ARTIFICIAL INTELLIGENCE & THE IMPLICIT MEANING OF LANGUAGE[±]

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Artificial Intelligence (AI) and machine learning have lit imaginations across many industries, including the legal profession. Speculations range from exuberant optimism about what these new technologies can achieve to troubling doomsaying, ultimately predicting a near-complete replacement by machines in entire industries. Neither of these extremes are likely to happen for lawyers, though. In fact, the legal profession is no stranger to AI. For several years now, lawyers have been using predictive coding– a method in which lawyers train computers through keywords and phrases to identify relevant documents for eDiscovery.[1] However, a new wave of algorithms that possess a far greater capacity to understand language is being implemented into the legal profession, making multiple legal tasks quicker, more accurate, and more efficient. Numerous software companies have emerged that are using AI algorithms to address issues that burden lawyers in their day-to-day work.[2] Many of the tech startups developing legal software are unsurprisingly headed by both practicing lawyers, who personally know what lawyers need to increase productivity, and AI experts, who are now equipped with the development tools needed to serve these needs.[3] This article examines some of the software platforms using this new, advanced form of AI, what makes them different from existing technology, and how their implementation into firms and in-house legal departments will enhance the capabilities of lawyers.

[±] This paper is intended to survey the AI and machine learning advancements that power various commercial legal AI tools, with a focus on the progress and use of AI natural language processing. None of the statements contained in this paper should be construed as promoting or advertising any of the products mentioned.

[1] *See* Thomas C. Gricks III & Robert J. Ambrogi, *A Brief History of Technology Assisted Review*, LAW TECH. TODAY (Nov. 17, 2015), https://www.lawtechnologytoday.org/2015/11/history-technology-assisted-review; Wallis M. Hampton, *Predictive Coding: It's Here to Stay*, PRACTICAL LAW (June/July 2014), https://www.skadden.com/-/media/files/publications/2014/06/lit_junejuly14_ediscoverybulletin.pdf.

[2] Additionally, non-commercial entities like universities are also researching AI applications to legal services. *See, e.g., University of Oxford Receives £1.2m for AI and Legal Services Project*, UNIV. OF OXFORD NEWS (Nov. 29, 2018), http://www.ox.ac.uk/news/2018-11-29-university-oxford-receives-%C2%A312m-ai-and-legal-services-project.

[3] Discovery, research, document review, and contract review are all repetitive tasks that AI can help to make less time-consuming, allowing lawyers to focus on other tasks like client relations.

ROSS, TEXT IQ, & A MORE LANGUAGE-SAVVY AI

ROSS claims that its self-titled platform is the "first artificially intelligent lawyer."[4] ROSS is powered by IBM's Watson – a question-answering system that first came to attention after winning a game of Jeopardy against two former champions and has since been applied in many fields, including healthcare and finance.[5] Instead of inputting long chains of search terms and modifiers in a monotonous and impersonal fashion, lawyers ask ROSS legal and research questions the same way they would ask another lawyer.[6] ROSS then searches its legal databases to return thoughtful, evidence-based answers, making proper inferences along the way that previous search algorithms were not complex enough to make.

Andrew Arruda, a lawyer and the CEO and Cofounder of ROSS, hopes to develop ROSS enough to act as another lawyer among a team of human lawyers. The goal is to make it so ROSS can have fluid, open conversations with lawyers about legal issues, as opposed to simply a device that can answer direct questions. Arruda even discussed putting ROSS into hardware similar to the Amazon Echo. That way, it can be placed on a table and participate in conferences with multiple lawyers. Because ROSS uses machine learning, it improves its legal understanding through continued inquiry and conversation. ROSS Intelligence is also the first AI to be integrated into the curriculum at various law schools. For example, Northwestern Pritzker School of Law now familiarizes its students with ROSS Intelligence through courses and library research, and allows students to directly apply ROSS and other technology through internships.[7]

As ROSS shows, improving AI's language skills is a key component to expanding the technology's usefulness in the legal profession. Although AI has been able to recognize words and grammar for years, it has only been able to do so at face value. It could tell you what a particular word or sentence meant, but it couldn't *read between the lines*, so to speak. It could not identify more abstract themes or concepts that are not explicitly written in

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[4] Diane Bédat, *The World's First Artificially Intelligent Lawyer*, ROSS NEWS (Dec. 12, 2016), https://rossintelligence.com/the-worlds-first-artificially-intelligent-lawyer.

