Using generative artificial intelligence during a PhD
Information sheet

Dr. Mark Carrigan, Professor Peter Kahn, Dr. Caglar Koksal
University of Manchester

Session description
Generative Artificial Intelligence (GAI) software with the capacity to generate cultural material in response to prompts has now become widely available. This session will look at how a set of generative AI tools can be used to support various aspects of research, such as ChatGPT, Ellicit and DALL-E (although the final selection of tools will be made nearer to the workshop). Opportunities will be provided to try out the tools alongside discussion with other participants. The workshop will give close attention to strategies by which to engineer prompts/conversation strategies to use with the tools so that one arrives at desired outputs. The session will consider a range of critical perspectives on implications for that usage for doctoral research, including the limitations of AI and the citation of output from generative AI.

Facilitated by Mark Carrigan, Peter Kahn, Caglar Koksal

Pre-sessional briefing

You may have heard a lot in the news recently about new artificial intelligence systems like ChatGPT that can generate human-like text, images, code, and more from simple prompts. The field developing these systems is known as generative AI. It represents a major step forward for AI, with significant implications for many areas of life and work.

In this workshop we'll explore what generative AI is, how it works, and what it might mean for social science research. At its core, generative AI uses neural networks - computing systems modelled on the brain - that are trained on vast datasets to recognize patterns and generate new outputs. For example, a system like ChatGPT is trained on millions of web pages and books to build a sophisticated model of natural language. It can then take a prompt and continue the text in a remarkably human-like way, answering questions, writing essays, even conversing back and forth.

The social sciences rely on activities like searching literature, analysing data, and communicating ideas that could potentially be transformed by generative AI. These systems can aid literature reviews, contribute to research methods, analyse datasets, or even co-author papers. This could greatly expand our capabilities as researchers. However, incorporating generative AI also surfaces profound ethical, epistemological and methodological issues that we'll need to carefully navigate.

This workshop will provide hands-on experience using Claude AI and other tools to get a sense of current capabilities. We'll also discuss principles and practices for responsibly integrating generative AI into the research process. Our hope is that you come away with a clearer sense of what these technologies can and can't do, and an appreciation for why reflexivity is needed as we enter this new era of augmented intelligence.

CC BY-ND 4.0 DEED Attribution-NoDerivs 4.0 International

Generative AI in Research: Limitations, Risks and Concerns

Issues that pertain to the limitations, risks, and concerns of using GAI in research largely hinges on the research domain and the manner in which GAI is used. For instance, risks for a medical sciences PGR might differ from those in social science. Hence, the following content is prepared with SEED PGRs in mind.

To harness the benefits of GAI while understanding and managing its risks, it's vital to grasp how it operates. There are numerous online resources to aid this understanding. A detailed article from Ars Technica offers an insightful introduction to Large Language Models (LLMs) - a type of GAI that we would explore in our workshop. In essence, AI does not "understand" content as humans do but recognises patterns in data to generate outputs. Popular LLM tools include OpenAI's ChatGPT, Microsoft Bing Chat, Google Bard, and Anthrompic's Claude, among others. Industry consensus often highlights GPT-4, which powers OpenAI's ChatGPT, as the superior model due to its human-like responses and logical reasoning. While many of these tools are commercial, with associated criticisms such as the black-box nature, there are also capable open-source models available. Hence, some concerns may be more applicable to certain tools than others.

Key challenges surrounding the use of GAI in PhD research include:

1. Data Bias and Quality:

AI models mirror the biases present in their training data and algorithms. Therefore, it's imperative to critically assess AI-generated outputs. While GAI can produce polished multi-modal content, it doesn't guarantee accuracy. It's known for creating fictitious references or generating false data. It's prudent to use GAI for brainstorming but exercise caution when relying on it for primary research tasks.

2. Reproducibility and Transparency:

Many AI models, especially deep learning ones, are deemed "black boxes," making their operations including trained data set, as well as algorithms, assumptions, and models that power these operations opaque. This poses challenges for reproducibility and verification of research findings.

3. Security Concerns:

GAI models might unintentionally produce outputs revealing sensitive details. Avoid sharing confidential information with these models unless using an open-source variant locally. Missteps could lead to data breaches or inadvertent incorporation into future training data.

4. Authenticity and Originality

GAI might inadvertently replicate content from other sources, raising plagiarism concerns. Plagiarism detection tools are notoriously ineffective at the moment but who knows where they will be in, say, six months? So, while AI can be a tool for brainstorming or theme identification, it shouldn't be trusted for drafting original content.

Recommendations for Researchers: Always scrutinise AI-generated content. Stay abreast of AI ethics and good practices.

