Harnessing the Power of AI: ChatGPT Assignment

Yulia Sevryugina

September 14, 2023
Chemistry Librarian, yulias@umich.edu

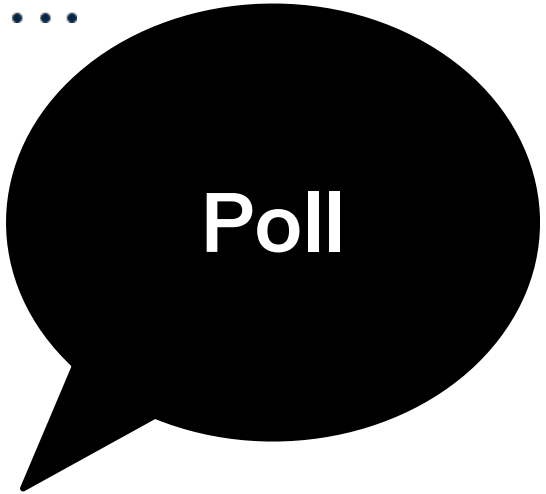
M | LIBRARY

What we'll cover today

- Defining generative AI, primarily large language models.
- What AI is good at, and what it isn't.
- A new Fall Assignment.
- Discussion.

M | LIBRARY

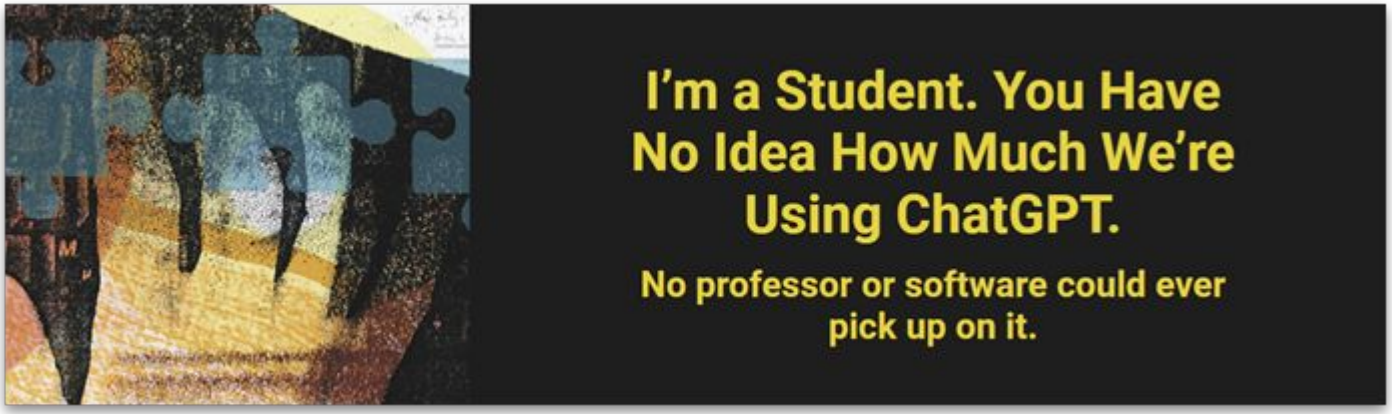
How familiar are you with GenAI writing tools such as ChatGPT?



Students use GenAI

A survey at U-M revealed that 56% of undergraduates and 66% of graduate students report that they have used GenAI - GenAI Committee Report - University of Michigan.

Terry, 2023



Artificial Intelligence and Large Learning Models

- A large learning model (LLM) is a trained machine learning model that reads and generates text in a human-like fashion.
- Powerful text predictors, trained on a very, very large dataset to generate the most likely completions for a word or series of words.
- E.g., “They fell _____” → “They fell apple”? “They fell down”? “They fell to ___”
- E.g. “Hi Bill, Unfortunately, Monday doesn’t work for me”

AI Beyond LLMs

- There are other types of artificial intelligence (AI) beyond LLMs, used for image recognition and production, for example, but the training process remains broadly the same.

- OpenAI's ChatGPT,
- Stanford's CoAuthor,
- Meta's Galactica,
- Google Bard,
- and others: futuretools.io



OpenAI

ChatGPT (Generative Pre-Trained Transformer) was the first free, easy-to-use language model

What can they do?

