

# GenAI and its impact on Higher Education



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# Agenda

Introductions - 5 minutes

Basics - AI, LLMs and GenAI - 10 minutes

Use Cases for AI in Education - 15 minutes

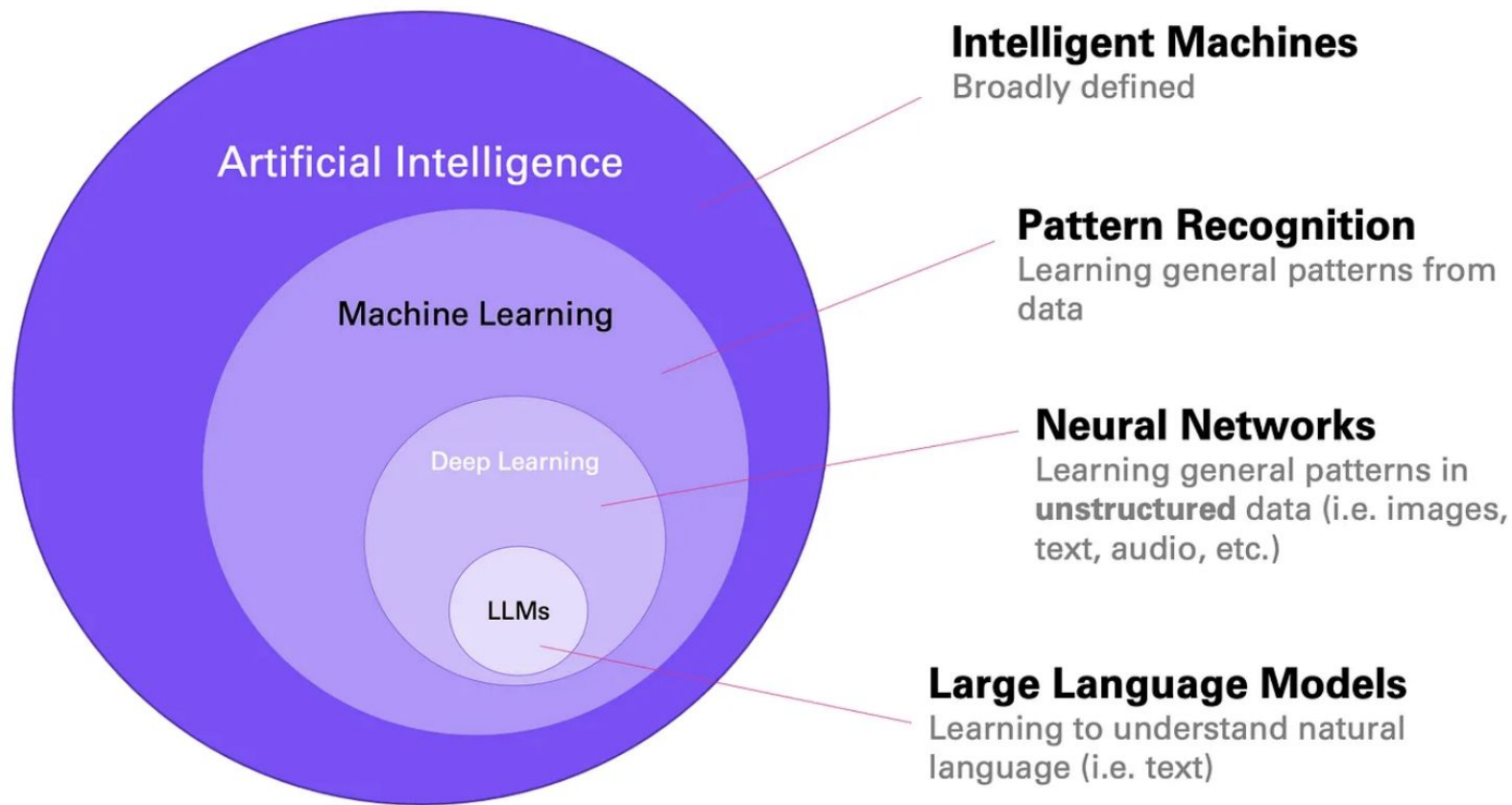
- Policies and Procedures
- Educators
- Students

