Optimizing Large-Scale Language Model-Based AI Integration and Human-Computer Interaction in Educational Scenarios

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Abstract: The impact of generative AI technologies, such as large-scale language models (LLMs) and related applications (e.g., ChatGPT), on the education industry, is emerging. Determining the long-term trend of this impact is challenging, and potential risks could have severe consequences. It has become urgent to study how to maximize the benefits of AI tools like ChatGPT while minimizing risks (Zhai, 2022; Perkins, 2023; Dwivedi et al., 2023). This pilot study aims to understand the effects of students' interaction with LLMs-based applications on their summarization and learning abilities.

Summarization is a crucial skill in academic and professional settings and a primary capability of generative AI technology like GPT. It involves condensing large volumes of information into concise and coherent summaries, allowing for better understanding, retention, and communication of essential points. In academia, summarization helps students process and remember key concepts from lectures, textbooks, and research papers, further developing critical thinking skills. Professors and researchers can also use summaries to share their findings succinctly, making their work more accessible and understandable to a broader audience.

Knowledge workers in various industries benefit from summarization as well. Summarization enables them to process and share information quickly and effectively, which is essential in today's fast-paced and information-rich environment. Developing and promoting summarization skills during education is crucial. LLMs' technologies, like GPT, have been designed to perform tasks such as summarization by leveraging their vast knowledge and natural language processing capabilities.

LLMs-based AI systems can process large amounts of text quickly, generating concise summaries by identifying key points and reasoning far faster than humans, increasing productivity and enabling users to focus on higher-level tasks such as analysis, strategy, and innovation.

The intersection of summarization as a key academic and knowledge worker skill with AI technologies like GPT presents opportunities for collaboration and improvement. However, the use of LLMs' applications for summarization could undermine human summarization and create ethical problems for students and teachers. Our proposal aims to understand the relationship between LLMs application and the ability to summarize and learn in educational settings, addressing potential risks and challenges.

The research employs a mixed-methods approach, combining quantitative and qualitative data to comprehensively assess the impact of LLMs-based applications on undergraduate students' learning and summarization abilities. We will conduct several pilot studies, including interviews, questionnaires, focus group discussions, and expert workshops to address our research questions.

The research questions are: RQ1) How does the interaction with LLMs-based applications influence students' summarization and learning ability in comparison to traditional learning methods? RQ2) How do learning behaviors, practices, attitudes, and expectations of students change when interacting with LLMs-based applications compared to traditional learning environments? RQ3) How do students' attitudes and perceptions towards LLMs-based applications impact their learning experience and understanding of course content? RQ4) What are the potential risks and challenges associated with the use of LLMs-based applications in the education sector, and how can they be mitigated? What strategies and interventions can be implemented to ensure generative AI tools like ChatGPT are used ethically and responsibly in the education sector?

The anticipated outcomes include insights into the effectiveness of LLMs-based applications in promoting learning and summarization skills, as well as identifying factors contributing to the success or challenges of using these applications. The research aims to develop risk mitigation strategies to address potential negative impacts on student skills and academic performance while offering recommendations for the ethical and responsible use of generative AI tools in education.

The findings will shed light on student attitudes, learning behaviors, and psychological profiles in relation to summarization skills, promoting LLMs-based applications as an effective tool in Human-Computer Interaction (HCI), education, computer science, and social science. The results will inform policy decisions and improve educational practices, creating a more inclusive and equitable environment. Additionally, the findings will guide future large-scale studies in different contexts, such as across disciplines, stages (e.g., K-12, graduate school, lifelong learning), scenarios (workplace), populations (older adults, people with disabilities), and cultures. Through the research related to this seed proposal, we hope to provide strong support for human-computer interaction and social justice in the context of the rapid development of LLMs. Expected research results may be published in prestigious journals and international conferences such as CHI, Teaching and Teacher Education, CSCW, IEEE Trans, ACII, etc., to extend the impact of the research project further, thereby increasing the likelihood of external funding support.