[5] *See* Conner Forrest, *IBM Watson: What Are Companies Using It For?*, ZDNET (Sept. 1, 2015), https://www.zdnet.com/article/ibm-watson-what-are-companies-using-it-for.

[6] *See* Andrew Arruda, *The World's First AI Legal Assistant*, TED (Nov. 2016), https://www.ted.com/talks/andrew_arruda_the_world_s_first_ai_legal_assistant.

[7] Hilary Hurd Anyaso, *Northwestern Law and ROSS Intelligence Partner to Address Access to Justice Through AI*, NORTHWESTERN NOW (Nov. 3, 2017), https://news.northwestern.edu/stories/2017/november/northwestern-law-and-ross-intelligence-partner-to-address-access-to-justice-through-ai.

text. New research, however, has expanded AI's understanding of language to include these implicit meanings. In one example, researchers at Columbia University were able to develop an AI that was able to read a nineteenth century novel and describe the relationships between characters.[8] Smarter and deeper language recognition is the change in AI that has already proven to be incredibly useful through numerous applications.

Apoorv Agarwal, one of the researchers from the Columbia University team, went on to co-found Text IQ[9] – an application that significantly enhances eDiscovery. In the past, lawyers would have to come up with colossal lists of keywords to identify documents that might be relevant for discovery purposes. This tedious process had two obvious risks: missing relevant documents that did not contain any of the keywords and including too many irrelevant documents that were responsive to keywords. This potential inaccuracy is partially due to that technology's reliance on explicit language and human input to understand the meaning within documents.

Text IQ uses an advanced form of AI, inspired by Agarwal's Ph.D. work, that can look for implicit meanings hidden in the text. For example, it can pick up on tonal patterns by examining sections of writing that pertain to the attorney-client privilege, then use the patterns it deciphered to detect when a document written by a lawyer is referring to the privilege without explicitly stating it. While specific keywords need to be explicitly mentioned in a document for traditional predictive coding algorithms to detect them and flag the document as relevant, Text IQ has a much greater ability to make inferences and detect nuances in writing styles. By leveraging improved language processing capacities, AI technologies like Text IQ can use both the text and subtext of documents to produce better eDiscovery results. Having this extra entity on a legal team that can understand language more like a person would will inevitably improve the accuracy and efficiency of the legal services that team has to offer.

LUMINANCE: THE UNSUPERVISED LEARNER

Luminance[10] is another platform that supplants simple keyword searches with advanced pattern recognition technology. Since launching a decade ago, Luminance has been implemented in

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[8] Alex Konrad, *How AI Startup Text IQ Got Profitable by Shaving Millions Off Customers' Legal Costs*, FORBES (Feb. 1, 2017, 11:33 AM), https://www.forbes.com/sites/alexkonrad/2017/02/01/ai-startup-textiq-shaves-millions-off-legal-costs/#2024125b6692.

[9] TEXT IQ, http://textiq.com (last visited Oct. 11, 2018).

[10] LUMINANCE | THE AI PLATFORM FOR THE LEGAL PROFESSION, https://www.luminance.com (last visited Oct. 11, 2018).

firms across the world, including ten of the Global 100 law firms.[11] Like Text IQ, Luminance's developers recognized that algorithms relying on keyword searches to produce documents or detect relevant language were outdated, limited, and inaccurate. Instead of only probing documents for specific words or phrases, Luminance looks for patterns within the language, allowing it to pick out clauses that relate to the parameters of the search that do not necessarily use the same words. For example, it is able to flag language in a contract that specifies the guidelines of a change in control without the need to directly search for the words in the clause. It will then compare that clause to similar clauses in its database of documents and recommend changes or additions based on past use of that clause.