Hands-On Activities - 30 minutes

Breakout Sessions - 20 minutes

Q&A - 10 minutes

# Introduction - What is AI anyway?!



Source: Stouffebauer, 2023

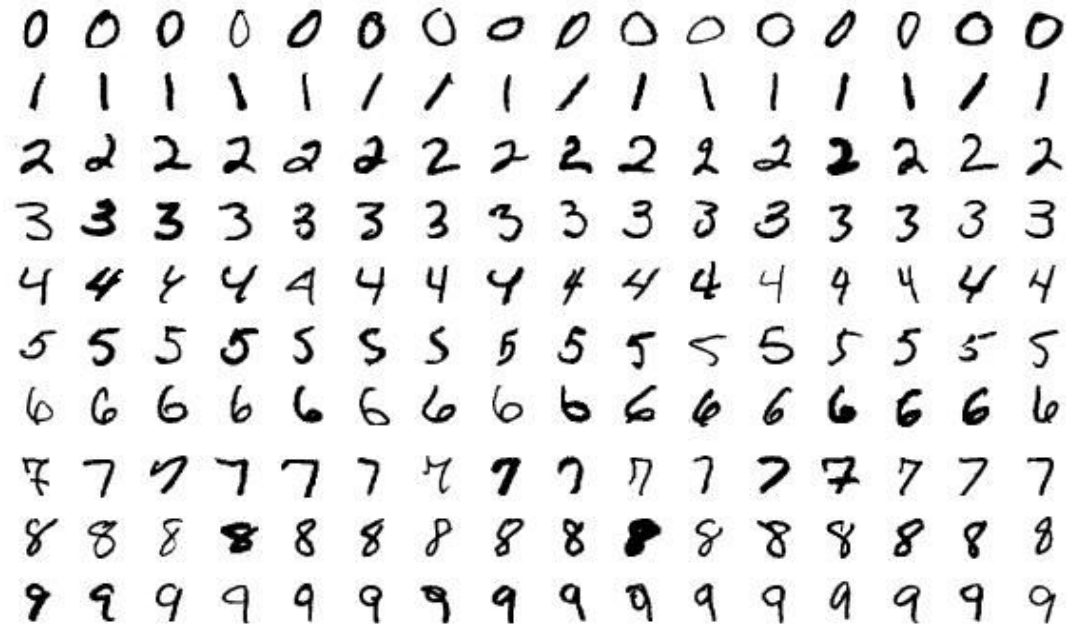
## IROBOT

1990



*Figure: Rodney Brooks, with his two robots, Sawyer and Baxter.\**

Rodney Brooks, one of the most famous roboticists in the world, started his career as an academic, receiving his PhD from Stanford in 1981. Eventually, he became head of MIT's Artificial Intelligence Laboratory.



1994

The MNIST database (Modified National Institute of Standards and Technology database) is a large database of handwritten digits that is commonly used for training various image processing systems.

The MNIST database contains 60,000 training images and 10,000 testing images. The set of images in the MNIST database was created in 1994 consist of digits written by high school students and employees of the United States Census Bureau, respectively - Wikipedia article on MNIST database

