



ARTIFICIAL INTELLIGENCE IN LAW: THE STATE OF PLAY 2016

by Michael Mills

Artificial Intelligence (AI) and its impact and applications in the legal profession is examined in this white paper by Michael Mills, Co-Founder & Chief Strategy Officer of Neota Logic, a provider of intelligent software.

Mills analyzes AI – what the author calls a “big forest of academic and commercial work around ‘the science and engineering of making intelligent machines’” – and how AI is being implemented in legal areas such as e-discovery, legal research, compliance, contract analysis, case prediction and document automation.



INTRODUCTION

Google Plays Go, Wins! No, that's not another [unpublished Dr. Seuss book](#). It's the dramatic outcome of artificial intelligence research at Google's Deep Mind subsidiary, whose [AlphaGo program recently won five straight games against the top-ranked Go master in Europe](#). The game of Go is 2,500 years old and, despite its simple rules, is many orders of magnitude more complex than chess.

What is most remarkable about AlphaGo's victory is that AlphaGo was not "taught" how to play Go. Instead, its multilayer neural network learned how to play, and then how to win, by playing millions of games and observing the winning strategies.

Ten years ago, [IBM Deep Blue defeated](#) the reigning world champion chess player. Five years ago, IBM Watson defeated the two best Jeopardy players. One year ago, [Google Deep Mind learned to play, and win](#), 46 old Atari arcade games. Today, Deep Mind plays Go, wins. ([Facebook AI Research](#) is [playing Go](#) too, and you can watch.)

These stunning and rapid advances in software that does what humans do, but better, invite not only an optimistic question – what next? – but also a worried warning. In [an editorial](#) accompanying publication of the AlphaGo research, the journal *Nature* wrote:

As the use of deep neural network systems spreads into everyday life – they are already used to analyze and recommend financial transactions – it raises an interesting concept for humans and their relationships with machines. The machine becomes an oracle; its pronouncements have to be believed.

When a conventional computer tells an engineer to place a rivet or a weld in a specific place on an aircraft wing, the engineer – if he or she wishes – can lift the machine's lid and examine the assumptions and calculations inside. That is why the rest of us are happy to fly. Intuitive machines will need more than trust: they will demand faith.

So, what does this mean for law?

The other day, a search for "artificial intelligence in law" produced 86,400 results from just the News section of Google's vast index. From the Web as a whole, 32.8 million results, and from Videos – 261,000, beginning with Jude Law's role as Gigolo Joe in the movie "A.I." (thank you, [RankBrain](#)).

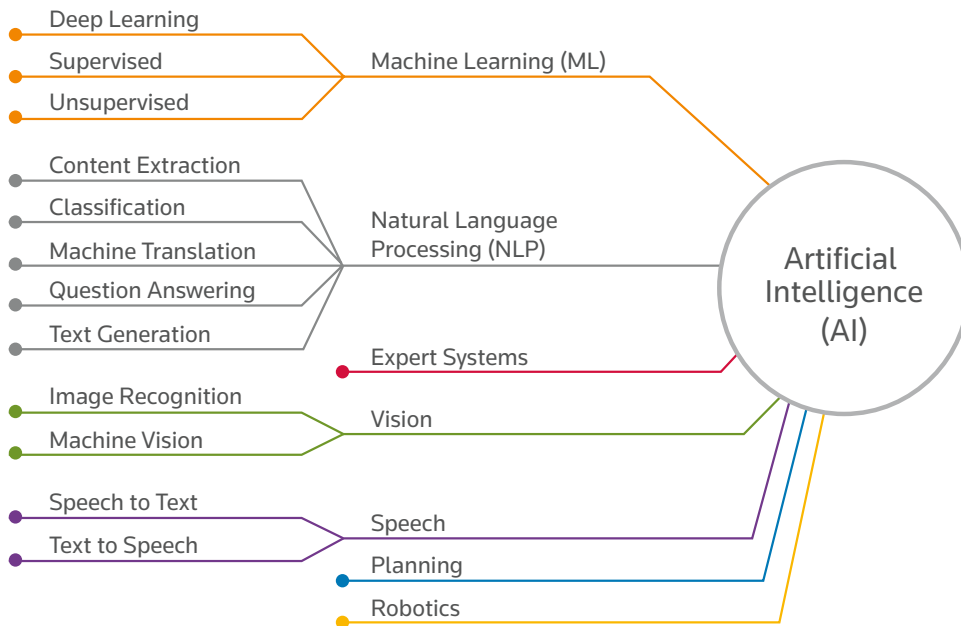
The first News story was "[Law firm bosses envision Watson-type computers replacing young lawyers](#)," reporting on the answers to one question in the recent [Altman & Weil survey of law firm leaders](#). As [wittily argued by Ryan McClead](#), "the question is flawed on many levels [and] ... it's time to cut the hysteria surrounding artificial intelligence in law."

