 16, 2018), https://www.forbes.com/sites/blakemorgan/2018/07/16/how-amazon-has-re-organized-around-artificial-intelligence-and-machine-learning/#695f4b2a7361

[60] Itamar Arel, et. al, *Deep Machine Learning—A New Frontier in Artificial Intelligence Research, Research Frontier*, RESEARCH GATE (Dec. 2010), https://www.researchgate.net/profile/Thomas_Karnowski/publication/224183837_Deep_Machine_Learning_-_A_New_Frontier_in_Artificial_Intelligence_Research_Research_Frontier/links/570bb11b08aee06603519bf8/Deep-Machine-Learning-A-New-Frontier-in-Artificial-Intelligence-Research-Research-Frontier.pdf.

[61] Thomas H. Davenport & Keith J. Dreyer, *AI Will Change Radiology, but It Won't Replace Radiologists*, HARV. BUS. REV. (Mar. 27, 2018), https://hbr.org/2018/03/ai-will-change-radiology-but-it-wont-replace-radiologists.

[62] Tonya Riley, *Artificial Intelligence goes deep to beat humans at poker*, HARV. BUS. REV. (Mar. 3, 2017), http://www.sciencemag.org/news/2017/03/artificial-intelligence-goes-deep-beat-humans-poker.

[63] Sandip Patel, *Digital transformation in the insurance industry: Part 1 – Data is the new natural resource*, IBM INDUSTRY BLOG (Oct. 2, 2018), https://www.ibm.com/blogs/insights-on-business/insurance/digital-transformation-in-the-insurance-industry-part-1-data-is-the-new-natural-resource/.

[64] Reinhardt Krause, *AI Companies Race To Get Upper Hand In Cybersecurity – Before Hackers Do, Investors' Business Daily*, INVESTORS (Aug. 9, 2018), https://www.investors.com/news/technology/ai-companies-artificial-intelligence-cybersecurity/.

After setting the general stage of AI through its key concepts, trends and applications, this article will now proceed to assess the impact of AI on the field of law. The approach that follows is two-fold: (i) to delineate the tasks that AI will likely perform better than human lawyers, and (ii) to highlight the scope of skills that will remain a prerogative and reside in the domain of the human lawyer.

III. AI IMPLICATIONS FOR THE LEGAL PROFESSION: WHERE WILL AI BEAT THE HUMAN LAWYER?

As mentioned above, the fundamental challenge with any AI application is customization, particularly at the initial stages of its entry into an industry or field.[67] This applies to the field of law. The essential task is to adapt the AI approach and capabilities to the legal problem at hand. The key initial questions with respect to AI customization in the area of the law are: (i) can AI add value to legal practice by automating a specific task?; (ii) is it technologically possible to develop an algorithm programming AI to perform such task (and has such algorithm already been developed or is it expected to be developed)?; and (iii) is there sufficient digital data to apply this algorithm in order to produce useful output? These and similar questions will measure the future prospects of machine learning application(s) in the field of law.

The analysis that follows draws on the latest examples of AI application in the legal domain. The analysis also endeavors to anticipate future applications based on technology developments in other fields where new capacities are beginning to emerge. This is, in other words, a capacity-anticipation exercise.[68] Of particular relevance to the legal field are advances in the capacity of AI to tackle language. For example, AI is becoming reliably capable of language translation.[69]

In the legal arena, augmentation of the human lawyer's work, as opposed to its outright replacement, would likely be the default paradigm. This is in large part because of the ethical and professional duties of lawyers and the need for final decision-making or determination by a human legal expert, such as a judge.[70] At the same time, where AI will have a competitive edge, is the advantage of AI consistency in outcomes and recommendations. This feature will have a heightened impact in the legal realm. Human lawyers are notorious for frequent inconsistency and divergence on vast legal issues. This is apparent where different judges presented with the same facts may issue disparate determinations, which are ultimately resolved by a Supreme Court or equivalent.

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[65] Brynjolfsson, *supra* note 23.

[66] Kevin Tran, *Google is Capitalizing on AI in Marketing*, BUSINESS INSIDER (Jul. 12, 2018), https://www.businessinsider.com/google-uses-ai-to-enhance-ad-campaigns-2018-7.

[67] Gary E. Marchant, *Artificial Intelligence And The Future Of Legal Practice*, A.B.A. (2017), Lawyerhttps://www.americanbar.org/content/dam/aba/administrative/litigation/materials/2017-2018/2018-sac/written-materials/artificial-intelligence-and-the-future.authcheckdam.pdf.

[68] *Id.*

[69] Bernard Marr, *Will Machine Learning AI Make Human Translators An Endangered Species?*, FORBES (Aug. 24, 2018), https://www.forbes.com/sites/bernardmarr/2018/08/24/will-machine-learning-ai-make-human-translators-an-endangered-species/#7f8b23883902.

[70] *Id.*

Based on current AI applications and projections for future progress, the following facets of the legal domain would be most amenable to AI augmentation:

A. Assessment of Legal Risk and Potential Regulatory Non-Compliance

The perils of litigation, arbitration, or other judicial or regulatory proceeding are a principal legal risk in today's global business environment. In addition, the risk of potential regulatory non-compliance is heightened in a world where numerous new regulations in multiple jurisdictions can impact an enterprise.[71] Assessing the litigation and regulatory risk is a critical component of any company's risk management framework.[72] The ability to isolate this risk and input its parameters into the larger risk analysis matrix that a company undertakes, alongside reputational, commercial, political and other applicable risk to which it is exposed would be a significant benefit to a company's overall risk mitigation strategy.[73] Furthermore, if an objective numerical value of a risk can be fed into the overall decision-making process, this may critically impact the decision, e.g., the decision to take a certain action with concomitant litigation risk before the action is taken; or, after a litigation claim has arisen, whether to pursue litigation, to settle, or to drop the claim altogether.

In pursuing such legal risk assessment, litigation and regulatory counsel are frequently urged to assign a specific numerical value in the form of a percentage, or a range thereof, to the chances of success of a given litigation claim. In countering that, litigators generally resist a client's insistence on pinpointed arithmetic assessments, citing well-known arguments about the ambiguity of the issue at hand, the complexities of litigation, and the uncertainties of the law.

AI has a material part to play in this respect. AI is able to meet the two main criteria for its applicability to this problem: (i) the availability of data and (ii) the potential to develop an algorithm. First, there is a vast amount of digitized data in the form of legal precedents such as judgments, arbitral awards, and rulings issued by regulatory authorities.[74] Any sphere with vast data on past behavior and precedent is ripe for the predictive capacity deployment of AI's supervised learning. Within this data, the input can be labeled under different relevant groups. These may be, for example, facts and circumstances giving rise to claims, actual decisions, dicta, procedural steps, and the behavior of and questions frequently raised by a particular court or a judge, arbitrator, or regulatory authority. Such data labelling would require a significant amount of upfront work, but is feasible.

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[71] *See generally* GENERAL DATA PROTECTION REGULATION OF THE EUROPEAN UNION ((EU) 2016/679).

[72] Robert Kantner & Carl Kukkonen, *An Introdcution to the Risks of AI for General Counsel, Corporate Counsel*, (Oct. 11, 2018) https://www.law.com/corpcounsel/2018/10/11/an-introduction-to-the-risks-of-ai-for-general-counsel/.

[73] *See generally* Managing the Dynamic Risk Landscape, GARTNER, https://www.gartner.com/en/legal-compliance/legal-compliance-leaders?utm_source=google&utm_medium=cpc&utm_campaign=RM_GB_2018_LCL_CPC_SEM1_RISK-MIT-LEGAL&gclid=EAIaIQobChMIp-TwzdCk3gIVS7nACh3s8gWbEAAYASAAEgKY6_D_Bw (last visited Dec. 9, 2018).

[74] Winick, *supra* note 8 ("There are steps underway to digitize even more of this data. For example, the Harvard Law School Library Innovation Lab is leading the CaseLaw Access Project, an effort to digitize the entire historical record of U.S. court opinions and make that data available for legal algorithms to read and train on.").