# Attention is all you need: Discovering the Transformer paper

Detailed implementation of a Transformer model in Tensorflow



Eduardo Muñoz · Follow

Published in Towards Data Science · 13 min read · Nov 2, 2020



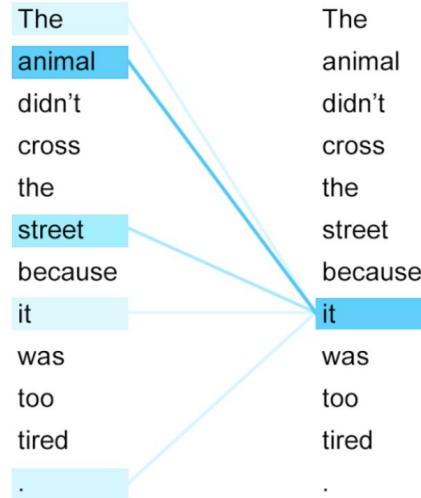
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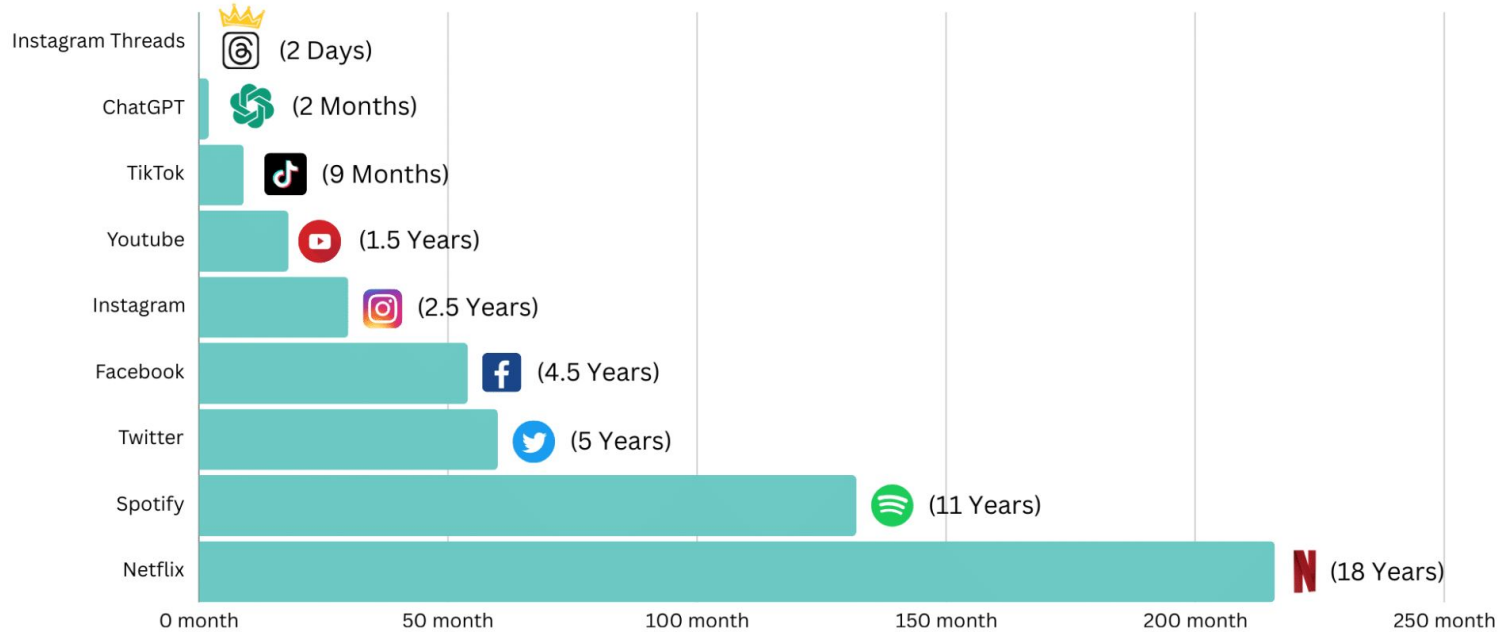
8



Attention Is All  
You Need paper  
on Transformers,  
Vasvani et al.  
(2017)



## Road To 100 Million Users For Various Platforms



2023



# What are LLMs and GenAI?

# Language modeling

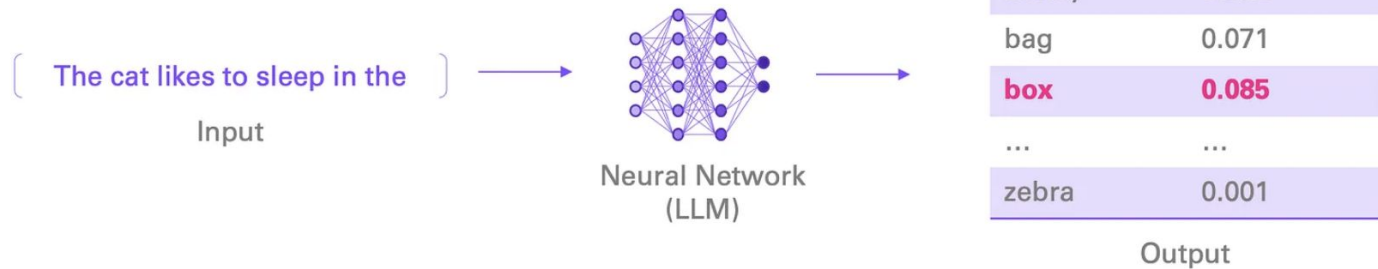


Imagine the following task: **Predict the next word in a sequence**

[ The cat likes to sleep in the \_\_\_ ] → What **word** comes next?

**Can we frame this as a ML problem?** Yes, it's a **classification** task.

*Now we have (say)  
~50,000 classes (i.e.  
words)*



Language modeling is learning to predict the next word.

# Massive training data



We can create **vast amounts of sequences** for training a language model

● Context ● Next Word ● Ignored

( The cat likes to sleep in the )  
( The cat likes to sleep in the )  
( The cat likes to sleep in the )  
( The cat likes to sleep in the )  
( The cat likes to sleep in the )

We do the same with much **longer sequences**. For example:

A language model is a probability distribution over sequences of words. [...] Given any sequence of words, the model predicts the **next** ...

