ABSTRACT

In a landmark study, US lawyers with decades of experience in corporate law and contract review were pitted against the LawGeex AI algorithm to spot issues in five Non-Disclosure Agreements (NDAs), which are a contractual basis for most business deals.

Twenty US-trained lawyers, with decades of legal experience ranging from law firms to corporations, were asked to issue-spot legal issues in five standard NDAs. They competed against a LawGeex AI system that has been developed for three years and trained on tens of thousands of contracts.

The research was conducted with input from academics, data scientists, and legal and machine-learning experts, and was overseen by an independent consultant and lawyer.

Following extensive testing, the LawGeex Artificial Intelligence achieved an average **94% accuracy rate**, ahead of the lawyers who achieved **an average rate of 85%**.

This report provides insights into the methodology and the training of the LawGeex AI, a full breakdown of the results and findings, as well as interviews with lawyers who participated in the experiment, ultimately providing practical insights into AI's value for the future of law.

	NDA 1	NDA 2	NDA 3	NDA 4	NDA 5	AVG
LAWYER AVG	84%	85%	86%	86%	83%	85%
LAWGEEX	92%	95%	95%	100%	91%	94%

BARRIERS TO AI UNDERSTANDING CONTRACTS

Training AI on legal documents involves a number of unique challenges.

1. Legalese

Training is made more difficult by the common use of "legalese" – technical legal language that is often complex and counterintuitive. For the purpose of AI training, this form of language cannot be considered a natural language. For contract review and approval, Natural Language Processing (NLP) and off-the-shelf solutions do not work. No existing computational language models could read legalese coherently.

2. High Accuracy Required

The primary role of a lawyer is to control and even reduce risks for their company or clients, making accuracy vital. In legal AI training, single document analysis requires much higher accuracy levels than, for instance, big data "sentiment" analysis (the process of using text analytics to mine various sources of data for opinions in order to predict trends).

LAWGEEX SOLUTIONS

- Creation of a new legal "language" — LawGeex created proprietary Legal Language Processing (LLP) and Legal Language Understanding (LLU) models for the task. Teams of lawyers and engineers taught LawGeex AI legalese by exposing the AI to a wide range of legal documents. Once the AI learned legalese, legal trainers pointed out the concepts it is required to recognize. The LLP technology allows the algorithm to identify these concepts even if they were worded in ways never seen before.
- Monitoring concepts, not keywords — LawGeex AI operates in a far more sophisticated manner than a blunt "keyword search." Keyword searches can be over- and under-inclusive, as words may be absent from relevant documents, or present in irrelevant documents. True AI recognizes a concept however it is phrased or wherever it appears in a document.

Professor Yonatan Aumann

"The technology has been developed through a combination of supervised and unsupervised learning techniques. Unsupervised learning was used for teaching the AI engine the core legalese language. Thereafter, supervised learning, using deep learning multi-layer LSTM and convolution technology, was used to train the system for the fine-tuned issue-spotting. Supervision was performed based on human-annotated documents, using legal experts. A unique augmentation algorithm was applied to boost learning from these examples.

The overall result is the most advanced technology for the automatic analysis of legal documents. The p-value for the statement that accuracy of AI is above that of these lawyers is 0.0068 (using Mann-Whitney's U test)."

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