Yes, there's something going on here. But we need to parse the pile a bit. What is Artificial Intelligence (AI)? What is AI doing in law? Who is doing it? And where is it headed?

WHAT IS THIS THING CALLED AI?

AI is a big forest of academic and commercial work around "the science and engineering of making intelligent machines," in the words of the person who coined the term artificial intelligence, John McCarthy. A thorough and hype-free review of AI in business was published recently by Deloitte, "[Demystifying Artificial Intelligence](#)," suggesting the term "cognitive technologies" to encourage focus on the specific, useful technologies that emerge from the broad field of AI.

However labeled, the field has many branches, with many significant connections and commonalities among them. The most active today are shown here:



Lawyers do not need robots or machine vision, but other branches of AI are indeed useful. Practical use of cognitive technologies in legal services is by no means new, nor did it begin when IBM's general counsel [predicted that Watson could pass the bar exam](#) by 2016.

HARD AT WORK IN LAW

Artificial intelligence is hard at work in the law – for example, in legal research, e-discovery, compliance, contract analysis, case prediction, and document automation – though often there is no “AI Inside” label on the box.

Machine learning, expert systems, and other AI techniques enable lawyers to devote more of their time to more valuable (and interesting) work. Mining documents in discovery and due diligence, answering routine questions, sifting data to predict case outcomes, drafting contracts – all are faster, better, cheaper, and becoming more so with the assistance of intelligent software.

LEGAL RESEARCH

Lexis® and Westlaw® have applied natural language processing (NLP) techniques to legal research for 10-plus years. No doubt Bloomberg BNA does as well. After all, the core NLP algorithms were all published in academic journals long ago and are readily available. The hard (very hard) work is practical implementation against good data at scale. Legal research innovators like Fastcase and RavelLaw have done that hard work, and added visualizations to improve the utility of results.

Recently, ROSS Intelligence has been applying IBM Watson's Q&A technology to legal research on bankruptcy topics, after [winning a finalist spot](#) in an IBM Cognitive Computing Competition among 10 universities. After building and training the data set, ROSS invites users to evaluate search results and feeds those evaluations back to

the engine to continue tuning (the essence of machine learning) in the manner of recommendation engines at Netflix and Amazon® as well as Google® feedback loops, based on what we do with the search results we're shown. No date for commercial release of ROSS has been announced.

Last October, Thomson Reuters, publishers of Westlaw (and incidentally, the Legal Executive Institute blog), [announced a collaboration](#) to use Watson across Thomson Reuters information businesses. Although nothing was said publicly about Thomson Reuters specific plans for Watson, one could speculate that the vast trove of legal content in Westlaw and the army of subject-matter experts in the company could together do impressive things to improve legal research. Watson needs big data and training, at least initially, by people: Thomson Reuters has both.

On February 1, at a private "innovation summit," Thomson Reuters teased the legal industry with hints that Watson Esq. will ride into town with a beta service for financial services regulation by the end of this year. [Jean O'Grady's commentary](#) is, as usual, acute.

Take note of the timeline: Even a company with the immense resources of content and expertise of Thomson Reuters, even in partnership with IBM, needs more than a year to get to beta with an AI legal research product. Why? Because neither AI nor Watson is magic. It takes time, human expertise, and painstaking effort to assemble useful data sets, analyze the content, train the algorithms, and test the results. The broader the targeted topic, the greater the effort. For perspective, the [IBM Jeopardy team's account of their work](#) is excellent.

ELECTRONIC DISCOVERY

Technology-assisted review (TAR, or predictive coding) uses natural language and machine learning techniques against the gigantic data sets of e-discovery. [Recommind](#), [Equivio](#) (now part of Microsoft®), [Content Analyst](#), and other vendors develop or license these tools. TAR has been proven to be faster, better, cheaper, and much more consistent than human-powered review (let's have another initialism: HPR). See, for example, the paper by University of Waterloo's Gordon V. Cormack and Wachtell, Lipton, Rosen & Katz's Maura R. Grossman, [Evaluation of Machine-Learning Protocols for Technology-Assisted Review in Electronic Discovery](#). (The story of Grossman and Cormack's work [was well told recently](#) by Susan Beck in [The American Lawyer](#).)

Yes, it is assisted review, in two senses. First, the technology needs to be assisted; it needs to be trained by senior lawyers very knowledgeable about the case. Second, the lawyers are assisted by the technology, and the careful statistical thinking that must be done to use it wisely. Thus, lawyers are not replaced, though they will be fewer in number.

Done right, TAR is both powerful and reliable. Doing it right isn't easy. One needs to understand the principles, and even some of the statistical mathematics, especially when appearing in court to argue that the outcomes are defensible and consistent with the standards of Federal Rule of Civil Procedure 26 and comparable rules in other courts.

