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The Marriage of Artificial Intelligence and Tax Law: (I) Past & Present

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According to recent research's prediction,[1] global GDP could be up to 14% higher in 2030 as a result of various artificial intelligence (AI)[2] applications, which is the equivalent of an additional $15.7 trillion. It makes AI oriented sectors the biggest commercial opportunity in the currently supersonic fast changing economy. This contribution, perhaps surprisingly, does not aim to propose how to tax profits generated by AI industries.[3] The author rather takes an attempt to depict a potential of AI technologies to be applied to tax law. This first part focuses on past and present of AI and tax law. Let us see if there are solid foundations for a happy marriage between AI and tax law.

Past: A Brief Origin of AI and Tax Law

Although lawyers have been using different varieties of legal technologies (or law tech) based on AI in their work in recent years, the idea stretches back to the 1970s.[4] One of the earliest, best-known, and most sustained projects on AI and law targeted the use of AI in the area of tax law. It was called "Taxman", and was the brainchild of L. Thorne McCarty (called also "the father of AI and law"), then assistant professor at Harvard University.[5]

Taxman was originally designed as a rudimentary form of "legal reasoning" in the very narrow area of US corporate tax law (re-organization of corporations). Its task was to determine whether or not a given re-organization of companies was exempt from income tax. It was meant to proceed by classifying a re-organization case (requiring the description of the case to be fed into the program) under a Type B, Type C, or Type D classification in sections 354, 355 and 356 of the Internal Revenue Code (IRC), respectively. The extended version of Taxman covered a much wider area of corporate tax law: the full tax treatment of the parties to a re-organization as well as the tax treatment of corporate distributions outside the re-organization. Ultimately, Taxman aimed to "understand" and distinguish between abstract tax-related concepts, such as "form" and "substance", and translate them into more precise and concrete concepts. This development, however, has never happened.

In addition to Taxman, (mainly between 1970s and 1990s) many other AI ideas related to the tax law were hatched, classified as "rule-based reasoning".[6] They included "Tax Advisor", written by Dean Schlobohm; "Tax Return Consultant". written by a team of Artificial Intelligence students at

the University of Toronto; and "Taxadvisor", written by Robert Michaelsen. Why was tax law considered particularly well suited for AI?

McCarty, for example, saw corporate tax law as the most suitable area of law for exploring possibilities of AI because of its many levels of commercial abstraction that are "artificial and formal systems themselves, drained of much of the content of the ordinary world", and because, by legal standards, it is very technical.[7] He said corporate tax law relies much more than other areas of law on the concepts developed purely for purposes of (tax) law; it was therefore rather artificial and had no equivalents in ordinary human experience, in contrast to, for instance, civil or criminal law, both of which are full of concepts reflecting or regulating daily life, e.g. births, deaths, marriages, divorces, inheritance, etc. McCarty aptly observed that the "simplest" legal problems of first-year law students are the hardest for AI because they require ordinary human experience, which is so alien to AI, but inherent to students. McCarty also emphasised the technical complexity of tax law (tax law may be seen as the most technical areas of law), which is very difficult to comprehend and deal with for lawyers, and therefore well suited to be assisted by AI.

Overall, his observations are persuasive not least because AI beats human champions in highly complex games, such as Go, chess, poker, while still being incapable of even the simplest tasks a 5-year-old can do.[8] In other words, tax law, being highly complex and technical in structure and content, may be one of the best candidates to be addressed by an AI.

Present: Barriers to the Development of Commercial AI Tax Legal Experts

Although tax law has been widely used as a legal basis for developing AI projects, these projects have primarily belonged to the theoretical realm. In particular, the ideas of McCarty and other authors that used the rule-based reasoning/expert approach to the design of AI, have been criticised for taking the de-humanizing (i.e. artificial) aspects of positivism to the extreme by (incorrectly) always assuming a near match between legal concepts and the features of a case of relevance to the concept. In fact, such matches are not automatic, but result from legal analysis and can therefore not be assumed under the type of rule-based reasoning applied by an AI.[9]

Other AI projects relying on case-based reasoning, hybrid reasoning (a combination of rule-based and case-based reasoning to develop a hybrid legal expert system), and neural networks, also failed in the commercial market.[10] Indeed, the more work invested in AI and law, the harder the problem of its practical use appears to be.[11] But research into AI and law has proved, however, to be very useful by revealing the barriers AI developers need to overcome before AI can be applied successfully to law in practice, including tax law.