Here is what makes Luminance so different from past legal software: Luminance's algorithms are built with both supervised and unsupervised machine learning. Supervised machine learning is simpler and more widely used. It works by directly feeding an algorithm a series of corresponding input and output data to teach it patterns and structures, which it then can apply to new data sets. Unsupervised machine learning only gives the algorithm input, general rules, and an end goal, leaving the AI to figure out on its own *how* to solve the problem and to discover patterns within the data. For example, a chess program that uses supervised machine learning would require the user to input large amounts of data from past chess games to teach it what moves to make under certain circumstances. Conversely, AlphaZero–another chess-playing program–uses unsupervised machine learning.[12] Instead of a person directly teaching it winning chess strategies and patterns, AlphaZero only needs the rules of chess and how to win as parameters. Then, it will play against itself for a period of time and figure out on its own what moves and strategies will win or lose at chess.[13] The advantage of unsupervised machine learning is that, by spotting patterns that may have been missed by humans, AI can uncover new, more efficient strategies for accomplishing its assigned goals.

Naturally, unsupervised machine learning is both more complex and more independent than supervised machine learning.

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[11] *Luminance Wins Best AI Start-Up at the Prestigious AIconics Awards*, LEGAL IT PROFESSIONALS (June 13, 2018), https://www.legalitprofessionals.com/global-news/10696-luminance-wins-best-ai-start-up-at-the-prestigious-aiconics-awards.

[12] Sarah Woodward, *Machine Learning*, CAMBRIDGE ALUMNI MAGAZINE (Issue 85), https://www.cam.ac.uk/machinelearning; *see also* Bernard Marr, *Supervised v Unsupervised Machine Learning – What's The Difference?*, FORBES (Mar. 16, 2017, 3:13 AM), https://www.forbes.com/sites/bernardmarr/2017/03/16/supervised-v-unsupervised-machine-learning-whats-the-difference/#eb95be3485d8.

[13] Demis Hassabis & David Silver, *AlphaGo Zero: Learning from Scratch*, DEEPMIND (Oct. 18, 2017), https://deepmind.com/blog/alphago-zero-learning-scratch.

This means that, by using unsupervised machine learning, Luminance can conduct searches and identify similarities between contracts and other documents without having to be directly taught such patterns. Moreover, the use of unsupervised machine learning increases the effectiveness and speed of the discovery process, thereby cutting costs. Older platforms require users to continually feed the application more, up-to-date data, usually resulting in long and complicated strings of clauses and search terms. Luminance is still capable of supervised machine learning, but its self-sufficient capabilities are what place it in this newer wave of AI. Luminance can reliably learn these complexities, supervised or unsupervised, and improve its reading and detection capabilities.

Another particularly interesting characteristic of Luminance is its universal application to any language. Because it learns and detects the patterns and nuances of language in general, not any one language specifically, it can sift through documents in any language and use unsupervised machine learning to draw rules and structures from that language. By searching for patterns, not words, the need to train the algorithm in a given language is eliminated, making the process cheaper and more efficient. This feature can also be beneficial in understanding legal terms or nuances that are unique to a particular language or foreign legal system, thereby assisting the process of exchanging terms between parties that speak different languages.

As these examples show, AI's enhanced ability to understand the subtleties of language, and to use language the way humans use do, makes the legal industry especially ripe for AI implementation. Old algorithms are dependent on a lawyer's guidance because they lack the capacity to understand *how* people write and *why* they write in a certain way. As that capacity in AI tools grows closer to the level of a human lawyer, AI will become a more useful legal assistant to reliably mine a large amount of documents.

CONTRACT REVIEW: THE AI ASSISTANCE ATTORNEYS NEED

Contracts are a prime target for AI assistance. Many attorneys dread the dull process of contract review. On any given contract, multiple lawyers will devote precious work hours to checking every detail and tracking changes with every exchange of contract drafts. Despite the significant amount of time and brainpower devoted to ensuring a contract's accuracy, the contract is still vulnerable to human error. The new AI developments can accelerate this process with increased accuracy.