A good place to start the journey to understanding is [TAR for Smart People](#), a book by John Tredennick, one of the pioneers of e-discovery (and legal technology generally). [TAR for Smart People](#) is a superb guide to a critical and often misunderstood topic. The book is clear but technically deep, founded on fact, balanced, and engaging. Who knew statistical sampling could be fun?

In scale and impact on costs, TAR is the success story of machine learning in the law. It would be even bigger but for the slow pace of adoption by both lawyers and their clients.

OUTCOME PREDICTION

[Lex Machina](#), after building a large and fine-grained set of intellectual property (IP) case data, uses data mining and predictive analytics techniques to forecast outcomes of IP litigation. Recently, it has extended the range of data it is mining to include court dockets, enabling new forms of insight and prediction. For example, the Motion Kickstarter enables:

attorneys [to] view granted motions with denied motions to see what's working and what's not. Enter a judge's name and motion type and instantly view the judge's recent orders on that motion type, as well as the briefing that led up to those orders.

[LexPredict](#) has built models to predict the outcome of Supreme Court cases, at accuracy levels challenging experienced Supreme Court practitioners. [Premonition](#) says they are using data mining and other AI techniques "to expose, for the first time ever, which lawyers win the most before which judge."

Perhaps Huron's Sky Analytics and the new AIG spinoff, [Legal Operations Company](#), can use their big databases of law firm case and billing data to offer outcome predictions as well as cost and rate benchmarks.

SELF-SERVICE COMPLIANCE

[Neota Logic](#) applies its [hybrid reasoning platform](#), which combines expert systems and other artificial intelligence techniques, including on-demand natural language processing (NLP) and machine learning, to provide fact- and context-specific answers to legal, compliance, and policy questions. (Disclosure: I am co-founder and chief strategy officer of Neota Logic.)

[ComplianceHR](#), a joint venture of [Littler Mendelson](#) and Neota Logic, offers a suite of Navigator applications to assist human resources professionals in evaluating independent contractor status, overtime exemption, and other employment law issues. [Foley & Lardner](#) uses expert systems technology to power its [Global Risk Solutions](#) service, an "integrated Foreign Corrupt Practices Act (FCPA) compliance solution that addresses each of the 'hallmarks' of an effective anti-corruption compliance program identified" by regulatory authorities.

CONTRACT ANALYSIS

General counsels recognize that their [high priorities of risk management and cost reduction](#) are served by understanding and managing the rights, obligations, and risks in a company's contracts, and rationalizing the processes by which contracts are initiated, negotiated, drafted, and managed through their life cycle, from execution to expiration.

Natural language processing, machine learning, and other AI techniques are being applied to many aspects of the contract life cycle, including discovery, analysis, and due diligence.

For example:

- [Kira Systems](#) reports that contract review times in due diligence can be reduced by 20 to 60%.
- [KM Standards](#) can "identify common clauses, agreement structure, standard clause language, and common clause alternatives" in a set of contracts.

- [RAVN](#)'s cognitive computing platform, the Applied Cognitive Engine (ACE to its friends), will "read, interpret, and summarize" key information from contracts.
- [Seal Software](#) can crawl a network to discover, and then classify, all of a company's existing contracts.

Contract analytics is well on its way to being a success story for machine learning in the law.

IS IT TIME TO GET IN THE GAME?

Many, perhaps most, law firms choose not to be early adopters of new technologies. Likely, that is not because they have read about the rewards of being a "fast follower" instead of a "first mover." Rather, they are lawyers – educated to precedent, alert to their peers, wary of failure, and hence, reluctant to experiment.

However, as I hope this quick tour has shown, notwithstanding the chatter and excitement about the arrival of Watson in Law Land, the techniques of cognitive technologies are robustly at work in the trenches of law practice, doing useful work today – improving service to clients, reducing costs, and creating new opportunities for firms.

THE FUTURE?

More, and better, of course. Cognitive technologies in the law are riding a wave of ever-smarter algorithms, infinite scaling of computer power by faster chips and cloud-clustered servers, intense focus by companies led by seasoned experts, and an ever-greater demand from clients for cheaper, faster, better services.

Note that cheaper is only one of the three words. Faster is important – companies measure cycle time, time to market, and other indicia of speed throughout their businesses, and increasingly expect their lawyers to do the same. And better is critical – big companies face ever-growing regulatory and operational complexity, for which traditional legal services on the medieval master craftsman model are simply inadequate.

To meet those needs, only technology-enabled services will do the job. And artificial intelligence is driving those changes.



Michael Mills

Michael Mills is the co-founder & chief strategy officer of Neota Logic, served as chief knowledge officer of Davis Polk & Wardwell, and was a partner at Mayer Brown.

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