Curtin University
AI in research fact sheet

● *Purpose*

The purpose of this document is to provide guidelines for the responsible and ethical use of Artificial Intelligence (AI) technologies in the university for researchers, aiming to help researchers adapt to the rapid advancements in AI technology worldwide. These guidelines aim to ensure that the use of AI aligns with the university's values, promotes academic integrity, protects privacy and security, and fosters a positive and inclusive researching environment. As a student, do not use this fact sheet but instead please see Curtin's Academic Integrity documentation regarding AI, linked in Curtin's Rules and Policies section of this sheet.

● *What is GenAI?*

GenAI, short for Generative AI, uses machine learning approaches trained on large data sets to manipulate and create content, including text, audio, images, and other media, in response to users' instructions, called "prompts". For example, ChatGPT is a GenAI model that is trained to mimic chat-like behaviour.

Here are a few examples of GenAI tools/models:

GitHub Copilot
Help debug and write code.

Stable Diffusion
Generate images from text

ChatGPT
Generate text from a prompt

Audiobox
Generate audio and speech from text

For many these could become regularly used tools. However, using Generative AI also entails risks for the researcher, their research, and data integrity.

● *Limitations of AI tools*

As powerful as these AI tools can be, they have their limitations.

First, it is important to note that none of these tools are classed as *AGI* (Artificial General Intelligence) and in no way, shape or form understand their interactions with humans. These models produce text (or other media) based upon material compiled from the internet and mimic human-like conversation with no genuine intelligence.

> Second, these tools can provide misinformation as well as biassed responses. The text or other media the model returns cannot be guaranteed as truth and therefore all information received from these models must be double checked with sources of truth.

● *Curtin's rules and policies*

The following AI guidelines aim to ensure that Curtin's values are followed.

It is important to uphold both:
- *Academic Integrity* https://www.curtin.edu.au/students/essentials/rights/academic-integrity/
- *Research Standards* https://www.curtin.edu.au/about/governance/research-standards/

For further information about AI rules and policies in tertiary education, read the TEQSA AI information page:
- https://www.teqsa.gov.au/guides-resources/higher-education-good-practice-hub/artificial-intelligence

AI Guidelines

Accuracy and Bias

Researchers are expected to apply rigour in the development, undertaking and reporting of research. Researchers using GenAI for research are fully and solely responsible for errors generated by its use, so information provided by GenAI must always be confirmed with credible sources. GenAI models are known for providing misinformation and therefore researchers must never use GenAI for factual confirmation of information.

Example: A lawyer in court used ChatGPT to provide information for his case and used it as a factual and credible source of data, which turned out to be false information, resulting in a fine.
Link: https://www.abc.net.au/news/2023-06-24/us-lawyer-uses-chatgpt-to-research-case-with-embarrassing-result/102490068

GenAI models are also known for bias based on the data it has been trained on, posing ethical concerns.

Example: The Department of Home Affairs created an algorithm to help speed up the visa processing, however it became biassed to who would be a high, medium, or low risk applicant based on several factors causing discrimination.
Link: https://www.abc.net.au/news/2022-12-12/robodebt-algorithms-black-box-explainer/101215902

✓ Ask ChatGPT to provide some information on the topic of research in dot points and use it as a guideline to read up on further sources, making sure it is accurate information.

✗ Ask ChatGPT to write an entire paragraph for your research paper and copy and paste it directly in.

🔒 *Data Privacy*

Generative AI services may capture user data, and this can include any sensitive research or personal data users might provide. It is essential to regularly read and review the terms of use of services being employed in research, as they may change without notice.

Example: An older version of ChatGPT could be prompted to repeat the word "poem" which resulted in it returning sensitive data that it had been trained on.
Link: https://www.wired.com/story/chatgpt-poem-forever-security-roundup/

✓ Remove all people's names and other personal information from your document before getting a GenAI model to provide insights.

✗ Send a document filled with confidential and personal identifiable information to a GenAI model.

IP & Authorship

AI tools cannot meet the requirements for authorship as they cannot take responsibility for the submitted work. As non-legal entities, they cannot assert the presence or absence of conflicts of interest nor manage copyright and licence agreements. Authors are fully responsible for the content of their manuscript, even those parts produced by an AI tool, and are thus liable for any breach of publication ethics.

The laws around Intellectual Property of AI generated content is continually evolving. Therefore, you are encouraged to keep updated with each organisations publishing policies to avoid breaking any rules.