The second question, whether an appropriate algorithm can be designed, has already been answered to some degree by achievements in practice. Current examples include the algorithm to assess the percentage of success of cases in the European Court of Human Rights,[75] the AI algorithm that has been created to predict the behavior of the U.S. Supreme Court,[76] and an algorithm based on information provided by clients used to predict how a divorce will progress and then to provide services to clients based on that prediction.[77] In addition, AI is being used to spot any potential non-compliance by companies in view of the rapidly changing regulatory environment.[78] For example, the Seoul-based law firm, Yulchon, has developed a client-focused digital compliance system called AlgoCompliance.[79] Its algorithm monitors daily government websites for regulatory changes and identifies the changes that could trigger non-compliance.[80]

B. Contract Review and Other Due Diligence Tasks

1. New AI Capability: Recognition of Legal Concepts

The accessibility of data, the availability of labelling options and the potential to develop algorithms are making it increasingly likely that AI will be involved in contract review and similar due diligence tasks. First, an enormous amount of data is digitally available in the form of past contracts and various contractual forms and templates. Moreover, this data can be labelled in various ways: by type of contract (e.g., loan agreement, lease agreement), by type of contract provision (e.g., representation and warranty, covenant, termination), or by parts of a single provision (e.g., chapeau, conditions, provisos). As for feasible algorithms, advancements to date have shown that algorithmic capabilities are evolving to enable AI to recognize legal concepts and related meanings and contexts, and not merely words.[81] An important example in this regard is the study described in the report titled Comparing the Performance of AI to Human Lawyers in the Review of Standard Business Contracts issued by LawGeex,[82] an AI company.[83] In this study, LawGeex established an algorithm by exposing it to a variety of contract types, thus making the

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[75] *See AI Predicts Outcomes of Human Rights Trials*, UCLNEWS (OCT. 24, 2016), http://www.ucl.ac.uk/news/news-articles/1016/241016-AI-predicts-outcomes-human-rights-trials.

[76] Daniel Martin et. al., *A General Approach for Predicting the Behavior of the Supreme Court of the United States,* SSRN (Jan. 16, 2017), http://dx.doi.org/10.2139/ssrn.2463244.

[77] *See generally* WEVORCE, www.wevorce.com (last visited Dec. 9, 2018).

[78] Bruce Love, *The lawyers using AI to keep tabs on new global sanctions*, Financial Times (Jun. 7, 2018), https://www.ft.com/content/0c2bda9e-4caf-11e8-97e4-13afc22d86d4.

[79] *Id.*

[80] *FT Asia-Pacific Innovation Lawyers 2018 Open for Submissions*, FINANCIALTIMES (Dec. 18, 2018), https://www.ft.com/content/7af761ee-c83c-11e6-9043-7e34c07b46ef.

[81] *AI vs. Lawyers*, LAWGEEX, https://www.lawgeex.com/AIvsLawyer/ (last visited Dec. 9, 2018) (describing a landmark study that involved US trained lawyers pilled against LawGeex Artificial Intelligence algorithm).

[82] *Id.*

[83] *Id.*

algorithm capable of identifying and distinguishing between different legal concepts regardless of how they are phrased or where they appear in a document.[84]

2. Practical Applications

That AI can be refined to operate at the level of technical legal concepts, rather than mere singular words or terms, can have a wide range of implications for legal AI. Under contract review, a key task that can be automatized by AI is issue-spotting, namely highlighting major issues or deviations within a particular contract.[85] For example, the LawGeex report referred to above describes an experiment in which U.S. lawyers with experience in corporate law and contract review were pitted against the LawGeex AI algorithm to spot issues in non-disclosure agreements.[86] This experiment was conducted after three years of training the LawGeex AI system through exposure to tens of thousands of contracts.[87] The results of the experiment were in favor of AI: the LawGeex AI achieved an average 94% accuracy rate, exceeding that of the lawyers at 85%.[88]

Other recent examples of AI contract review and due diligence in practice include the following: (i) J.P Morgan Chase introduced a software system for reviewing commercial loan contracts,[89] (ii) Invoke Capital invested in Luminance, a start-up developing AI to produce "thinking computer systems" for use in merger and acquisition due diligence,[90] (iii) Kira Systems' product, which aims to enable machine learning contracts analysis, is also intended for use in the performance of merger and acquisition due diligence, as well as contract analysis and lease abstraction,[91] (iv) eBrevia uses AI, including machine learning and natural language processing technology, developed in partnership with Columbia University to extract data from contracts, aiming to enhance the accuracy and speed to contract analysis, due diligence, and lease abstraction[92]; and (v) Riverview Law, a firm based in the United

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[84] *Id.* at p. 11 ("This level of technology for analyzing legal documents has only been possible with advances in computing over the last five years. Computers convert the text into a numeric representation. The image below is a visualization of how computers read text. Each dot represents one paragraph in the semantic space. The different colors shown represent different legal issues. Pink dots, for example, represent samples of non-compete issues, and purple ones represent governing law sections.").

[85] Jason Tashea, *New Game Lets Players Train AI to Spot Legal Issue*, A.B.A. (Oct. 16, 2018), http://www.abajournal.com/news/article/new_game_lets_players_train_ai_and_close_the_justice_gap/.

[86] *AI vs. Lawyers, supra* note 81.

[87] *Id.*

[88] *Id.*

[89] Debra Cassens Weiss, *JPMorgan Chase Uses Tech to Save 360,000 Hours of Annual Work by Lawyers and Loan Officers*, A.B.A. J. (Mar. 2, 2017), http://www.abajournal.com/news/article/jpmorgan_chase_uses_tech_to_save_360000_hours_of_annual_work_by_lawyers_and .

[90] *See generally* Julie Sobowale, *How Artificial Intelligence is Transforming the Legal Profession*, A.B.A. (Apr. 2016), www.abajournal.com/magazine/article/how_artificial_intelligence_is_transforming_the_legal_profession.

[91] *See generally*, KIRA, https://www.kirasystems.com/ (last visited Dec. 9, 2018) (marking a company machine learning software searches and analyzes text in contracts, and automates the extraction and analysis of key contract provisions).

[92] *See generally* EBREVIA, https://ebrevia.com/ (last visited Dec. 9, 2018).

Kingdom, launched a virtual assistant, powered by the Kim technology platform,[93] aimed at in-house legal teams globally to aid in the delivery of legal services across the business.[94]

In light of these developments in algorithms, AI will likely have a deepening role in reviewing vast numbers of standardized contracts and recognizing provisions. AI can be employed to identify divergence from an established benchmark provision, such as change of control, termination, or assignment.[95] In furtherance of issue-based legal diligence, the process of issue-spotting by AI can be advanced to produce what corporate attorneys frequently refer to as 'issues list,'[96] which now is often prepared by corporate lawyers when a draft agreement is delivered by opposing counsel to facilitate client review and discussions.[97] The AI algorithm would scan the provisions and legal concepts highlighted in the redlined document and summarize the key changes for lawyers and business people, building on the text-extractive capacity of AI.

C. Legal Research

As described above, AI can be taught to identify legal concepts and not merely to recognize words or terms. In turn, this will empower more elaborate and targeted legal research tasks that extend beyond simple keyword searches. The time is nearing when a legal question can be posed in natural language,[98] or technical legal terms to which AI can present a response following some form of basic legal research. The depth and scope of such research will initially be limited as AI evolves, but is envisioned to expand in a relatively rapid fashion. Even if the AI algorithm simply provides a preliminary response to a basic question, such a response would still provide a benefit to legal practice. A current example of this is the Chatbot "Parker" used by Norton Rose's Australia office in conversations with potential clients.[99] Parker is trained to provide basic answers to questions about changes to data protection and privacy laws, thus saving human lawyers' time for more customized advice.[100]

For purposes of this task, digital data is already extensively available in the form of, for example, case law and legislative databases, which can be labeled appropriately. Cases can be labeled into facts, analysis, and decisions, and each sub-category can be further labelled. The AI research assistant may pursue the following three stages of research:[101] (i)

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[93] *See generally* KIM, http://ask.kim/ (last visited Dec. 9, 2018).

[94] *See generally* RIVERVIEW LAW, http://www.riverviewlaw.com/global-launch-first-virtual-assistants-powered-kim/ (last visited Dec. 9, 2018).

[95] Beverly Rich, *How AI is Changing Contracts*, HARV. BUS. REV. (Feb. 12, 2018), https://hbr.org/2018/02/how-ai-is-changing-contracts.

[96] *Id.*

[97] *Id.*

[98] *Natural Language*, MERRIAM-WEBSTER DICTIONARY (a language that is the native speech of a people).

