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To what Extent have LLMs Reshaped the Legal Domain so far? A Scoping Literature Review

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Padiu, B; Iacob, R; Rebedea, T; Dascalu, M.

Corresponding author:

Bogdan Padiu

mbogdan.padiu@gmail.com

Author Affiliation:

Computer Science & Engineering
Department, National University of
Science and Technology
POLITEHNICA Bucharest.

ADMINISTRATIVE INFORMATION

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INTRODUCTION

Review question / Objective RQ1: Which LLM tools are considered leading in the field, and which are best suited for legal applications according to the current open access SOTA research?

RQ2: What are the primary sources for data extraction and the best strategies for dataset development within the legal domain?

RQ3: What are the challenges of LLMs in addressing legal tasks?

RQ4: What are the main strategies for increasing the performance of LLMs in solving legal tasks?

Rationale Since November 2022, with the launch of ChatGPT, and especially after GPT4, there has been an exponential increase in using LLMs in various research fields, including code generation, economics, healthcare, and education. Amidst this surge of innovation, the legal domain remains particularly challenging. Legal systems are hard to

understand and explain because of their complicated structure, specialized language, and varying interpretations. This complexity makes it difficult for both the general public and professionals to navigate the legal field. Although technological advancements have the potential to create LLMs that simplify these systems, their effectiveness has not yet been proven, and multiple challenges remain. The multi-level hierarchies, domain-specific vocabulary, and nuanced interpretations inherent to legal matters pose significant challenges for these models. Consequently, the outputs generated by the models do not consistently provide the necessary depth and precision to provide meaningful assistance in real-world legal scenarios. Nevertheless, the emergence of LLMs has introduced new opportunities for legal research and practice. These technologies can potentially enhance the accessibility, efficiency, and accuracy of legal information retrieval and processing. However, while the general application of LLMs

can provide benefits, it also highlights the need for specialized systems tailored to the legal domain to realize their full potential. As is the case in code generation tasks, the unique nature of legal tasks makes common prompting techniques, that have been optimized for natural language tasks, significantly less effective. Off-the-shelf LLMs struggle to fully capture the complexities and nuances of legal language and reasoning. They may fumble with the specialized terminology and citation formats or outright hallucinate domain-specific knowledge, losing the rigor and precision essential in legal contexts. To truly leverage the capabilities of LLMs in the legal field, it is necessary to develop models that are fine-tuned and adapted to the specific requirements of legal research and practice. This involves training LLMs on extensive collections of legal texts, incorporating domain-specific knowledge, and optimizing them for tasks such as legal document retrieval, summarization, and analysis. Specialized legal LLMs can better understand the context and meaning of legal language, handle the unique structures and formats of legal documents, and provide more accurate and relevant results.

Condition being studied The traditional judiciary system possesses several distinct characteristics that are essential to comprehend when considering the application of judicial Artificial Intelligence. These characteristics encompass a reliance on human decision-making, a lack of flexibility, and substantial resource consumption. One of the primary features of the traditional judiciary is its dependence on human decision-making, particularly that of judges, prosecutors, and lawyers. Throughout the process of reasoning and evidence collection, legal professionals often refer to case-specific circumstances, legal provisions, and precedents, in conjunction with their professional knowledge, to formulate judgments and decisions. The final judgment or defense is then presented through a trial. Another key aspect of the traditional judiciary is its reliance on precedents during the decision-making process. Previous judgments in similar cases and relevant legal provisions often guide the decisions of courts. In many judicial systems, the judgments of the highest court are considered authoritative and binding, serving as a reference for other courts in relevant cases.

METHODS

Search strategy We selected studies concerning the application of LLMs in the legal domain. Since the speed with which the domain has evolved in the past years is very high, we considered only

recent works to establish the current state-of-the-art: newer than 01.01.2022 and up until 28.03.2024. We used mainly Scopus and Web of Science databases to calibrate the search criteria and decided early on that we would focus only on articles published in English.

On Web of Science, we refined the search to include only Open Access studies. For the rest of the sources, we tried to retrieve the article, and when not successful, we excluded the article. For the selected and analyzed articles, we also included in the analysis any cited papers that satisfied the criteria.

One reviewer screened each record, if the title and abstract indicated that the paper could be eligible to be included in the review then the reviewer tried to retrieve the paper. In 14 cases we were unable to retrieve the article because the article was not open access. We excluded all the articles that matched the Query string but while containing the keywords and being associated with the required categories were about subjects other than the use of LLMs in the Legal domain. For example, some articles were related to the use of LLMs in healthcare, finance, or education, while others were about the legal aspects of using AI in finance. In all cases, the keywords matched but the semantic content did not. For each retrieved report, a high-level review followed in order to decide if, indeed, the research article satisfies the eligibility criteria. Intercoder reliability was ensured with only one reviewer by consulting a second, more experienced reviewer to validate decisions, thereby mitigating risk despite the absence of standardized coding protocols in this scoping review. Additionally, for the selected and analyzed articles, we also included any cited papers that satisfied our inclusion criteria in the analysis.

Participant or population This is not applicable to our review.

Intervention This is not applicable to our review.

Comparator This is not applicable to our review.

Study designs to be included This is not applicable to our review.

Eligibility criteria The initial search results formed a starting set of papers that underwent analysis. During this analysis process, we identified additional related studies that aligned with the established selection criteria. These newly discovered relevant papers were then incorporated into the reviewed set, expanding the scope of the literature under consideration.

Information sources Web of Science database 22.02.2024; SCOPUS database 22.02.2024; Specific websites search 22.02.2024; arxiv.org register 22.02.2024.

Main outcome(s) As part of our bibliographical analysis, we highlighted the key themes and focus areas within the selected body of literature. By comparing these word clouds, we observe how different keyword extraction methods (i.e., automated or author-defined) emphasize different aspects of the research. Next, we analyzed the distribution and trends within the selected body of literature, we conducted a statistical analysis that focused on three key aspects: geography, publication month, and publication channel. The selected literature reveals several key tasks for applying LLMs within the legal domain: Legal case retrieval, Legal judgment prediction, Legal question answering, Document drafting, Semantic annotation.

Additional outcome(s) The application of LLMs in the legal domain, much like their success in code optimization, holds the potential to significantly transform legal practice, particularly in the drafting of legal documents. Just as developers rely on LLMs to generate and refine code based on specific input parameters, lawyers can use these models to create initial drafts of legal documents, such as case reports and contracts.

Data management Data Availability Statement: Data is contained within the article or supplementary material.

Quality assessment / Risk of bias analysis This is not applicable to our review.

Strategy of data synthesis This is not applicable to our review.

Subgroup analysis This is not applicable to our review.

Sensitivity analysis This is not applicable to our review.

Language restriction English.

Country(ies) involved Romania.

Keywords Scoping Review; Legal Datasets; Large Language Models (LLM); Legal; Judicial Data; Natural Language Processing.

Dissemination plans Publication in Journal.

Contributions of each author

Author 1 - Bogdan Padiu - Conceptualization, methodology, validation, investigation, resources, data curation, writing—original draft preparation, writing—review and editing.

Email: mbogdan.padiu@gmail.com

Author 2 - Radu Iacob - validation, writing—original draft preparation.

Email: radu.iacob@upb.ro

Author 3 - Traian Rebedea - validation, writing—review and editing.

Email: traian.rebedea@upb.ro

Author 4 - Mihai Dascalu - Conceptualization, methodology, validation, investigation, resources, data curation, writing—review and editing, supervision.

Email: mihai.dascalu@upb.ro