Example: Publishing company Elsevier has a policies and standards document outlining their stand on writing and publishing with AI.
Link: https://www.elsevier.com/en-au/about/policies-and-standards/the-use-of-generative-ai-and-ai-assisted-technologies-in-writing-for-elsevier

Use GenAI to help assist the research process but be sure your manuscript is 100% accurate and is your intellect.

Write down AI as a co-author of your publication as it wrote a lot of it for you.

Transparency and Reproducibility

Authors who use AI tools in the writing of a manuscript, production of images or graphical elements of the paper, or in the collection and analysis of data, must be transparent in disclosing in the Materials and Methods (or similar section) of the paper how the AI tool was used, and which tool was used.

Declaring the use of these technologies supports transparency and trust between authors, readers, reviewers, editors, and contributors and facilitates compliance with the terms of use of the relevant tool or technology.

A great way to support transparency with AI is providing the code, prompts or similar for the reproducibility of the content generated by AI. However, underlying models such as ChatGPT continue to change and improve which can have an impact on reproducibility.

Example: Researchers used ChatGPT to write papers without disclosure, creating challenges for peer reviews and the scientific community.
Link: https://www.nature.com/articles/d41586-023-02477-w

✓ Disclose all GenAI tools used throughout the research process and present reproducibility of content where possible.

✗ Generate text, image or other content and claim it as solely your intellect and work with no references.

🧪 *Synthetic Data*

GenAI tools can be used to create fake or synthetic data. This tool can be used to anonymise a dataset filled with personal identifiable information by generating a statistically similar dataset with confidentiality removed.

However, this is a very powerful tool that can be easily misused. This is also a complex topic and therefore you should consult an expert to determine if your use case is suitable. It is worth considering as it is a powerful AI tool that can be used to aid and improve your research.

Example: WADSIH worked with the WA Health Department to synthetically generate healthcare data for researchers to experiment on, where all personal identifiable information was removed.
Link: https://wadsih.org.au/wa-health-hackathon-2023-synthetic-data/

✓ Anonymizing a text-based dataset by synthetically generating statistically similar information with the removal of personal identifiable data.

✗ Add biased fake data/information into your dataset with no statistical similarity to improve the accuracy of your model for better publication.

Ethical Considerations

1. The requirement for ethics approvals remains and must include descriptions of the use of generative AI when used as part of research.

2. Adhere to Curtin's Policies when using AI tools involving data collection, storage, or processing. Link: https://researchtoolkit.library.curtin.edu.au/data/research-data-management/access-and-security/

3. Be aware of potential biases in AI tools and take measures to address them, ensuring fair outcomes.

4. Respect IP rights and comply with copyright laws when utilising AI tools.

5. Be aware of falsification of data as there is no guarantee that GenAI will produce accurate results.

6. Be aware of the AI tool's terms of service, where it obtained data and how it uses yours.

Example Use Cases

Chat with Research Papers

- Upload research papers to ChatGPT or other LLMs.
- Ask for summaries to quickly understand the purpose of the paper.
- Ask specific questions and ask for direct quotes so answers can be checked for validity.

Generate Python Scripts for Exploratory Data Analysis

- LLM's are not suitable for statistical analysis but they can help you to generate a Python script to analyse your data.
- E.g. *"I have uploaded weather_cycles.xlsx, create a python script which finds the average temperature and humidity of the dataset"*.

Planning Research

- Use ChatGPT as a tool to help plan out a research topic, for example:
- *"I want to learn more about quantum computing, what are some areas I should study?"*
- *"I am conducting research on synthesising new organic compounds for pharmaceuticals and have data on their molecular structure, solubility, reactivity, and biological activity; suggest methods to analyse the solubility and reactivity of these compounds under various conditions?"'*

Sentiment Analysis

- AI can be used to evaluate the sentiment of survey responses into negative, neutral, positive etc.
- Rather than spending hours manually labelling and identifying survey responses, GenAI can complete this task in a few minutes.

Synthetic Data Generation

- AI can be used to generate synthetic datasets which are able to replicate the patterns of an original dataset whilst protecting privacy and generating more examples.
- Text, audio, and image formats can all be used with synthetic data.

Data Extraction

- Data can be extracted from thousands or even millions of documents and automatically fill out a table by using a combination of 2 techniques, OCR and language models.
- OCR (Optical Character Recognition) can extract handwritten/printed text from a document. A language model like ChatGPT can use this text and extract any piece of information from it such as all the dates, names, scores, etc.