- Essays
- Poems and short stories
- Code
- Multiple choice questions
- Revising for different audiences
- Feedback based on a provided rubric
- Math and science problems
- Formatting citations
- Summarizing texts
- And more!

What can they not do?

- AI is not actually intelligent, and “generative” AI (GAI) can’t actually generate novel concepts, speech, or new knowledge.
- “Hallucinations” - it has no sense of what information is true or accurate
- Information lag - ChatGPT has no knowledge of anything more recent than 2021
    - Google Bard (which uses the LaMDA language model) can pull data from the current internet, but is more experimental and is more likely to provide incorrect information than ChatGPT.
- Has a tendency to “correct” dialects or other speech patterns.
- Model collapse?

Sanctions ordered for lawyers who relied on ChatGPT artificial intelligence to prepare court brief

Ethical considerations for LLMs

- Possibly trained using large-scale theft of copyrighted material (lawsuit)
- LLMs and other AI are being trained using your data without your explicit consent (Duet AI for Google Workspace)
- Massive exploitation of labor (OpenAI Used Kenyan Workers on < $2/h)
- Massive environmental costs (1 ChatGPT prompt ~ 1000 Google searches)
- Inequitable access
- AI writing tools sometimes reproduce human biases and prejudices (Open AI 2023)

Detection of ChatGPT

- ChatGPT cannot be used to identify texts written by ChatGPT
- Current initiatives for AI detection by AI:
  - E.g., version generation watermarking
  - False positives, including bias against non-English speaking writers
  - False negatives, trivially easy to circumvent
- Current initiatives for AI detection by humans also have flaws.

Myers, 2023



GPT detectors are biased against non-native English writers

Weixin Liang[1*], Mert Yuksekgonul[1*], Yining Mao[2*], Eric Wu[2*], and James Zou[1,2,3,+]

[1]Department of Computer Science, Stanford University, Stanford, CA, USA
[2]Department of Electrical Engineering, Stanford University, Stanford, CA, USA
[3]Department of Biomedical Data Science, Stanford University, Stanford, CA, USA
[+]Correspondence should be addressed to: jamesz@stanford.edu
[*]these authors contributed equally to this work

ChatGPT Assignment Timeline

- **9/14** - Introductory lecture on AI;
- **9/21** - Submit 5 most exciting topics in RNA biology and/or RNA-based therapeutics. Try different prompts. Explain why you find these topics important or interesting;
- **9/26** - GenAI article clinic;
- **10/3** - Submit a 500-word essay about the RNA topic assigned to you. Structure your prompt such that the essay contains in-text citations as well as a bibliography;
- **10/24** - Evaluate and refine your GenAI output into a 1000 word essay (include in-text citations and a bibliography). Check the accuracy of the information and authenticity of citations. Grade ChatGPT based on its tone, structure, and scientific accuracy;
- **10/24 & 10/26** - Present the before and after refinement versions in-class presentation (8 min = 5 min present + 3 min Qs), explaining the changes you made;
- **11/16** - Submit the Final version of your essay improved by peer feedback and additional research.

See details on Canvas/Syllabus

Citing ChatGPT

Chicago style with prompt:

[1] ChatGPT, response to “Tell me about confirmation bias,” February 16, 2023, https://chat.openai.com.

Let’s Dive In



- U-M GenAI Guidance
- U-M’s GPT tool: https://umgpt.umich.edu/
- OpenAI ChatGPT

M | LIBRARY

Surely My Authentic Response Is AI-Proof

- Imagine you are a pharmacy student who has just completed a week-long placement block at a community pharmacy. Write a 500-word reflection about your placement. Summarise a significant event that happened, then describe how this relates to your past experiences, then describe what you have learnt, and finally identify a question that remains unanswered.
- ChatGPT's response is : **Reflective, Personal, Contextualised, Situated, Real world**