[99] *Norton Rose Fulbright launches first Australian law firm chatbot to help manage data breach*, NORTON ROSE FULBRIGHT (Dec. 13, 2017), http://www.nortonrosefulbright.com/news/159704/norton-rose-fulbright-launches-first-australian-law-firm-chatbot-to-help-manage-data-breach.

[100] *Id.*

[101] *See* generally, ROSS INTELLIGENCE, https://rossintelligence.com (last visited Dec. 9, 2018) (marketing "...an advanced legal research tool that harnesses the power of artificial intelligence to make the research process more efficient).

identify the source data (e.g., relevant cases or legislative provisions), (ii) detect, categorize, and analyze the specific information relevant to the issue at hand, and (iii) present the results in a user-friendly format by extracting and summarizing salient points. A current example of such development in practice is Ross Intelligence, which uses the International Business Machine ("IBM") Watson cognitive computing system to enhance legal research.[102] Users may ask legal questions in plain English and Ross searches legislation, case law, and secondary sources.[103]

D. Discovery

An AI-based system that reviews discovery documents[104] referred to as predictive coding is used to classify the relevance of discovery documents, or the relative match of any document to a specific model set for this purpose. The model is patterned on the prior coding of a small sample of discovery documents by an attorney.[105] Lawyers are already employing this text-mining technique to review thousands of documents collected during discovery and to identify the most relevant ones for deeper review by human lawyers.[106]

This customization of AI for purposes of litigation discovery is further enhanced by the new capabilities afforded by AI's understanding and recognition of legal concepts. An example in this regard is the e-discovery AI system developed by the start-up team at NexLP, which aims to reduce the time needed for e-discovery and document review by using innovative tools like concept search, enhanced threading, and in-depth filtering.[107] Another example is Zapproved, a start-up focused on a cloud-based electronic discovery tool aiming to streamline the document review process with intuitive data processing and review software.[108]

E. Contract Drafting

Building on the AI capabilities discussed above, the logical question arises – can a machine draft a contract? If it can review it, understand concepts in it, spot issues in it and compare it to other contracts, the AI capability to draft a contract is within reach. In particular, this seems increasingly feasible in the shorter term in the realm of standardized form contracts, for example, International Swaps and Derivatives Association Agreements

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[102] *Id.*

[103] *Id.*

[104] Paul Bergman, *Formal Discovery: Gathering Evidence for your Lawsuit*, NOLO, https://www.nolo.com/legal-encyclopedia/formal-discovery-gathering-evidence-lawsuit-29764.html (last visited Dec. 9, 2018).

[105] *See* Nicholas Barry, Man Versus Machine Review: The Showdown Between Hordes of Discovery Lawyers and a Computer Utilizing Predictive-Coding Technology, 15 Vand. J. Ent. & Tech. L. 343, 344 (2013).

[106] Michael Chui et. al, *Four Fundamentals of Workplace Automatic*, MCKINSEY QUARTERLY (Nov. 2015), https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/four-fundamentals-of-workplace-automation.

[107] *See generally*, NEXLP, https://www.nexlp.com/ediscovery (last visited Dec. 9, 2018) (marketing to customers, "[t]he future of e-discovery is here [:] [s]ay goodbye to predictive intelligence and hello to artificial intelligence).

[108] *See generally*, ZAPPROVED, https://www.zapproved.com/ (last visited Dec. 9, 2018).

("ISDA").[109] It is no longer far-fetched to project an AI-driven methodology capable of producing a first draft of an agreement based on initial basic specifications and preferences[110] set by a human lawyer. These initial properties can take the form of a pre-set menu of standardized options, such as business terms to be incorporated and the level of "friendliness" of a provision to a specified party. The human lawyer can select from a range of degrees set for a borrower, or lender-friendly provisions in a loan agreement, such as mandatory prepayments or financial covenants,[111] to guide AI in its approach to the first draft.

To assess more accurately the scope of AI capacity in drafting a contract, it is relevant to examine the capacity for what is predominantly referred to in AI terminology as language processing. [112] This is currently one of the most rapidly advancing fields of AI.[113] In furtherance of this ability, it is now becoming evident that algorithms can be built to process human language input and convert it into understandable representations.[114] There are already some notable examples of AI language processing pointing towards future possibilities for machine contract drafting. Some are briefly touched on below:

- Basic capabilities in this regard are already widely-used; for example, word auto-completion is text-based prediction.[115] Admittedly, writing a contract is not a predictive exercise, but this is evidence of a rudimentary capacity to process language.
- Another example is the experiment which involved the writing of a screenplay called "Sunspring," where the AI produced a new screenplay based on input of multiple examples of screenplays.[116] Despite the shortcomings of the output such as lack of a coherent story or originality, for contract drafting purposes this experiment points to the capability of AI to create new text based on precedents.[117] For contract drafting capabilities, AI would be fed multiple contracts of the same kind or type of provision in a multitude of contracts. Storytelling is not a prerequisite in contracts

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[109] *Scope of the ISDA Master Agreement and Schedule—overview*, LEXIS NEXIS, https://www.lexisnexis.com/uk/lexispsl/bankingandfinance/document/391289/57X4-8841-F185-X2H3-00000-00/Scope_of_the_ISDA_Master_Agreement_and_Schedule_overview# (last visited Dec. 9, 2018).

[110] *Id.*

[111] *Id.*

[112] Michael Chui et. al, *What AI can and can't do (yet) for your business*, MCKINSEY QUARTERLY (Jan. 2018), https://www.mckinsey.com/business-functions/mckinsey-analytics/our-insights/what-ai-can-and-cant-do-yet-for-your-business ("45 percent of work activities could be automated using already demonstrated technology. If the technologies that process and 'understand' natural language were to reach the median level of human performance, an additional 13 percent of work activities in the US economy could be automated.").

[113] Tegmark, *supra* note 3.

[114] *See, Harnessing Artificial Intelligence for the Earth*, WORLD ECONOMIC FORUM (Jan. 2008), http://www3.weforum.org/docs/Harnessing_Artificial_Intelligence_for_the_Earth_report_2018.pdf.

[115] Tesema et al., *Enhancing the Text Production and Assisting Disable Users in Developing Word Prediction and Completion in Afan Oromo*, 7 J. OF INFORMATION TECH. & SOFTWARE ENGINEERING 2 (2017) (describing word completion).

[116] Walter Frick, *Why AI Can't This Article (Yet)*, HARV. BUS. REV. (July 24, 2017), https://hbr.org/2017/07/why-ai-cant-write-this-article-yet.

[117] *Id.*

(except to some extent in recitals[118]) and in many standardized contracts, originality is not essential.

- AI is used in the processing of text for auto-summarization purposes;[119] that is the creation of summaries based on large amounts of text. This may be done both by extractive and abstractive methods[120]; in the latter case through original language written by the algorithm itself.[121] While generating new language is still a challenge for AI, its extractive and abstractive aptitudes[122] can be useful in contract drafting as contracts are largely based on text already in existence in some form (precedents, templates) that require processing. For example, in extractive summaries, AI algorithms learn how to 'score' sentences according to the likelihood that they would be included in a summary.[123] AI can similarly "score" a provision of a contract according to how often it appears in a database of contracts or how favorable it is to a particular contractual party.
- Translation algorithms are another text-processing application of AI.[124] If AI can be taught to identify a word in one language with the word in another, why not teach AI the meaning of the word and its contextual connotations? In a contractual language context, this competency could, for example, focus on defined terms of the contract. Building on the translation capacity, AI can be developed to translate a business term sheet, appropriately standardized, into a first draft of an agreement, also standardized. An additional dimension in which to formalize data for this purpose is to enable AI to devise a menu of risks (e.g., how many times a contract with such provision led to litigation and who won?), options, and recommendations for tailoring the provision to the interests of a party.
- Another example of language processing is chat or messenger AI-based applications, with essential functions to understand the meaning of words and text. In addition to the popular Siri[125] or Alexa,[126] a captivating development is the creation of the world's first mental health chatbot.[127]

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[118] *A Manual Style for Contract Drafting*, ABA, http://apps.americanbar.org/abastore/products/books/abstracts/5070601_SamCh.pdf (last visited Dec. 8, 2018).

