

Can Large Language Models Analyze the Complexity of Human Writing?

Yoram M Kalman, Dept. of Management and Economics, The Open University of Israel yoramka@openu.ac.il

This work-in-progress abstract describes the challenge of applying large language models (LLMs) to produce a novel format of writing analytics. Large Language Models (LLMs) have rapidly advanced, but can they truly understand the complexity of human text creation? This abstract builds on the ongoing work with CAPP Logger, previously presented at LAK24 (Kalman, 2024). CAPP Logger captures both the writing process and the evolving text concurrently. In that project reported in LAK24, we analyzed its output using a deterministic algorithm. The output of this analysis of 552 writing sessions demonstrated the ability to provide unique writing analytics which included stats and analytics such as a count of word edits and sentence edits, and longitudinal counts of writing and editing activities during different phases of the writing sessions. The main drawbacks of the algorithm based analysis were limited accuracy, and a limited ability to classify the editing activities using a taxonomy that leverages the unique capabilities of CAPP Logger (Kalman & Allen, 2020).

Given the recent emergence of LLMs, the obvious choice was to attempt using them and link their linguistic capabilities with their extensive computing power to analyze the output of CAPP Logger and produce a much more detailed and accurate analysis of the keyboarding, writing and editing activities. After an introduction to CAPP Logger in which its purpose and capabilities are described, the challenges of moving from deterministic algorithms to LLM-based analytics are discussed. This is followed by a description of the challenges of handling large JSON files with OpenAI and Azure interfaces, and of preventing LLMs from predictive completion when analyzing incomplete text strings.

The presentation will include successes, as well as obstacles that have yet to be overcome, and lessons learned from working with several LLM's, different interfaces (chat, playground, API, "assistant"), and with or without pre-processing of the logger output.

The discussion emphasizes two key concepts: reproducibility and explainability in the context of LLM-based writing analytics. Ensuring these aspects is central for the credibility and broader adoption of LLM-enhanced methodologies.

This paper is informed by broader research into Generative AI (GenAI) and its role in fostering creativity. Specifically, research on human-GenAI collaboration in creative writing tasks.

In summary, this paper explores ways LLMs can offer meaningful and innovative writing analytics, while balancing their computational capabilities with the need for accuracy, reproducibility, and explainability.

Acknowledgements

I wish to thank Yuval Erez and Alex Kuznetsov for technical assistance and helpful discussions. This work was supported by the Research Authority of the Open University of Israel.

References

- Kalman, Y. M. (2024). CAPP Logger: Proof of Concept of a New Writing Analytics Methodological Approach. *LAK24 Conference Proceedings (Companion)*, 212–214. https://www.solaresearch.org/wp-content/uploads/2024/03/LAK24_CompanionProceedings.pdf
- Kalman, Y. M., & Allen, L. K. (2020). Towards a Taxonomy of Writing Activities. *Companion Proceedings 10th International Conference on Learning Analytics & Knowledge (LAK20)*, 726–727. https://www.solaresearch.org/wp-content/uploads/2020/06/LAK20_Companion_Proceedings.pdf