LawGeex is a company that offers a contract review application that utilizes advanced AI.[14] Like many similar startups, LawGeex was co-founded by a practicing lawyer, Noory Bechor, who became frustrated with the time-consuming and monotonous nature of contract review. He desired a tool that expedited the process without sacrificing accuracy. The LawGeex platform allows a business to specify which outcomes it is looking for in a contract and which it wants to avoid. Then, the AI will review the proposed contract and flag language that supports or inhibits these outcomes. On the back end, LawGeex is designed to function as a lawyer's brain would, most notably with how it looks beyond the facial meaning of text and answers the question "What is this text *really* saying?"[15] It then combs its extensive database of contracts for similar meaning and compares the contract in question with the ones it produces from the database.

In a recent test, the LawGeex AI and twenty human lawyers were asked to annotate five non-disclosure agreements. The AI scored a 94% accuracy level, beating the human lawyers' average accuracy of 85%.[16] Although the AI still is not infallible, it certainly cuts out a significant degree of human error from contract review.

Similar contract review technology also use previously negotiated agreements and knowledge of deals to advise firms on the likely success of specific edits. This new technology can review the history of similar provision proposals within the scope of the company or industry and predict the likelihood that the opposite party will accept the proposal. This ability will further speed up contract review because proposals that will very likely be rejected can be cut out. Parties can save time by avoiding the exchange of numerous adverse proposals back and forth with little to no chance of final incorporation in the contract.

Automated contract review will certainly be a useful and continuously-advancing tool for lawyers. However, at its current state, it cannot function independently. While it can eliminate the more monotonous tasks of contract review, human lawyers are still required to catch complex details and answer tough questions from clients. Although LawGeex and other applications can understand what clients want from contracts through input parameters, they still require supervision on the lawyer's part to communicate the client's

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[14] LAWGEEX, https://www.lawgeex.com/aboutus (last visited Oct. 11, 2018).

[15] Olga Mack et. al, *Artificial Intelligence Meets the Mainstream: AI's Potential Impact on In-House Practice*, ACC DOCKET, Mar. 2017, at 31.

[16] *LawGeex Hits 94% Accuracy in NDA Review vs 85% for Human Lawyers*, ARTIFICIAL LAWYER (Feb. 26, 2018), https://www.artificiallawyer.com/2018/02/26/lawgeex-hits-94-accuracy-in-nda-review-vs-85-for-human-lawyers.

needs. Some platforms have implemented levels of unsupervised machine learning, though they are still a ways away from being able to independently evaluate a client's situation, let alone effectively communicate with a client. Likewise, contract drafting software has aided lawyers over the years, but the development of more complex and automated drafting technology faces numerous barriers.[17] For these reasons, instead of supplanting human lawyers for these tasks at some point in the future, it is far more likely that AI will integrate with lawyers' work and act as an advanced tool to make every lawyer more accurate and efficient at contract review.

CONCLUSION

AI's inability to understand the implicit meanings of language has impeded increased efficiency for legal work. However, this shortcoming has created an opportunity for tech startups with more advanced AI language processing to implement AI technology in the legal field. As AI experts continue to expand the level at which AI can understand human language, practicing lawyers will continue to team with these experts to development platforms that address the many kinks in the legal profession. With legal AI capabilities expanding, it is inevitable that AI will become an integral part of a lawyer's work and will change the nature of the legal profession as a whole. As with digital research databases, eDiscovery, or any other technological innovation that changes how lawyers work, courts and administrative bodies must likewise familiarize themselves with new AI technology as lawyers integrate it into their daily work. That way, they can be prepared for when lawyers bring arguments, documents, or any other materials before the court in which AI played a crucial role in producing.

[17] *See* Kathryn D Betts & Kyle R Jaep, *The Dawn of Fully Automated Contract Drafting: Machine Learning Breathes New Life Into a Decades-Old Promise*, 15 DUKE L. & TECH. REV. 216, 228-32 (2017) (available at https://scholarship.law.duke.edu/dltr/vol15/iss1/11).