[119] Min-Yuh Day, et al., *Artificial Intelligence for Automatic Text Summarization*, IEEE (2018), https://ieeexplore.ieee.org/document/8424747.

[120] Aman Pranay et. al., *Test Summarization in Python: Extractive vs. Abstractive Techniques Revisited*, RARE TECHNOLOGIES (April 5, 2017), https://rare-technologies.com/text-summarization-in-python-extractive-vs-abstractive-techniques-revisited/

[121] Frick, *supra* note 116.

[122] Pranay *supra* note 120.

[123] Frick, *supra* note 116.

[124] Naveep Singh Gill, *Overview of Artificial Intelligence and Natural Language Processing*, UP WORK, https://www.upwork.com/hiring/for-clients/artificial-intelligence-and-natural-language-processing-in-big-data/ (last visited Nov. 8, 2018).

[125] Zac Hall, *Apple explains how 'Hey Siri' works using a Deep Neural Network and machine learning*, 9TO5MAC (Oct. 18, 2017), https://9to5mac.com/2017/10/18/how-hey-siri-works/.

[126] Richard Baguley & Colin McDonald, *Appliance Science: Alexa, how does Alexa work? The science of the Amazon Echo*, C|NET (Aug. 4, 2016), https://www.cnet.com/news/appliance-science-alexa-how-does-alexa-work-the-science-of-amazons-echo/.

[127] *See generally*, WOEBOT, *supra* note 5.

- AI can detect malware[128] through algorithms with natural language understanding that can read a trillion characters in a minute. The algorithm then processes all the input language and uses it to validate a hypothesis, namely, if the page is a threat or if the page is benign.[129] Can a similar capacity be developed to validate provisions of a contract – e.g., is this provision standard (with varying degrees) or entirely unprecedented?

One of the limitations on AI in language processing emphasized in experiments is that AI is not yet fully equipped to interpret contexts as effectively as humans.[130] But, with regard to recent developments, some of which are described above, AI can presumably be taught to understand contexts as well. If you feed AI with a billion contexts in which a word has been or can be used, it can then start to distinguish and learn how and when the term is used, building a contextual vocabulary. Of course, even then, it would be hard to imagine AI overcoming what I would denote as the Wittgenstein language barrier,[131] i.e., the impossibility of a logically perfect language. But this barrier applies to lawyers as well.

While natural language is different than technical legal language,[132] it is critical to note that given AI's propensity to deal with natural language, it may follow that AI may easily tackle legal language. It may be envisioned that technical legal language is more disposed to AI processing for it is highly standardized and subject to somewhat uniform, though not universal, rules of drafting. This is in contrast to natural language, which has more variety. It can be highly diversified and littered with linguistic idiosyncrasies that are less prone to the order-seeking and pattern-finding methodology of AI. In fact, not only is the legal text within a contract highly standardized, but there are many types of contracts or other legal documents that are substantially similar to one another, such as NDAs,[133]IDSAs,[134] loan agreements, lease agreements, and so on. Thus, this area is ripe for AI augmentation.

F. Other Potential AI Applications in the Legal Sphere

In addition to the above uses of AI to supplement the work of human lawyers, the potential other uses of AI in law are likely to be wide-ranging. Essentially, AI is viable in any area with sufficient digitized data that can be labeled and mapped in 'input-output' processes through predictive or other cognitive methods. By way of example, the following

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[128] Dr. Giovanni Vigna, *How AI will help in the fight against malware*, TECHBEACON, https://techbeacon.com/how-ai-will-help-fight-against-malware. (last visited Nov. 9, 2018).

[129] Husain, *supra* note 20.

[130] Scott Berinato, *Inside Facebook's AI Workshop*, HARV. BUS. REV. (July 2017), https://hbr.org/2017/07/inside-facebooks-ai-workshop.

[131] Gary A. Phillips, *Ludwig Wittgenstein: A Philosophical Theory of Language Acquisition and Use*, 27 WORD J. 1-3, 139-157 (1975).

[132] *See e.g.*, *AI vs. Lawyers*, *supra* note 81 (recognizing that they needed to develop an algorithm beyond natural language processing more closely tailored to contract review).

[133] Tim Rayner, *Meaning is use: Wittgenstein on the limits of language*, PHILOSOPHY FOR CHANGE (Mar. 11, 2014). https://philosophyforchange.wordpress.com/2014/03/11/meaning-is-use-wittgenstein-on-the-limits-of-language/.

[134] *Nondisclosure Agreement*, CORNELL LAW SCHOOL, https://www.law.cornell.edu/wex/nondisclosure_agreement. (last visited November 9, 2018).

applications may, too, be within the realm of AI deployment. This list is, of course, far from exclusive as new developments are continuously pursued and changes are rapid:

- AI Use in Adjudicative Proceedings.[135] Though not yet in comprehensive focus, it is not exceedingly far-fetched to conceive AI systems in some way to aid judges or other adjudicators. The basic input-output mapping, where evidence is input and out-put, comes a decision by an 'AI judge' based on millions of bits of data, comprising previously decided cases, is perhaps a bit overly simplistic. Yet forms of AI used in the decision-making process is not implausible, especially given that AI can be programmed to produce some type of percentage output aiding in the "preponderance of the evidence" analysis. Furthermore, by avoiding some common human biases and inconsistencies, AI can potentially help human lawyers weigh issues of fairness and good faith.[136] Other potential aspects are jury selection and the assessment of credibility of witnesses. Existing AI are already at or beyond human level performance in discerning a person's emotional state based on voice or facial expression.[137] Therefore, one can imagine AI being used to make such type of assessments with legal implications, e.g., weigh witness testimonies or pursue jury selection based on inputted criteria and data.
- Management of Legal Data. A company can outsource the management of its contract or other legal data to AI. It can do so by (i) organizing its contract database by selected relevant metrics, such as a type of contract, date, etc., and (ii) setting up AI to alert the system of upcoming key dates such as contract termination dates (e.g., when does an NDA expire and what happens to the information thereafter).
- Detecting Potential Violations of Law. There can be multiple scenarios and contexts where it is conceivable to have AI involved in spotting patterns of legal infractions. This can be used by lawyers as well as adjudicators or regulators. For example, AI can be trained to scan patents and text in order to track violations of patent and copyright law.[138] AI can also be taught, through sample patterns, to spot fraud patterns in large sets of documents or communications that would require inordinate amounts of time for human processing.
- Applications as Part of Administrative Processes. For example, AI can enable individuals to apply for change in immigration, employment, or other status. The relevant agency or other regulators on the receiving end can, too, utilize AI in processing such applications.

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[135] *ISDA Master Agreement,* INVESTOPEDIA https://www.investopedia.com/terms/i/isda-master-agreement.asp. (last visited Nov.8, 2018)

[136] Charles Kerrigan, *Artificial Intelligence and Equity,* Charles Kerrigan, BUTTERWORTHS J. OF INT'L BANKING AND FIN. L. (2017).

[137] *See generally, Affectiva's Emotion AI Humanizes How People And Technology Interact,* AFFECTIVA, https://www.affectiva.com/ (last visited Dec. 9, 2018).

[138] *Artificial Intelligence Collides with Patent Law,* WORLD ECONOMIC FORUM. (Apr. 2018). http://www3.weforum.org/docs/WEF_48540_WP_End_of_Innovation_Protecting_Patent_Law.pdf.

- Finding an Attorney. AI can manage and use databases and client preferences to help individuals identify the right lawyer for them based on the area of law, cost, geographical location, etc. This would be akin to 'Uber for lawyers' by analogy.[139]
- Law Firm Processes. AI can be applied in the management of law firm billing by automatizing the process of invoicing.

IV. FUTURE LEGAL SKILLS: WHERE WILL HUMAN LAWYERS OUTPERFORM MACHINES?

AI evolution will be a watershed moment with multi-faceted ramifications for the legal profession. Economically, early AI adopters in the legal field will seek to grow revenue, expand market share and reduce costs, in varying degrees.[140] The development of legal AI algorithms will entail initial investments, increasingly evident in law firms partnering with tech start-ups to pursue AI legal customization.[141] Some of these may not be successful and thus will add to the preliminary costs associated with AI. However, once propitious, AI applications in law are brought to economies of scale and are available for use in a wider array of tasks, the cost-and time-savings over time will likely be substantial. We can now envision a juncture when the famous Turing Test[142] can be, in certain contexts and with respect to certain tasks, successfully applied to a computer lawyer. If a client can receive a reply on a legal question within a much shorter timeframe, the source of the answer, a human or AI lawyer, will decline in importance as the quality and precision of the two are becoming increasingly comparable.