CC BY-ND 4.0 DEED Attribution-NoDerivs 4.0 International

Academic integrity and the use of Generative AI

Formal institutional guidance on the use of Generative AI is expected shortly. This formal guidance will supersede any advice given in this information sheet on the implications for academic integrity of using GAI. Initial guidance on the use of GAI is currently available from the library: https://manchester-uk.libanswers.com/teaching-and-learning/faq/264824

> ## Can I use a chatbot or AI tool in my assignments?
>
> You should not submit work for assessment that has been generated by a chatbot or AI tool. Such work would be considered as academic malpractice; the words and ideas generated are not your own. Further to this, the words and ideas generated by the chatbot or AI tool would make use of other, human authors' ideas without referencing them, which is plagiarism.
>
> If you were writing an assignment on chatbots or AI tools — how the technology works or their impact on society — and include words and ideas generated by the chatbot or AI tool as an example, you should clearly reference the chatbot or AI tool used. If you are using Harvard Manchester referencing style, you should use the 'Software' example on the Library's guide to Harvard referencing.

Please note in addition to the above library guidance that some GAI tools provide sharable links to their outputs so that readers can access the output for themselves. Such output can be referenced in the same way that a webpage can be referenced, with the URL provided as an integral part of the reference.

PhD candidates are advised to consult their supervisors for guidance on how GAI might most effectively be integrated into their doctoral studies.

Session outline

Introducing Generative AI for research

- Initial remarks
- Introduce yourself and your research to Claude
- Critique your writing sample as a reviewer
- Connect your two writing samples
- Questions/comments

Practical tasks

- Presenter run-through for one exercise
- Choose an exercise from the prompt list (below) to do in pairs, talking through the exercise with your partner as you proceed
- Plenary feedback

Introducing further GAI tools

- Introduction to XXXX
- Introduction to XXXX

CC BY-ND 4.0 DEED Attribution-NoDerivs 4.0 International

- Introduction to XXXX
- Discussion on further tools
- Questions/comments?
- What are you next steps going forward?

Prompt list

Understanding literature
- Identify potential gaps in a piece of literature or a field.
- Identify literature that is relevant to answering a research question.
- Evaluate the strengths and weaknesses of a research article or other text.
- Share a thought-provoking quote from literature and identify connections with your field.
- Identify appropriate theory to support a dissertation or research topic.
- List, in a table, specific details, themes or findings from a set of research papers.

Research design
- Identify related formulations of a research question or more specific variants of the question.
- Brainstorm potential hypotheses for a research question.
- Outline the pros and cons of different research methodologies for a given research question.
- Develop a set of ethical considerations for a given research scenario.
- Identify an appropriate research design for a given set of research questions, objectives, context and researcher interest/expertise.

Generating research findings
- Identify an appropriate set of data analysis and statistical techniques for a research process.
- Identify themes and sub-themes in a set of transcripts, indicating ways in which these themes and sub-themes connect to each other.

Understanding research findings
- Identify how a given set of research findings extends the findings present within one or more specific research papers.
- Evaluate the extent to which a set of research findings have already been reported within a research field.
- Elaborate upon the significance of a set of research findings for a given research field.

Recommendations and conclusions
- Generate a list of potential implications for a particular research finding.
- Write a briefing note for policymakers given a specific set of research findings.
- Identify possible recommendations on the basis of a set of research findings.
- Identify a suitable direction for further research given a research abstract.

Examples of further tools

Consensus: An AI-powered search engine sourcing from research papers, offering relevant findings, source details, and citation capabilities.
Semantic Scholar: A research tool that enables users to save papers to an online library, provides AI-based recommendations, and alerts for new relevant papers.

CC BY-ND 4.0 DEED Attribution-NoDerivs 4.0 International

Genei: Assists in generating first drafts from relevant papers, features GPT-3.5 integration for expanded writing, and offers automated citation. Also introduces a tool, CoLoop, for qualitative analysis.
ChatPDF: Generates a GPT-3.5 chatbot from uploaded PDFs but is limited to text-based content. A free plan is available.
OtterPilot: An AI tool designed for recording, transcribing, and summarising online meetings, compatible with both Zoom and Teams.
Lumelixr.ai: Assists in retrieving Excel formulas through natural language queries. It's accessible as both a web app and browser extension.
ChatGPT Best Practices by OpenAI: A guide that provides strategies and prompts to achieve optimal results from GPT models.
PromeAI: An AI-powered design assistant equipped with an extensive model style library, catering to various design professionals.
Tomat.AI: A user-friendly tool designed for opening and analysing CSV or Excel files.
Elicit: An AI tool based on the papers in Semantic Scholar that summarises papers, extracts data from papers, and synthesises findings.

CC BY-ND 4.0 DEED Attribution-NoDerivs 4.0 International