



Generative AI for research

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Generative AI

- GenAI is a next-word-predictor.
- GenAI is multimodal i.e. LMMs (text, audio, image, video).
- GenAI is increasing in competence.
 - Retrieval Augmented Generation (RAG).
 - Plugins, APIs, and GPTs connect foundation models to 3rd party services.
- GenAI is everywhere (Computer operating systems, productivity software, cars, phones. Intelligence-on-demand. For everyone. For free).
- Bigger context windows enable more accurate responses to increasingly complex prompts.

Generative AI is not 'search'

- Responses are not being retrieved from a database; they are generated, one word at a time, using the prompt as a starting point.
- There is therefore no 'ground truth' for LLMs, and no *a priori* model of the world that they refer to.
- Data provenance is a difficult problem (see *hallucinations* and *citation*).
- However, LLMs are nonetheless proving remarkably adept at limited forms of world-building, even if only one word at a time.

Prompt development (crafting, engineering)

- 'Prompting' is not equivalent to 'searching'; it establishes the boundaries of the world within which the model 'thinks'.
- Contextual richness of the prompt is an important indicator of the quality of the generated response; more context = higher quality output.
- Contextual awareness of LLMs is constantly increasing.
- Role. Goal. Instruction.
 - You are...; I am....; I want you to...

Treat genAI like an expert i.e. a person

- Expertise within, and across, professional domains.
 - Extensive knowledge, and the ability to apply it in creative ways.
 - The ability to understand and navigate complexity.
- Expert communication skills.
 - Generative AI gives us access to expertise through natural language.
- Don't ask it for answers. Ask it for ideas.
- Evaluate its responses on a spectrum that assumes some level of error and adjust expectations accordingly.
- 'Collaboration' means that you are both responsible for weak outputs.

Research process

1. Identify your research question or problem.
2. Review existing literature and research.
3. Choose your research methodology.
4. Create a research design.
5. Collect and analyse data.
6. Interpret findings and draw conclusions.
7. Communicate results.

Use-cases for generative AI

- Research process relies on data provenance.
- However, some research tasks rely on it less than others.
- GenAI can adopt the persona of research assistants.
 - Literature reviewer.
 - Idea generator.
 - Summariser.
 - Data collection.
 - Writer.
 - Grant writer.
 - Data analyser.

Research assistant

Literature reviewer

- *Use the attached articles to give me an overview of the **key features approach to developing clinical reasoning**. Tell me why this approach has merit and why it might be useful for me in my role in a school of health and social care. Give me 5 key takeaways from the articles. Give me a set of principles for incorporating this concept into assessment tasks.*
 - The key features approach focuses on assessing the essential steps in solving a clinical problem...
 - Why the approach has merit and could be useful: Efficiency - By focusing only...
 - 5 Key Takeaways: KFPs focus only on essential challenging decisions...
 - Principles for Incorporating KFPs into Assessment: Use a systematic test development process...

Research assistant

Idea generator

- *I'm interested in the topic of generative AI in scholarly practice and would like to do a PhD in the area. Do you have any suggestions for research questions that I could explore?*
 - What are the ethical implications of using generative AI to assist with academic writing and research? Issues around authorship, originality, and transparency could be examined.
 - How might generative AI impact knowledge production and dissemination in academia? You could investigate effects on collaboration, peer review, publishing models, etc.
 - What challenges do scholars face in evaluating and critiquing generative AI outputs? Studies could identify gaps in interpretability and benchmarking.
 - What biases exist in current generative AI systems and how can they be mitigated? Testing systems across different domains and datasets would reveal limitations.

Research assistant

Summariser

- *Summarise the attached article / report.*
- *Explain this article / paragraph to me as if I was a novice.*
- *Summarise the attached meeting transcript.*
 - *What time did Mary say...?*
 - *When did they discuss...?*
 - *Who said...?*

Research assistant

Data collection

- *Use this analysis as a framework to develop a survey for the workshop participants.*
- *I want to gauge their perception of AI across a range of different aspect of practice, and then run the survey pre- and post-workshop.*
- *In other words, I want a survey that will help me to see if and how the workshop influenced participant perceptions of AI in the profession.*
- *Draft me a set of questions I can use to survey the participants. Include a range of different question types.*
- *I will need to compare the two sets of responses, so focus on questions that would best help me determine the impact of my workshop.*

Research assistant

Writer

- *I have attached 3 files that each include a version of a book chapter...*
- *The book is an introductory text to compassion in health and social care, and the chapter explores the question of whether an AI can truly be compassionate.*
- *There are relevant definitions of what compassion means in the context of this book, that I want you to pay especially close attention to. I want you to analyse each of the attachments and take the high-level ideas as a framework for a draft that I want you to write.*
- *I want you to take the role of an academic writer, but avoid stuffy, jargon-filled writing.*
- *I want you to begin by laying out the aim of the chapter and why it matters.*

Research assistant

Grant writing

- "How to intelligently prompt ChatGPT with the contextual knowledge it will require to write your grant well — *using the funding body's grant proposal guidelines*, past successful applications..."
- "You will learn how to synthesize complex research goals into compelling and digestible content for potential national and other funding bodies, ensuring adherence to formal grant guidelines but also more subtle normative rules for grant applications..."
- "The practicalities of using AI to maintain alignment with the ever-changing landscape of grant funding will also be discussed..."

Research assistant

Data analyser (second / supervisor pass)

- *Analyse the attached responses to the question, "What do you believe makes a competent healthcare professional?"*
- [copy and paste transcript]
 1. Assessment and Clinical Skills.
 2. Communication.
 3. Continuous Learning and Development.
 4. Ethical and Professional Behaviour.
 5. Holistic Care.

Adding value

- Problem selection: We decide which problems are worth exploring.
- Significance: We decide what results are significant.
- Collaboration: We can work in teams to achieve more than any individual can achieve in isolation.
- Strategic goals: We decide on the high-level goals that matter to us.
- Interpretation: We put findings into a relevant context.
- Accountability: We are ultimately responsible for the products of research.
- **Meaning: We give meaning to the research enterprise.**

Moving forward

- AI as a tool for research. But, we also have AI as the subject of research.
- As the cost of generative AI systems decreases, what new applications and use cases do you foresee emerging in your research domain?
- How might the tendency to anthropomorphise generative AI systems shape how people interact with and trust the information these systems generate?
- What biases, flaws or limitations of generative AI should we be aware of as these systems become commonplace?
- What is the value that you add on top of cheap, ubiquitous, and accessible AI?

Summary

- GenAI systems are next-word predictors that can generate multimodal content, which are rapidly improving in competence.
- GenAI provides abundant expertise and creative ideation through natural language conversations, though biases and limitations exist.
- Wide range of use cases for genAI across all aspects of research and professional learning contexts.
- Ethical implications around authorship, originality, and transparency must be considered when using genAI for academic work.
- Evaluating outputs critically remains important (for now).