The biggest barrier follows from the fact that tasks which are easy for humans, such as reading and understanding a text, common sense reasoning and devising explanations, are the most difficult for AI to grapple with. It is, of course, impossible to perform any legal task without having mastered the necessary skills. Indeed, every lawyer has to be able to give a proper meaning to a legal text in a rational way (legal interpretation), which in many (if not most) situations requires them to deal with ambiguities and legal uncertainties (statutory and/or case law) in various circumstances and socio-economic contexts. Moreover, since law is an effective tool for influencing human behaviour and changed behaviour changes reality, to know the law is not enough to decode its meaning from the text, but also through the prism of its purpose.[12]

[1] See PWC, *Sizing the prize What's the real value of AI for your business and how can you capitalise?*, 2017, https://www.pwc.com/gx/en/issues/analytics/assets/pwc-ai-analysis-sizing-the-prize-report.pdf.

[2] AI is a very broad term and therefore may be confusing. For the purpose of this draft, AI is understood broadly as "activity devoted to making machines intelligent, and intelligence is that quality that enables an entity to function appropriately and with foresight in its environment". For more on this, see N. Nilsson, The Quest for Artificial Intelligence: A History of Ideas and Achievements p. 13 (Cambridge U. Press 2009). Technically, machine learning is a subfield of AI. See P. Domingos, *The Master Algorithm: How the Quest for the Ultimate Learning Machine will Remake Our World*, p. 8 (Basic Books 2015).

[3] For that see, for instance, L. de Lima Carvalho, *Spiritus Ex Machina: Addressing the Unique BEPS Issues of Autonomous Artificial Intelligence by Using 'Personality' and 'Residence'*, 12 January 2019, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3306427 (accessed: 12.01.2019).

[4] *See* B. G. Buchanan & T. E. Headrick, *Some Speculation about Artificial Intelligence and Legal Reasoning*, 23 Stanford Law Review 1, November 1970, pp. 40-62.

[5] *See* L. T. McCarty, *Reflections on "Taxman": An Experiment in Artificial Intelligence and Legal Reasoning*, 90 Harvard Law Review 5, March 1977, pp. 837–893.

[6] They are also classified as "expert systems" because they seek to mimic the way in which a human expert in a certain field applies her skills to specific types of problems, for example, tax related problems. *See* generally R. E. Susskind, *Expert Systems in Law: Jurisprudential Inquiry*, Oxford: Clarendon, 1987.

[7] *See* L. T. McCarty, *Some Requirements for a Computer-based Legal Consultant*, Technical Report LRP-TR-8, Laboratory for Computer Science Research, New Jersey: Rutgers University, p. 4. Cited after: J. Popple, *A Pragmatic Legal Expert System*, Dartmouth: Aldershot, 1996, p. 27.

[8] *See* J-P. Fillard, *Brain vs Computer: The Challenge of the Century*, London: World Scientific, 2017, p. 86. Cf. Kurzweil who described the difficulty an AI has in addressing broad realms of knowledge, with ambiguous language, and with contextual communication. *See* R. Kurzweil, *The Age of Intelligent Machines*, Massachusetts: MIT Press, 1990, pp. 299, 302–307.

[9] *See* K. D. Ashley, *Modeling Legal Argument: Reasoning with Cases and Hypotheticals*, Artificial Intelligence and Legal Reasoning Series, Massachusetts: MIT Press (Bradford), 1990, pp. 220 –227; R. N. Moles, *Definition and Rule in Legal Theory: A Reassessment of H. L. A. Hart and the Positivist Tradition*, Oxford: Basil Blackwell, 1987, p. 20.