In the context of the above economic advantages associated with AI, the time has arrived to undertake a serious "soul-searching" of the core legal competencies of the future, focusing on the skills giving a competitive edge to the human lawyer. This is not simply a matter of choice. The professional rules of conduct of Bar Associations,[143] such as the ABA,[144] already require lawyers to keep themselves apprised of the benefits and risks

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[139] Carole Piovesan & Vivian Ntiri, *Adjudication by algorithm: The risks and benefits of artificial intelligence in judicial decision-making,* THE FUTURE OF ADVOCACY (2018), https://marcomm.mccarthy.ca/pubs/Spring-2018-Journal_Piovesan-and-Ntiri-article.pdf.

[140] *Artificial Intelligence The Next Digital Frontier?,* MCKINSEY&COMPANY (June 2017), https://www.mckinsey.com/~/media/McKinsey/Industries/Advanced%20Electronics/Our%20Insights/How%20artificial%20intelligence%20can%20deliver%20real%20value%20to%20companies/MGI-Artificial-Intelligence-Discussion-paper.ashx (stating "[f]irms that we consider more advanced AI adopters were 27 percent more likely to report using AI to grow their market than companies only experimenting with or partially adopting AI, and 52 percent more likely to report using it to increase their market share. Experimenters, by contrast, were more focused on costs. They were 23 percent more likely than advanced AI adopters to point to labor cost reductions, and 38 percent more likely to mention non-labor cost reductions").

[141] *Turing Test,* ENCYCLOPAEDIA BRITANNICA, https://www.britannica.com/technology/Turing-test. (last visited Dec. 9, 2018).

[142] *Model Rules of Professional Conduct: Table of Contents,* ABA (Aug. 15, 2018) https://www.americanbar.org/groups/professional_responsibility/publications/model_rules_of_professional_conduct/model_rules_of_professional_conduct_table_of_contents/.

[143] *Id.*

[144] *The Future of UK Skills: employment in 2030,* NESTA, http://data-viz.nesta.org.uk/future-skills/index.html

associated with new technologies. But beyond solely understanding and applying technological innovations, there is a larger, more fundamental dilemma. Lawyers have a responsibility to the profession and to future generations of lawyers to delineate the skillset that distinguishes the future human lawyer from the future computer one. The exigencies of the future AI age should inform our vision and approach, not tomorrow, but today, to legal competencies responsive to such a world. The following analysis outlines the future competitive skills of the human lawyer. This is an attempt to provide a guiding blueprint to legal education in striving to prepare future lawyers for an AI-competitive reality.[145]

A. Methodology vs. Specificity: Rationalization and Reasoning

Until reaching the level of sentient AI, which is equipped with self-awareness, able to set objectives, and able to self-rationalize actions, in the distant time horizon, AI will mostly follow the strict path of logic embedded in its algorithmic code. However, this logic would be programmatic, not explanatory. AI would generally not be capable of explaining the result it has arrived at by providing a human-like rationale for the legal output delivered. This would require some form of reverse-deciphering of the algorithm in the particular context or scenario in which it is applied. This limitation is sometimes referred to as the "explain-ability" problem of AI. Machines are ill-equipped to furnish a humanly comprehensible rationale for a decision or outcome, especially where complex competing factors or interests are at hand.[146] This, in a way, is the reverse Polanyi's Paradox[147] at play, namely machines knowing more than they can tell us.[148]

Bearing this limitation in mind, the ability to rationalize legal decision-making and legal advice will be even more vital in the future. In essence, this is the skill to discern and enunciate in clear and coherent terms a logical analytical path between a set of premises, be they findings of fact, legal stipulations or other elements, and a legal conclusion or recommendation derived from such premises. There is a difference in exposition between AI algorithmic logic and human cognitive logic in explaining a rationale. The algorithmic pathway underlying AI's output is forward logic, namely based on a set of data, understanding what is the optimal determination or most efficient course of action. But AI will, for the foreseeable future, lack the reverse logic capacity; i.e., to explain the steps of the process so to convince the human mind of the seamlessness of the analysis. In the field of law, the ability to rationalize is an essential element of the analytical framework from the arguments behind a legal opinion, to the reasoning in a court judgement, to the legal advice regarding alternative courses of action.

(last visited Dec. 9, 1018) (providing a detailed review of future skills not specifically confined to the legal field).

[145] *Id.*

[146] Chui, *supra* note 112 ("It can be difficult to discern how a mathematical model trained by deep learning arrives at a particular prediction, recommendation, or decision. A black box, even one that does what it's supposed to, may have limited utility, especially where the predictions or decisions impact society and hold ramifications that can affect individual well-being. In such cases, users sometimes need to know the 'whys' behind the workings, such as why an algorithm reached its recommendations—from making factual findings with legal repercussions to arriving at business decisions, such as lending, that have regulatory repercussions—and why certain factors (and not others) were so critical in a given instance.").

[147] Brynjolfsson, *supra* note 23.

[148] *Id.*

Reflecting this expectation, law schools should be well-advised to devise curricula, and law firms to develop legal training programs for junior attorneys, that emphasize, even more than presently, legal methodologies for reasoning and rationalization. This is not necessarily at the complete expense of the focus on specific substantive issues.[149] Substantive aspects of the law will naturally continue to be of importance. But for purposes of the human lawyer's "value-add" training in the future age of AI, substantive legal issues would matter more in the context of developing legal methodology and reasoning skills, rather than in the form of formulaic responses to detailed concrete questions. That is because AI would likely be able to analyze and process some of the specific substance faster, if not better. AI would be able to summarize, draft, identify specific issues and predict specific outcomes. However, AI would probably not inherently internalize the methodology essential to bridge the analytical gap between substantive findings and legal determinations.

B. Multi-disciplinary, Cross-Connectivity and Multilayeredness vs. Linearity

Because AI's capabilities depend on the underlying algorithm, one would need to look at the capacity to develop the algorithm itself to determine AI's potential role. Generally, AI algorithms will be easier to devise for more linear tasks. In other words, tasks for which all data points are situated on the same analytical plane and cognitive level. It is harder to envision algorithms that can recognize, in processing issues within a particular area of the law, when and how much to infuse into the analysis additional information or data from a different area of the law, or even a distinct discipline, that may be relevant to the task at hand. Furthermore, it is more difficult to arrange, label, categorize and invoke, as applicable, data sourced from dissimilar areas that do not neatly overlap or fit in with each other. The algorithmic capacity would find it more problematic to superimpose inputs of data that are substantively different in kind and to know when to summon, or distinguish between, inter-disciplinary inputs. Multi-layered and cross-connectivity analysis requires discerning nuances and distinctions not solely numerically, or by mechanical logic, but in terms of the overarching nature of the issue and the field from which it originates.

In the legal realm, some of the manifestations of such inter-disciplinary, cross-connectivity, or multi-layeredness can be found through legal analyses across multiple legal systems or fields of knowledge, such as comparative law, supranational legal frameworks (such as general principles of law), and law and economics. For instance, it would be difficult to envision how an AI algorithm could optimally grasp and process legal rules or principles that may appear to have some similarity or equivalency, but are treated differently in scope and application in divergent legal systems, such as civil and common law.[150]

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[149] Winick, *supra* note 8 (illustrating that many law schools have created new programs to teach the next generation of lawyers to use technologies and platforms in the provision of legal services. For example, offers courses in legal innovation and programming for lawyers).

[150] Bernard Marr, *How AI and Machine Learning are Transforming Law Firms and the Legal Sector*, FORBES (May 23, 2018), https://www.forbes.com/sites/bernardmarr/2018/05/23/how-ai-and-machine-learning-are-transforming-law-firms-and-the-legal-sector/#60f4950d32c3.

