CS 846 Software Engineering for Big Data and AI

A Literature Review on Leveraging Large Language Models (LLMs) for Topic Modeling in Natural Language Processing (NLP)

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This project presents a literature review on the application of large language models (LLMs) in the domain of topic modeling in natural language processing (NLP). The motivation of this project stems from LLM having NLP capabilities and aiming to explore the potential of LLM beyond its current uses (particularly in QA scenarios) and its potential in topic modeling tasks. With that, the authors outlined various tools used in topic modeling (such as LDA and BERTopic) and a growing interest in utilizing LLM to perform topic modeling tasks. Using a series of methodological approaches, it aims to gather and synthesize findings from various top NLP conferences and recent publications to explore its research questions.

Strengths

- High Relevance: Given the current state of GPTs and LLMs in rapid development, the project holds high relevance and value for both researchers and professionals.
- Good Background Research: The authors have done great background research work on the recent work of LLM for topic modeling in NLP while using these background studies to define the research questions, giving a good expansion of work onto the current research state.
- Clear Methodology: The project's methodology was clear with the filtering process (inclusion/exclusion criteria), ensuring the relevance of the literature and findings obtained. With that, it also raises the credibility of the research outcomes.

Weaknesses

- Rapid Evolution: Given the rapidly changing atmosphere of LLM literature, it will be difficult to grasp or fully evaluate the state of LLM in topic modeling, as some research work may still be ongoing. As such, the findings of the research may only be applicable to a certain extent (i.e., providing a comprehensive review up until today).
- Unclear Impacts: The presentation illustrated the background and objectives of the study, with little description of the overall impact of the study; as such, it is unclear what the impacts of the topic modeling study will be and how they will impact (i.e., researchers, professionals, societies, etc.).
- Possible Bias and Limitations: The RQ1 findings for determining LLM's performance on topic modeling tasks may be affected by biases and some other limitations (such as biases from datasets).

Suggestions for Potential Improvements

- Include threats to validity, discussing the limitations of the case study, and acknowledging the scope of the research findings.
- Address or include how biases play a role in affecting the performance of LLM in topic modeling (RQ1).
- Include practical examples of LLMs in topic modeling tasks (such as case studies); this would make the reviews more concrete and solid in their real-world implications.
- Add future research on how future research could be expanded or benefit from this study.
- The RQ3 talks about comparison across topic modeling tools; it would be great if specific details could be included, such as its parameters and metrics comparison. This would provide a stronger analysis and review.