The Weizmann Institute of Science
Faculty of Mathematics and Computer Science

Vision and AI

Lecture Hall, Ziskind Building
on Thursday, May 16, 2024
at 12:15

Misha Tsodyks
WIS

will speak on

Large-scale study of human memory for meaningful narratives

Abstract:
The statistical study of human memory requires large-scale experiments, involving many stimuli conditions and test subjects. While this approach has proven to be quite fruitful for meaningless material such as random lists of words, naturalistic stimuli, like narratives, have until now resisted such a large-scale study, due to the quantity of manual labor required to design and analyze such experiments.
Large language models (LLMs) have provided the necessary technological breakthrough for this purpose, given their ability to generate human-like text and carry out novel tasks after being prompted by instructions in natural language, without additional training. In this work, we develop a pipeline that uses large language models (LLMs) both to design naturalistic narrative stimuli for large-scale recall and recognition memory experiments, as well as to analyze the results. We performed online memory experiments with a large number of participants and collected recognition and recall data for narratives of different sizes. We found that both recall and recognition performance scale linearly with narrative length; however, for longer narratives people tend to summarize the content rather than recalling precise details. To investigate the role of narrative comprehension in memory, we repeated these experiments using scrambled versions of the narratives. Although recall performance declined significantly, recognition remained largely unaffected. Recalls in this condition seem to follow the original narrative order rather than the actual scrambled presentation, pointing to a contextual reconstruction of the story in memory. Finally, using LLM text embeddings, we construct a simple measure for each clause based on semantic similarity to the whole narrative, that shows a strong correlation with recall probability. Overall, our work demonstrates the power of LLMs in accessing new regimes in the study of human memory, as well as suggesting novel psychologically informed benchmarks for LLM performance.