An example of such a principle is the duty of good faith.[151] While it appears by the same or similar names in both systems, the concept of good faith can differ significantly in scope. An AI algorithm may be able to spot it in both systems, but it would likely not be able to distinguish correctly between the two by simply superimposing one on the other. This is not a straightforward exercise of discerning mere overlap. The exercise would require a much deeper analysis of the concepts, history, application over time and current role to the integrity of contract law. As another example, the legal analysis of an issue under international law may require a parallel or related study of a particular domestic legal system. For instance, the question of when a failure by a government administrative body to issue or renew a license to a foreign investor amounts to regulatory expropriation under international law may require analysis under the host country's administrative law as to whether the decision to issue or renew is discretionary or mandatory in nature. The international and domestic issues exist on different planes and entail multiple layers of the same analysis that is not easily susceptible to AI modeling.

Not only will comparative and interdisciplinary legal methodologies become more critical in an AI world, but also in the overall development of global society. In an ever-globalizing and interconnected world, it is increasingly imperative to understand distinctions between legal systems and distill, through comparative analysis, some essential principles of law that would guide the legal framework for such an inter-connected world. What is more, in the pursuit of ideas suited for the exigencies of an ever-complex world, this interconnectedness will not merely be between geographic localities and units. Importantly, it will also be between fields of knowledge. Some examples in the legal domain include: (i) the objectives and impact of tax laws entail the grasp of budgetary and other government policies pursued; (ii) law, political risk and geopolitics will be more intertwined than ever in discerning domestic or international movements; and (iii) ascertaining certain obligations of the lawyer as a trusted advisor would require borrowing some analysis of the principles of ethics, notably in handling AI-posed ethical concerns.

In this context, law schools and training programs in general should invest in the training of students and lawyers to strengthen their comparative and interdisciplinary analytical skills. The objective is to strengthen the aptitude of lawyers to apply these skills to distinct categories of matters substantively diverging in nature. Such issues do not lend themselves to a linear, one-dimensional examination. These categories can be distinctive legal systems. They can be law and policy or political risk, different fields of knowledge, or other types of paradigms. As a specific example, law schools should expand their comparative law, cross-legal system and cross-disciplinary courses. Machine lawyers beware: the comparative law and multi-disciplinary human expert will be a potent adversary.

C. Originality and Creativity

Within the foreseeable time horizon, the ability of AI to create original output without considerable dependence on input will likely be limited. AI would be bound by the scope of information and tasks given to it at the outset. To be completely original, AI would essentially need to learn how to program and markedly modify its own algorithm. That

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[151] Emily M. Weitzenbock, *Good Faith and Fair Dealing in Contracts Formed and Performed by Electronic*, ARTIFICIAL INTELLIGENCE AND LAW (2004), https://link.springer.com/content/pdf/10.1007%2Fs10506-004-1908-0.pdf.

possibility, though expected at some juncture, is some ways away into the future. Until then, human original thought will likely remain unparalleled.

In the human context, teaching creativity is an attainable goal.[152] There have been numerous studies and commentaries on the pedagogical approaches to creativity in the context of higher education.[153] Nevertheless, creativity, originality and innovation find different expressions in different fields of knowledge and human endeavor. In the field of law, education and training are to some degree inherently doctrinal, repetitive and technical by design.[154] Much time is spent on teaching technical proficiency and subject-specific knowledge at the expense of, or at best without deliberately promoting, creative abilities and original thought.[155] However, in recent years there has been some progress in studying and researching how to teach creativity and innovation in legal education.[156]

In the AI age, creativity in the field of law will be a capability of paramount value. As an analytical skill, it will increase in importance over subject-specific knowledge, which will change faster than ever and will be more easily processed by AI. The capacity to devise new and hitherto unknown solutions to legal issues would be more highly prized than ever in a future where competition with AI competencies will be central to legal skills. Moreover, this would also bolster the socio-economic development as a whole, since the law is often not simply a social context but a tool for social change. In this vein, examples of creative thinking in the legal domain, which have also led to social or economic changes, can be found in multiple areas of the law, from constitutional jurisprudence (e.g., interpreting the right to privacy under the due process clause of the 14th Amendment of the US Constitution to extend to a woman's decision to have an abortion[157]), through international law (e.g., interpreting expropriation to encompass certain regulatory measures taken by governments, termed

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[152] See Thomas Chamorro-Premuzic, *You Can Teach Someone to Be More Creative*, HARV. BUS. REV. (Feb. 23, 2015), https://hbr.org/2015/02/you-can-teach-someone-to-be-more-creative.

[153] Victoria Gleason, *Cultivating 21st Century Law Graduates Through Creativity in The Curriculum*, 10 J. OF COMMONWEALTH L. & LEGAL EDUC. 1 (2015) (providing an example of a study conducted in two UK universities as part of the Imaginative Curriculum project has helped to shed some light on the question of how students in higher education experience and understand creativity. Many students engaged by the study struggled to explain what they thought creativity was and, rather than providing an explicit definition of creativity, typically employed 'ideas' to do so. These 'ideas' of creativity are, for example: 'freedom from routine'; an 'expression of imagination'; 'something personal' i.e. which could have only been created by that person; 'independence'; 'risk'; 'superficiality' (primarily concerned with being free from having to justify decisions); 'commonplace' (as in everyone is creative every day) and, lastly, something which is 'infectious. A desire on the part of the students for courses which allowed them some space to take risks 'free from the need to justify decisions and where failure was an opportunity for learning rather than a problem').

[154] Gary Watt, *Reflections on creative writing within a law and literature module, Law and Humanities*, J. OF L. & HUMAN., 247-284 (2015) (stating "[t]he legal work that law students first produce - case briefs, legal memos, opinion letters or appellate factums - tend to allow (even to encourage) writing processes that are repetitive and uncared for...").

[155] Lauren Dixon, *What Skills are Artificial Intelligence Students Learning?*, TALENT ECONOMY (Sept. 2, 2016) https://www.clomedia.com/2016/09/02/what-skills-are-artificial-intelligence-students-learning/.

[156] *See*, Carrie Menkel-Meadow, *Aha? Is Creativity Possible in Legal Problem Solving and Teachable in Legal Education?*, 6 HARV. NEGOT. L. REV. 97-144 (2001).

[157] Anita L. Allen, *Symposium: Privacy Jurisprudence as an Instrument of Social Change First Amendment Privacy and the Battle for Progressively Liberal Social Change*, 14 U. PENN. J. CON. LAW. 885 (Mar. 2012), https://www.law.upenn.edu/cf/faculty/aallen/workingpapers/14UPaJConstLaw885.pdf.

"regulatory expropriation"[158]), to corporate law (such as the concept of the poison pill in mergers and acquisitions[159]).

In view of this, law schools should, more than ever, structure curricula, course work, teaching and grading methods to boost creative thinking among law students. This necessitates, for example, frequently asking law students novel questions which never before arose in legal practice or jurisprudence. Or questions that would seek argumentation not based on case precedents, but based on the essence of law, legal principles, analogies with or borrowing from other systems of law or disciplines of knowledge, new contextual interpretations and new ways of thinking about and analyzing legal issues. This may mean less emphasis on existing case law and more focus on the application and interpretation of fundamental legal principles in wholly new contexts, and creating analytical bridges between principles that have not been connected before. More encouragement to creative thinking about new legal norms that need to respond to an ever-complex world surpassing legal regulation should start from law schools and flow seamlessly into practice. Law schools should also think of fundamentally new methods to teach creativity, which is in itself a daunting proposition. This, too, may be aided by infusing new and completely unrelated disciplines as methodological examples, such as art.[160]

D. Ethics, Judgment and Adaptability

The ethical and moral implications of AI are fundamental matters in its evolution. To be clear, this paper does not deal extensively with the ethical issues surrounding the use of AI itself, which in their own right raise a multitude of questions that will inform how AI is designed, used and regulated.[161] Given their complexity, these ethical issues warrant a separate comprehensive analysis that is beyond the scope of this paper. This article touches on ethics vis-à-vis AI to emphasize that in the currently foreseeable time horizon this area will continue to be a source of human lawyer advantage. AI is not yet at the stage where it can develop its own ethical compass and metrics. This is not to say, however, that in a more distant future AI would not be able to apply some type of a moral framework of AI "right"

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[158] Christoph Schreuer, *The Concept of Expropriation under the ETC and Other Investment Protection Treaties* (May 20, 2005), https://www.google.com/search?q=The+Concept+of+Expropriation+under+the+ETC+and+Other+Investment+Protection+Treaties%2C&oq=The+Concept+of+Expropriation+under+the+ETC+and+Other+Investment+Protection+Treaties%2C&aqs=chrome..69i57j0.61765j0j7&sourceid=chrome&ie=UTF-8.