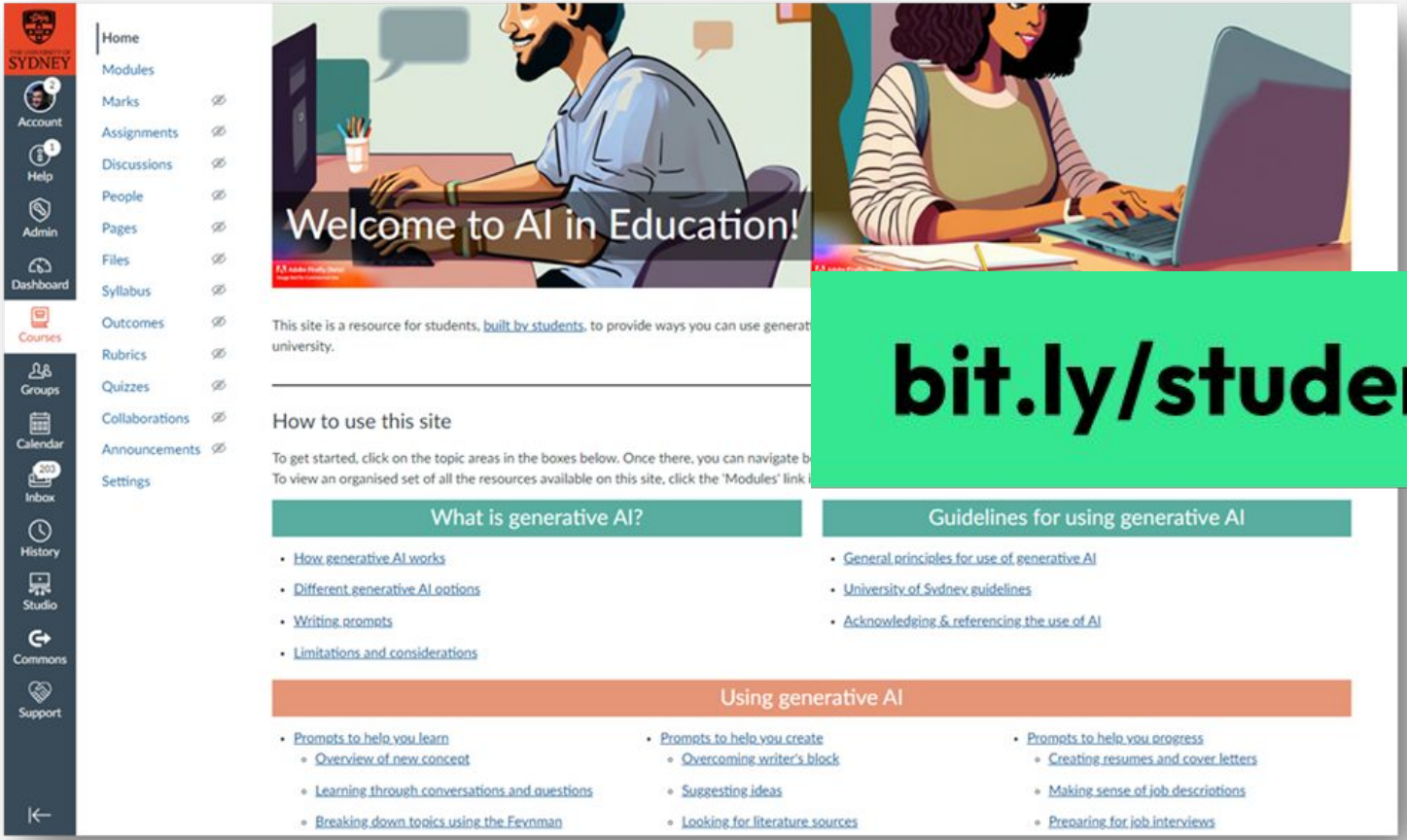
Discussion



1. What are your immediate questions about this presentation?
2. What questions do you have about ChatGPT and AI in education?
3. Are any of your faculty discussing ChatGPT use?
4. Have you used ChatGPT in your own work?
5. Jamboard for capturing notes/ideas