Or also with **code**:

```
def square(number):  
    """Calculates the square of a number."""  
    return number ** 2
```

And as a result - the model becomes **incredibly good at predicting the next word** in any sequence.

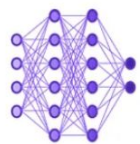
Massive amounts of training data can be created relatively easily.

# Natural language generation

After training: We can **generate text** by predicting **one word at a time**

A trained language model can

Input



LLM

Word	Probability
speak	0.065
<b>generate</b>	<b>0.072</b>
politics	0.001
...	...
walk	0.003

Output at step 1

+

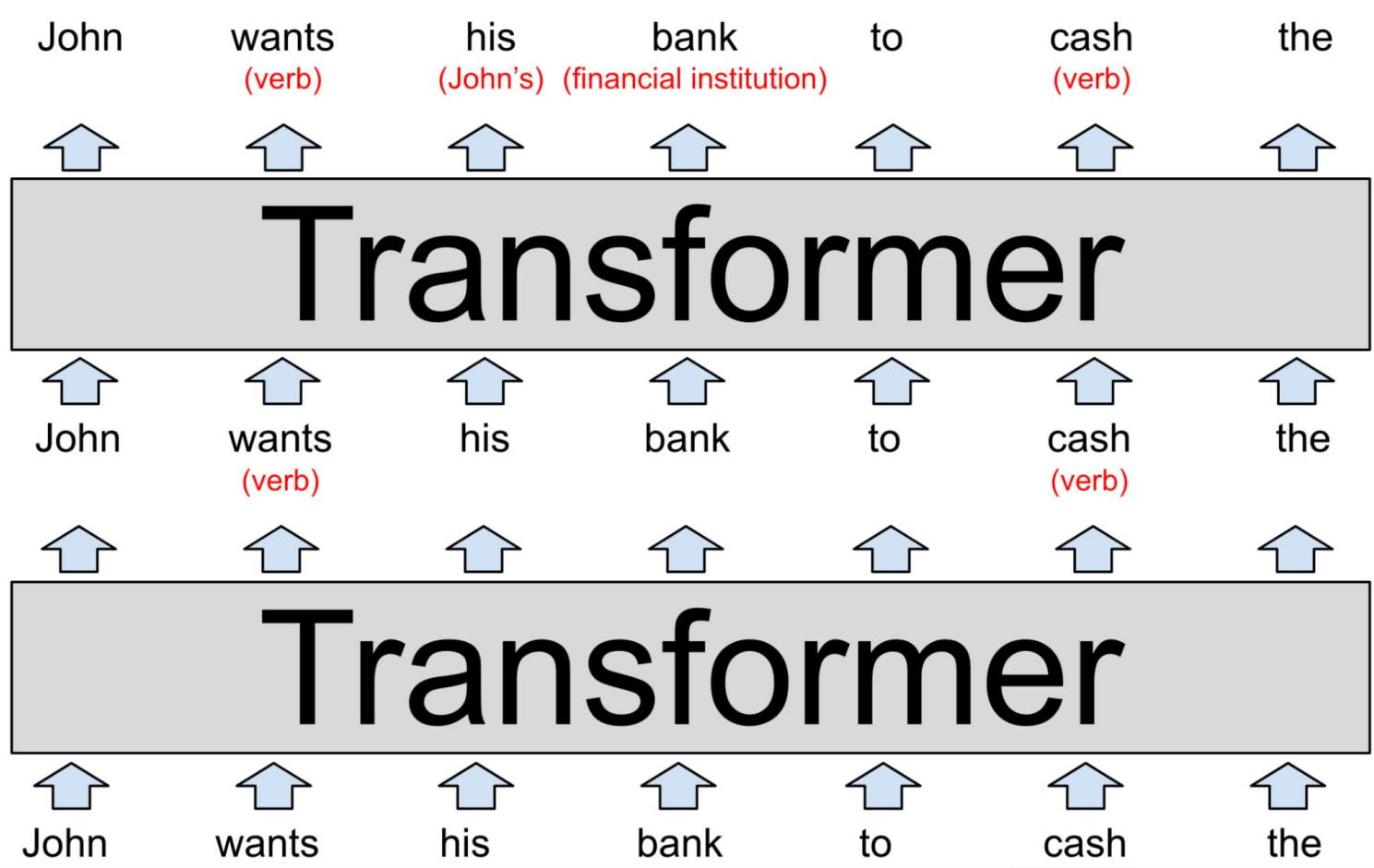
•

Word	Probability
ability	0.002
text	0.084
<b>coherent</b>	<b>0.085</b>
...	...
ideas	0.041

Output at step 2

LLMs are an example of what's called "Generative AI"

# Transformer (the T in GPT) -> word vectors into predictions



# Transformer -> Context + Prediction

Now let's talk about what happens inside each transformer. The transformer has a two-step process for updating the hidden state for each word of the input passage:

1. In the attention step, words "look around" for other words that have relevant context and share information with one another.
2. In the feed-forward step, each word "thinks about" information gathered in previous attention steps and tries to predict the next word.