[159] Corporate Finance Institute, *Poison Pill A Defensive Strategy to Dissuade Any Hostile Takeovers*, CFI (2015), https://corporatefinanceinstitute.com/resources/knowledge/deals/poison-pill-shareholder-rights-plan/.

[160] John C. Kleefeld & Patricia L. Farnese, *Incorporation a Creative Component in First-Year Law*, 6 THE CAN. J. FOR THE SCHOLARSHIP OF TEACHING & LEARNING 8 (2015) (stating "[t]o address this, we offered a creative option in two first-year law courses, worth 20% of the grade. Students who chose this option created a diversity of artistic works, including short stories, visual arts, literary criticism, culinary art, music and lyric composition, film, a blog, a video game, and a board game. Some of these works were of startling originality; all engaged in law in unconventional ways").

[161] Wendy Chang, *Artificial Intelligence in the Practice of Law*, AMERICANBARASSOCIATION (Apr. 3, 2017), https://www.americanbar.org/publications/litigation-news/business-litigation/artificial-intelligence-in-the-practice-of-law/ (stating "[t]echnology, especially AI technology, can be deceptive because its inner workings are invisible to the naked eye. A user cannot see what is going on behind the scenes. One asks a question, and the answer appears," believes Chang. In the end, lawyers cannot ignore their ethical obligations or abdicate their duties of professional responsibility to technology").

and "wrong" (e.g., by training it through reward incentives under the rubric of deep reinforcement learning).

Furthermore, machines are, at least for now, not equipped to develop and learn judgment and adaptability in the individual or collective human sense. Judgment requires an ability to make a decision not solely by processing information, but based on non-informational inputs, such as previous experience (even if unrelated to the present situation), thin-slicing,[162] understanding of a range of human interests and incentives, even such that are not rational or logically predictable. Adaptability to constantly changing legal or factual contexts is another area of human advantage. It would be difficult to predict such changes and build each potential scenario into an AI that is bound by a finite and a somewhat static algorithmic framework.

Thus, for some time human lawyers will remain with at least some competitive advantage over machines regarding questions of inherent ethics and judgment. For example, AI is not yet able to assign relative costs and benefits in ethical terms, giving appropriate weight to axioms that do not lend themselves to numerical or algorithmic valuation. How do you teach AI to recognize, through an algorithm, the social value of the Blackstone principle of criminal law that "it is better that ten guilty persons escape than that one innocent suffer."[163] Another example would be detecting an arbitrary decision-making which, at first glance, appears appropriate but does not pass a more detailed scrutiny in the context in which it has occurred (e.g., there was a hidden conflict of interest). This would also apply to other cases where the benefit of a given principle, rule, or action is measured more in social, collective terms, than in the context of an individual case or transaction. Those are the underlying interests holding the structure of the legal system together.

Law schools should, therefore, advance even further their approach to teaching ethics and judgment. This can be done through simulating exercises by, for example, replicating real-life situations that demand judgment calls, test ethical boundaries and require the balancing of competing interests of moral nature that may arise in the practice of law. In addition, the training of future lawyers should concentrate on the ethical considerations in using AI outputs. For example, there is an ethical side to employing AI in predicting litigation or regulatory risk (as explained above) in that it can lead to manipulation or abuse of the justice system. For instance, claimants may wish to have the proceedings with certain courts, judges or arbitrators that AI has determined to be favorable. Further, if an action to be taken by a company is illegal, but AI evaluates the risk of regulatory or judicial action as significantly low, the company may still be willing to consider undertaking it, assuming it solely focuses on risk; this analysis is about how the human utilizes AI rather than the capability of the AI itself. Therefore, it is essential to deal with the ethical implications of AI's application up front by educating law students and training junior lawyers adequately.

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[162] Gladwell, *supra* note 41 (describing thin-slicing as a term used in psychology and philosophy to describe the ability to find patterns in events based only on "thin slices", or narrow windows, of experience).

[163] *Commentaries on the Laws of England Book the First*, GUTENBERG (Dec. 30, 20019), https://www.gutenberg.org/files/30802/30802-h/30802-h.htmhe (stating the principle was formulated by the English jurist William Blackstone in his seminal work, Commentaries on the Laws of England, published in the 1760s).

E. Social Context Connectivity and Strategic Analysis

As shown above, the current trajectory of AI's progression over the near term evinces some limitations of AI in understanding context. There is a distinction between an AI neural network that processes inputs (e.g., case law precedents), even if vast in scope and nature, and the various contexts in which these inputs have been observed or have occurred, such as social, economic, or political contexts. The context is one layer removed from the knowledge imparted on AI. It informs the knowledge by virtue of its impact on the input data, but it is not necessarily taken fully into account in the application by AI to produce the output.

This is particularly relevant to law. Law is not a static domain; laws are hardly absolute norms outside of or irrespective of time and place. What was considered a fundamental principle of law in the past may no longer be of such stature, and vice versa. Legal interpretations should be viewed within the temporal bounds of socio-economic and legal development.[164] To understand a legal rule, one must first understand the social context in which it has arisen as well as the one in which it is applied. This is, for instance, manifested in the principle of legal interpretation by examining legislative intent. The intent behind a legal norm is, by design, informed by the social setting necessitating its adoption. Generally, AI's algorithms will likely assign somewhat absolute, albeit varying, non-contextual values to criteria. But legal issues are not absolute or existing in a vacuum from the socio-economic environment. Thus, lawyers will likely continue to have a competitive edge over AI in this respect.

A competency related to contextualizing a legal analysis is the ability for strategic thinking, that is to say, generally, to set normative parameters and to identify broad goals. In the legal field, strategic analysis is vital in utilizing law as a tool for socio-economic change. In particular, some of the pertinent applications of this skill arise at the intersection of law and policy. For instance, using tax law as a policy tool against tax evasion techniques or using criminal law in combatting drug use. Overall, strategic thinking abilities are especially critical in the age of mass information. It is ever more essential to synthesize the most relevant aspects of the vast amounts of information available in devising a long-term path to achieve a certain set of overarching objectives.

In this context, law schools should devote more resources to training students in contextual and strategic analysis. They can do so, for instance, by adding to their curricula specific courses designed to enhance the ability to understand relationships between contexts, legal rules, case outcomes, and social trends. Or, courses that embed law and policy analysis in the larger framework of strategic governance comprising of both the public and private sectors. As another option, law schools can also supplement existing coursework with an additional dimension connecting historical zeitgeists and the development of the law. This can be accompanied by legal experiments and lessons learned from previous normative strategies with implications for legal outcomes. There is a rich diversity of current and historical settings, varied in both geographical and temporal terms, that can form the backdrop against which law and social contexts are connected in the intellectual laboratory of a law

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[164] MOTOR VEHICLE ACT, RSBC, 1996, C 318 (CAN.) ("If the newly planted 'living tree' which is the Charter is to have the possibility of growth and adjustment over time, care must be taken to ensure that historical materials, such as the Minutes of Proceedings and Evidence of the Special Joint Committee, do not stunt its growth.").

school. If human lawyers can recognize a context that matters to the application of a legal rule, they will likely be ahead of their AI machine "peers" impaired by inherent non-contextuality.

F. Client Management, Communication and Advocacy Skills

An important dimension of a lawyer's work is interfacing with human decision-makers regarding taking a particular course of action (e.g., in the case of clients), or making a particular determination (e.g., in the case of judges, juries or other adjudicators). In the AI era, this dimension will grow in importance within the skillset of the human lawyer, whereas the technical processing of specific legal matters will reside more prominently within AI's competency.

With respect to clients, human interaction entails explaining clearly and in an understandable human language the legal reasoning and recommendations being made for consideration by the client. This also involves convincing the client of the benefits of a proposed course of action, which can be particularly tricky in situations where multiple options or solutions are available to the client with varying degrees of sensitivity and risk. With respect to human adjudicators, an important part of the advocacy skillset of the litigator is, for example, persuading the decision-maker of the credibility of a human witness; though, it is possible to imagine a distant future where an AI-powered machine "appears" as an expert witness in litigation proceedings.

