Review of: "Limitations of and Lessons from the Learning of Large Language Models"

Xingsi Xue[1]

1 Fujian University of Technology

Potential competing interests: No potential competing interests to declare.

This manuscript, "Limitations of and Lessons from the Learning of Large Language Models," presents an intriguing exploration into the boundaries of logical reasoning capabilities within large language models (LLMs). The application of the Curry-Howard correspondence to analyze these limitations is both novel and intellectually stimulating. However, I recommend a major revision of the paper to fully realize its potential impact. Below are my suggestions for improvement:

1. The paper could benefit from a clearer articulation of its main thesis, particularly in the abstract and introduction. While the discussion on the Curry-Howard correspondence is fascinating, the implications for LLMs and the specific limitations you propose are not immediately clear to the reader. A more direct explanation of how these logical structures translate to limitations in LLMs would greatly enhance comprehensibility.
2. The manuscript briefly mentions existing solutions and the potential of hybrid systems but lacks a detailed comparative analysis with these approaches. A more thorough examination of how EG-STC stands in relation to these systems, especially in handling classical logic, would provide valuable context and highlight the unique contribution of your work.
3. While acknowledging the theoretical nature of your argument, the paper would be strengthened by some form of empirical validation or case studies. Even though large logical derivations may not fit into the finite sequence of tokens, providing examples or simulated scenarios where the limitations of LLMs become apparent would make your argument more compelling.
4. The discussion on potential ways to overcome the limitations of LLMs, such as augmenting the input string with symbols or using a portion of the input sequence as a stack, is intriguing. Expanding on these ideas with more technical details, potential implementations, and their expected impact on overcoming the discussed limitations would provide a clearer roadmap for future research.
5. The paper touches on several fascinating implications for philosophy, computer science, and education. These sections could be further developed to explore the broader significance of your findings. For instance, elaborating on how these limitations impact the understanding of language learning, the interpretation of quantifiers, and the challenges in teaching logical reasoning would enrich the discussion.
6. The manuscript would benefit from careful editing to polish the language and improve the overall presentation. Ensuring consistency in terminology, clarifying complex sentences, and streamlining the argument would enhance readability and engagement with your findings.

In conclusion, this manuscript offers valuable insights into the intrinsic limitations of large language models in performing

logical reasoning. By addressing the above points, I believe the paper could significantly contribute to the ongoing discourse on the capabilities and future directions of LLMs.