

Title	法的文書含意関係認識システムの曖昧性解消能力向上のための意味強化アプローチ
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Citation	
Issue Date	2023-09
Type	Thesis or Dissertation
Text version	ETD
URL	http://hdl.handle.net/10119/18778
Rights	
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学 位 の 種 類	博士（情報科学）		
学 位 記 番 号	博情第 514 号		
学 位 授 与 年 月 日	令和 5 年 9 月 22 日		
論 文 題 目	Semantic Enhancement Approaches for Strengthening the Ambiguous Discrimination of Legal Text Entailment System		
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論文の内容の要旨

Ambiguity poses a significant challenge within the legal domain, and the utilization of natural language processing (NLP) has emerged as a potential solution for resolving ambiguity in legal texts. This research proposes a semantic enhancement approach aimed at addressing the ambiguity prevalent in legal language. The approach entails leveraging external knowledge sources to enhance the accuracy and consistency of legal decision-making processes.

Furthermore, this study emphasizes the potential benefits associated with the semantic enhancement approach in the context of legal decision-making. These benefits include improved accuracy, enhanced consistency, and increased transparency within the decision-making process. The paper also acknowledges and discusses the inherent challenges and limitations associated with this approach. These challenges encompass the necessity for high-quality knowledge sources and the potential presence of bias and errors within the external knowledge utilized.

By introducing this semantic enhancement approach, the research aims to contribute to the field of legal language processing and facilitate more effective and reliable legal decision-making processes by mitigating the impact of ambiguity.

Keywords - Deep Learning, Large Language Model, Abstract Meaning Representation, Legal Domain, Transformer Model

論文審査の結果の要旨

The thesis mainly investigates the use of Abstract Meaning Representation (AMR) for enhancing the performance of Legal AI applications (i.e Legal Case Retrieval, and Legal Textual Entailment Recognition). The first contribution of the thesis is to build the strong baseline for integrating various pre-trained models for Legal Textual Entailment Recognition tasks. The second contribution of the thesis is to show how triplet extraction from AMR (triplets of head-relation-tail) are used for improving semantic matching score in legal case retrieval tasks. The important finding of the thesis is that combining the transformer with Abstract Meaning Representaion (AMR), as well as with a lexical matching technique (such as BM25), can improve results of Legal Case Retrieval due to the semantic matching score and information combination presented in the thesis. Empirical results show that utilizing AMR would be beneficial for enhancing legal case retrieval and legal entailment recognition tasks. In addition to that, the thesis exploited LLMs methods with the uses of appropriate prompts to attain the state of the art performance in legal entailment recognition. Various LLMs models are investigated for checking the potential of exploiting LLMs on Legal Textual Entailment Recognition task. The findings show that using large language models is more effective compared to small-size models for Legal domain. It demonstrates that large language models have shown superior performance compared to small models, with more than a 10% improvement on Task4 and a 4% improvement on Task2 in COLIEE 2023 competition, respectively. This suggests that LLMs are a promising approach for improving the performance of legal textual entailment recognition systems.

For publication, the candidate published his works in good international conferences and journals and participated in COLIEE 2022 and COLIEE 2023 competitions with the best system results.

Overall, this is an excellent dissertation, and we approve of awarding a doctoral degree to Mr. Bui Minh Quan.