Many of the aspects of a lawyer's role require a particular human touch and sensibility that, at least in the near future, a human lawyer would be better equipped to handle. These tasks are too subjective and personalized to be successfully pursued by an AI-propelled algorithmic sequence. Such tasks require tailored understanding of the particular human on the receiving end of the information and the situational circumstances. Of course, it is possible to imagine in the more distant time horizon an AI that can read human emotion (e.g., through facial expression mapping). But this type of human understanding of the full spectrum of personalized human interpretation, such as of the face, words, place in which the conversation is taking place, the circumstances in the life of the person, the mood that can be affected by multiple factors such as weather or whether the person is hungry,[165] is still some distance away from optimal implementation by AI.

In this regard, law schools and legal trainings would be well-advised to explore innovative ways to boost human lawyers' client management and human persuasion and advocacy skills. Human lawyers will likely continue to have the upper hand in adding value in the future competition with AI. This also includes interpersonal skills such as being able to relate to and interact with clients and other recipients of legal output, as well as being able to generate trust. In addition to the plethora of legal advocacy courses and seminars that are currently in their curricula, law schools can pursue this by, for instance, creating environments and exercises simulating sensitive client issues, common difficult clients or typical client crises situations. The ability to do technical legal analysis should be coupled with an even greater competency to translate the analysis into legal output better-tailored to

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[165] *See e.g.* Danziger et. al., *Extraneous factors in judicial decisions* (Apr. 12, 2011), www.pnas.org/content/108/17/6889.full (contending that hungry judges are harsher; how can such consideration be built into an AI algorithm?).

human grasp. Since a legal analysis is ultimately addressed to a human, it will help if the human intermediary translating the results of the analysis is equipped with superior skills of legal communication and inter-personal connection.

G. New Legal Skill: Mastery and Management of Legal AI as a Technological Innovation

With the rise of AI, not only would certain existing skills become more critical and attractive to human lawyering in the age of AI, but there will likely be wholly new skills, tasks and activities that do not exist today. At this juncture, the scope of such activities is difficult to predict. One example of a new segment in the legal domain that is gaining momentum and will likely grow is the field of AI legal engineering and the management of legal AI.[166] This includes, for example, the capability to customize AI to the field of law and to design algorithms with special usage in law.

It is expected that the legal domain will generally be somewhat better protected than other fields from total and sweeping AI conquest. Legal AI will likely not be designed predominantly as a standalone tool. The more probable paradigm of AI use is the intertwined approach of the "AI lawyer" **plus** the "human lawyer," without full mutual exclusivity. In this context, writing algorithms for legal tasks would become a new human skill in managing AI. Lawyers would need to be adept at not just managing people, but managing machines. This would necessitate understanding the technology inside and out, the applicable algorithms, the scope of AI capabilities and their limitations, the output produced, and how it can be used and customized to law. Additionally, once designed, how it can be managed continuously to produce verifiable and reliable results that can be included into the final deliverables that lawyers produce to clients, regulators or other recipients. In fact, the entire field of legal innovation, including AI, will progressively gain further significance. Law schools are starting to recognize the growing needs of this segment of legal knowledge and are beginning to create programs to respond to them.[167] Schools should further strengthen these efforts, by including or considering wholly new types of degrees in legal AI engineering in conjunction with university IT departments.

V. REGULATION OF THE MACHINE LAWYER

Undoubtedly, some of the paramount challenges presented by AI's evolution relate to the legal framework regulating AI. This topic necessitates a separate in-depth analysis in itself, which is beyond the scope of this paper. It should be noted that there is an urgent need to devise a comprehensive legal framework for AI, which is critically missing at present. This governing framework will need to encompass a wide spectrum of diverse issues. For example, such issues as the use of autonomous AI in controlling weaponry, the legal liability

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[166] *See* Gary E. Marchant, *Artificial Intelligence and the Future of Legal Practice*, A.B.A. (Nov. 14, 2017), https://www.americanbar.org/content/dam/aba/administrative/litigation/materials/2017-2018/2018-sac/written-materials/artificial-intelligence-and-the-future.authcheckdam.pdf.

[167] Winick, *supra* note 8.

of human actors for AI actions (e.g., accidents caused by driverless cars[168]), and the legal rights to be afforded to machines (e.g., granting citizenship to robots[169]).

One of the key elements of such a comprehensive legal framework for AI is the regulation of the AI-lawyer, whenever in the future such a separate unit arises as a quasi-independent entity. Human lawyers have been, for a long time, governed by detailed professional rules of conduct enshrining ethical principles of the legal profession.[170] Should' the machine lawyer also be subject to an elaborate set of professional rules carefully crafted to deal with the ethical and other matters to arise in the activities of AI in legal practice? The more autonomy the AI legal expert gains, the more the answer will need to be a resounding "yes." These special AI-lawyer professional rules should be coupled with the new rules that will need to be adopted to govern the work of human lawyers in using legal AI. Some of the questions and criteria to consider in this regard are: who should an AI-powered lawyer be reporting to and what kind of monitoring by human lawyers is both practical and necessary; how should AI algorithms be overseen, and, if necessary, sanctioned, if they lead to unintended consequences in their implementation; what would be the equivalent concept to conflict of interest in legal AI (can a machine have or recognize such conflict?); how much of the legal analysis by AI is to be verified in detail by a human attorney without full duplication; what changes to legal procedures, such as court and administrative proceedings, are necessary to accommodate technological advances to enhance the justice system. These are largely open questions. Yet, they need to be urgently addressed if we are to build a coherent, harmonious framework for deploying AI in law.

VI. CONCLUSION

The rise of AI poses a constantly growing number of challenges and dilemmas in a wide spectrum of areas of human endeavor and fields of knowledge. Many of them frequently find prominent spots in everyday news and social media. A multitude of the issues to grapple with are of ethical nature, such as 'killer robots' controlling autonomous weapons, protection of privacy, and conscious or unconscious biases embedded in AI by the individuals who select and label the inputted data and program the AI algorithms, to name a few. There are also political implications, with AI being developed and used to profile participants in the political process such as voters for electoral or other political purposes. The economic ramifications of AI are, too, likely to be of enormous magnitude by upending whole sectors of the job market and profoundly altering multiple professions. An attendant socio-economic peril of AI is the potential for the disproportionate concentration of social and market power in the hands of a few companies with exclusive control over AI evolution and use.

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[168] Warren Moïse, *Rules of the Road, or the Lack Thereof: A Heads Up on Driverless Vehicles*, 29-NOV S.C. LAW. 16, at 16-17 (2017) (noting that much commentary assumes that fault will devolve upon the software writers and manufacturers, and that the person inside the vehicle will be blameless).

[169] Andrew Griffin, *Saudi Arabia Grants Citizenship to a Robot for the First Time Ever*, INDEPENDENT (Oct. 26, 2017), https://www.independent.co.uk/life-style/gadgets-and-tech/news/saudi-arabia-robot-sophia-citizenship-android-riyadh-citizen-passport-future-a8021601.html

[170] *See generally* Model Rules of Prof'l. Conduct, A.B.A. (1983).

In this larger framework, some of the paramount challenges presented by AI's evolution are and will be related to the law. This paper examined the comprehensive implications of AI for the legal profession and the necessary future skills of human lawyers. The analysis is largely forward-looking, envisioning a future trajectory in view of today's developments and current predictions.

Like most professions, lawyers will need to adapt to the AI future. Yet, the law profession and the system of legal education are not yet reflective of this need. The age of AI will expose human lawyers to AI competition and some jobs or facets of jobs will be displaced. The question will then be how best to respond to this new world. Technological protectionism, i.e., artificially preserving tasks for humans that are more efficiently done by AI lawyers- will not work in a global market place powered by technological advancements. The better option is to adapt by strengthening the skills that will equip future lawyers with a competitive advantage over AI-powered lawyers. Some of these skills will be multi-disciplinary and multi-layered non-linear analysis, originality and creativity, judgment and ethics, social context and strategic assessment, and client management skills, including interpersonal relatability. Importantly, the training of future lawyers should concentrate on the ethical considerations in using AI. This set of skills of the future will, in turn, inform the design of new legal training, most notably law school curricula and teaching methodologies. Lawyers cannot control technological advancements and their impact on legal work. However, lawyers can pursue a new vision for the legal profession, starting with educating future generations of lawyers. Law schools must be some of the first responders to the incoming AI wave. Lest the human lawyer, though perhaps not at an imminent risk of becoming a relic of the past, will be unprepared for the turbulence to come.