[10] *See* M. Aikenhead, *The Uses and Abuses of Neural Networks in Law*, 12 Computer & High Technology Law Journal 1, 1996. *See* generally R. Kurzweil, *The Age of Intelligent Machines*, Massachusetts: MIT Press, 1990, pp. 139–142; M. H. Hassoun, *Fundamentals of Artificial Neural Networks*, Massachusetts: MIT Press, 1995.

[11] *See* S. M. McJohn, *Review of the "Artificial Legal Intelligence" by Pamela N. Gray, Brookfield, VT: Dartmouth Publishing Co., 1997*, 12 Harvard Journal of Law & Technology 1,

1998, p. 248. *See* more generally D. G. Stork (ed.), *Hal's Legacy: 2001's Computer as Dream and Reality*, Massachusetts: MIT Press, 1997.

[12] Cf. "To know the law is not merely to understand the words, but as well their force and effect" (*scire leges non hoc est verba earum tenere sed vim ac potestatem*), the words of Celsus, a 2nd-century Greek philosopher, as included in Justinian, *Digest*, Book 1, Title 3, p. 17, available online at: http://hls.harvard.edu/library/about-the-library/history-of-the-harvard-law-school-library/quotations-in-the-langdell-reading-room/ (accessed 21/3/2018). *See* more on goal oriented interpretation of law in R. Dworkin, *Law's Empire*, Cambridge: Harvard University Press, 1986, p. 321.

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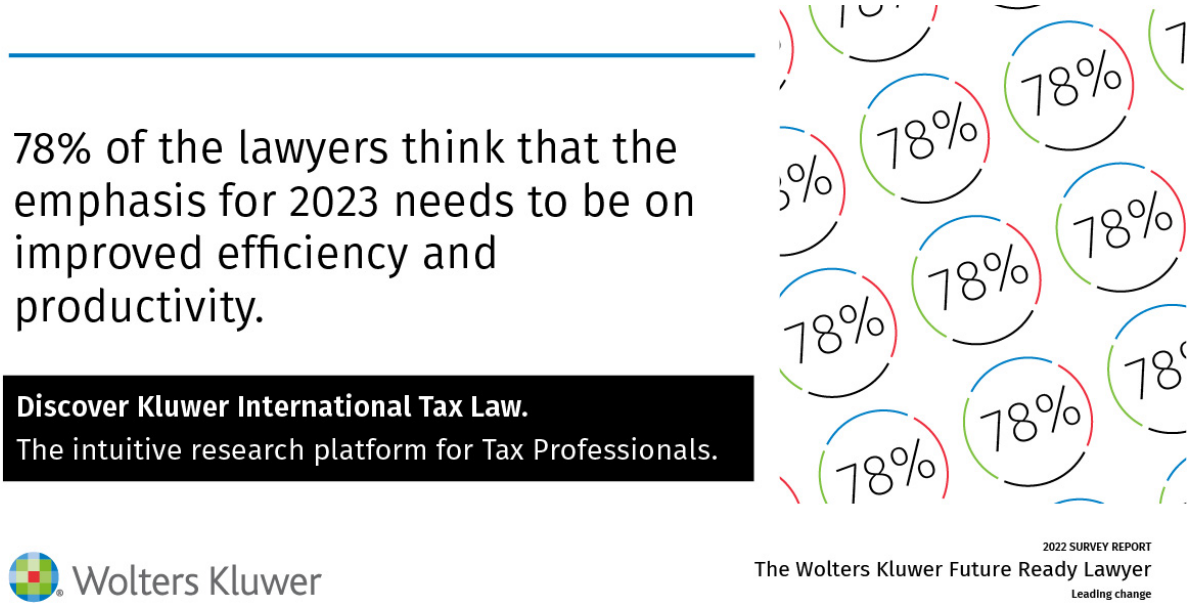

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