Resources

- Embracing AI - U-M Alumni Association
- Generative AI Resources; Using Generative AI for Scientific Research - MIDAS
- ChatGPT Teach-Out U-M
- https://www.coursera.org/learn/prompt-engineering/home
- Let ChatGPT Be Your Teaching Assistant – Strategies for Thoughtfully Using AI to Lighten Your Workload.
- Article: How to use Midjourney: The popular AI image generator
- Tool to help summarize web content: Merlin ChatGPT browser extension
- *Prompt engineering for students - making generative AI work for you*
- Article: Tools to Help Accelerate Your Research



bit.ly/students-ai

M | LIBRARY

Principles of Effective Prompt Engineering

- Clarity - The prompt should clearly define what you want the model to do. Avoid ambiguity. For instance, instead of "Tell me about dogs," use "Provide a detailed description of the characteristics, behavior, and care required for domestic dogs."
- Context - ChatGPT responds to the immediate context of the prompt. So, establishing a clear context is crucial. For example, the prompt "Translate the following English text to French: 'Hello, how are you?'" provides clear context and instructions.

Principles of Effective Prompt Engineering

- Precision - Precise prompts yield precise responses. For example, if you want a list, specifically ask for it: "List the top 10 most populous countries in the world."
- Role-play - ChatGPT responds well to role-play. You can set it in a role to guide its responses: "As a historian, explain the significance of the American Civil War."

Principles of Effective Prompt Engineering

Prompt: "*As a data scientist, describe the process of cleaning a dataset before it is used for analysis. Include steps such as handling missing data, dealing with outliers, and data normalization.*"

Role play Precision Clarity Context

Principles of Effective Prompt Engineering

Prompt: "As a data visualization expert, explain the concept and process of creating a 'Box and Whisker Plot' in data analysis. Include its purpose and how to interpret it."

Role play Precision Clarity Context

Principles of Effective Prompt Engineering

Prompt: "As a data visualization expert, explain the concept and process of creating a 'Box and Whisker Plot' in data analysis. Include its purpose and how to interpret it."

Role play Precision Clarity Context

Debugging ChatGPT Prompts



- Adjust the tone and formality - “*Explain it to me like I'm five*"
- Tweak the details - Add words like "briefly" or "in detail"
- Experiment and iterate - Don't be afraid to experiment and iterate on prompts. Sometimes, slight rephrasing or additional instructions can yield significantly better results.

ChatGPT Cheat Sheet for Data Science

Conversation with ChatGPT

What technology-enhanced learning design models or approaches are most helpful for supporting the design of high-school science lessons? Provide examples. Use at least five research papers from 2015 or later to justify arguments. References in APA format and include the reference list. Answer in 500 words. Do not use websites to justify arguments.

Provide a critical response to the post above, citing at least one research article. Make the response 250 words.

What is the full citation in APA format for the Papastergiou (2009) source cited in the previous output.

Mathew Hillier on 20 February, 2023

Why does ChatGPT generate fake references?

FAKE: Blumenfeld, P. C., Knezek, G. , Maksimova, O., & Romanowski, A., (2015). International Handbook of Information Technology in Primary and Secondary Education. Springer.

None of these names appeared as editors on this book. Only one appeared as an author of a paper but not with these people. The combination of these four authors was not found via google. However these names have all published on topics related to education. The real editors were Joke Voogt and Gerald Knezek. Knezek was a chapter author but not with the others listed here. However the book did have 75 papers in it and given Knezek publishes in this field it the chance that the author wrote a conference paper in the field at this particular conference is greater than zero. The book title is true however, the book title was actually produced in 2008. Given there are 75 chapters it could be a conference proceedings collection. Correct publisher for the title, but it is also a very common publisher of education works. The real URL for this book title: https://link.springer.com/book/10.1007/978-0-387-73315-9. The contents pages are open access on the web, however individual full text PDFs are behind a pay wall.

Why does ChatGPT generate fake references?

FAKE: Kim, Y., & Lee, J. (2015). Effects of augmented reality on learning outcomes: A meta-analysis. Journal of Educational Technology Development and Exchange, 8(1)

The authors and year combo was not found via google scholar, but noted lots of East Asian authors in this journal, the names were found on papers of similar topics but also a lot of papers from biochemistry. But both Kim and Lee are common family names in the East Asian region. The title was not found, but a similar mix of words has been used in other papers, but titles with similar words do not appear in this issue. The title and authors are not in this vol/issue or journal. This is a real journal and is open access by University of Southern Mississippi, and so on the web with full text of all papers accessible. The URL is https://aquila.usm.edu/jetde/ . The volume/issue number correctly equated to 2015.