Applying ChatGPT to Extract Mind Maps For Resource Evaluation
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Abstract
Student researchers are increasingly using automated summary tools such as ChatGPT in order to quickly analyze resources given the growing volume of information they have access to. However, ChatGPT has several known problems with hallucinating false information (Bang et al., 2023). Meanwhile, graphical summaries of information can be more effective at summarizing information for students than text. For instance, mind maps, which are maps of connected keywords in a text organized around a central point, are faster to process and have better recall than text (Morfidi et al., 2018). For this research, I created an algorithm that automatically generates mind maps to summarize research papers, using filtered output from GPT3 to minimize hallucination. I then asked a group of students to use it as well as ChatGPT and compare the two methods of summarizing research.

Problem Statement
Would GPT3-generated mind maps be more useful and accurate summaries of research articles to student researchers than GPT3-generated textual summaries?

The Process of Generating Mind Maps

State of Art: Literature Review
The process of generating mind maps has been automated using artificial intelligence (Wei 2019). However, none of these tools have yet integrated a large language model comparable to GPT3. Automated mind map generation has been suggested as a tool for resource evaluation in Zidek 2015. However, its efficacy was not tested with a group of students.

Methods
After the creation of an algorithm to automatically generate mind maps, a group of five volunteer ASU undergraduate students sourced from HON 171, HON 370, and HON 194 courses. They were asked to use the algorithm for evaluating resources for their class projects, and to use ChatGPT for the same purpose. After two weeks they were asked to complete an open-ended survey on their experiences with each and to compare their effectiveness.

Results
Three participants preferred the automated mind maps for quickly understanding the subjects covered in a paper and their interrelations. Multiple participants preferred textual summaries for understanding the arguments posed by papers, however. Multiple participants criticized the layouts of the generated mind maps, suggesting that the efficacy of the maps as a tool is sensitive to the visual structure of the maps as well as their content.

Proposals for Future Work
- An investigation into how the layouts of mind maps affect their ability to be quickly processed and understood, and how effective layouts can be automatically generated
- Testing mind map generation algorithms with a larger and more diverse group of students to address the limitations of the small sample size of this research

References