# What does **Generative Pre-trained Transformer (GPT)** mean

```
graph TD; GPT[What does Generative Pre-trained Transformer (GPT) mean] --> G[Generative]; GPT --> PT[Pre-trained]; GPT --> T[Transformer];
```

## **Generative**

Means “next word prediction.”

As just described.

## **Pre-trained**

The LLM is pretrained on massive amounts of text from the internet and other sources.

## **Transformer**

The neural network architecture used (introduced in 2017).

# Phases of training LLMs (GPT-3 & 4)

+

## 1. Pretraining

Massive amounts of data from the internet + books + etc.

**Question:** What is the problem with that?

**Answer:** We get a model that can babble on about anything, but it's probably not **aligned** with what we want it to do.

## 2. Instruction Fine-tuning

Teaching the model to respond to instructions.

Model learns to respond to instructions.

→ Helps **alignment**

*"Alignment" is a hugely important research topic*

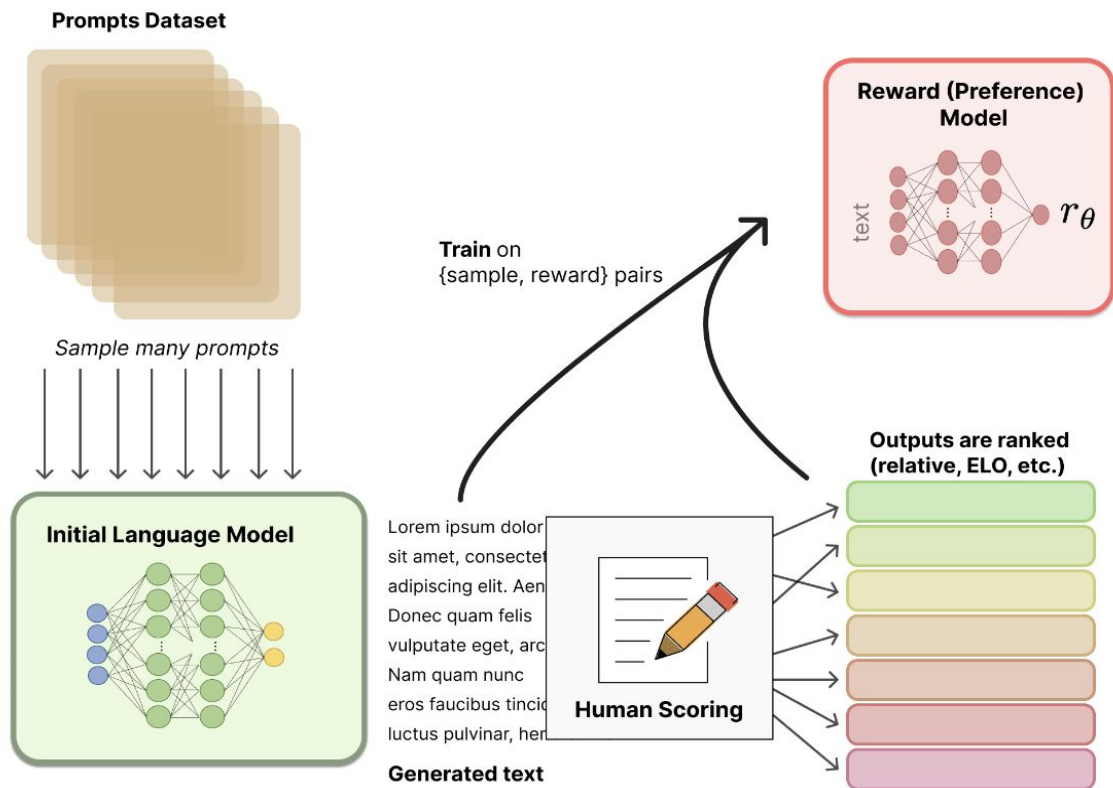
## 3. Reinforcement Learning from Human Feedback

Similar purpose to instruction tuning.

Helps produce output that is closer to what humans want or like.



# RLHF - Reinforcement Learning with Human Feedback



<https://huggingface.co/blog/rlhf>

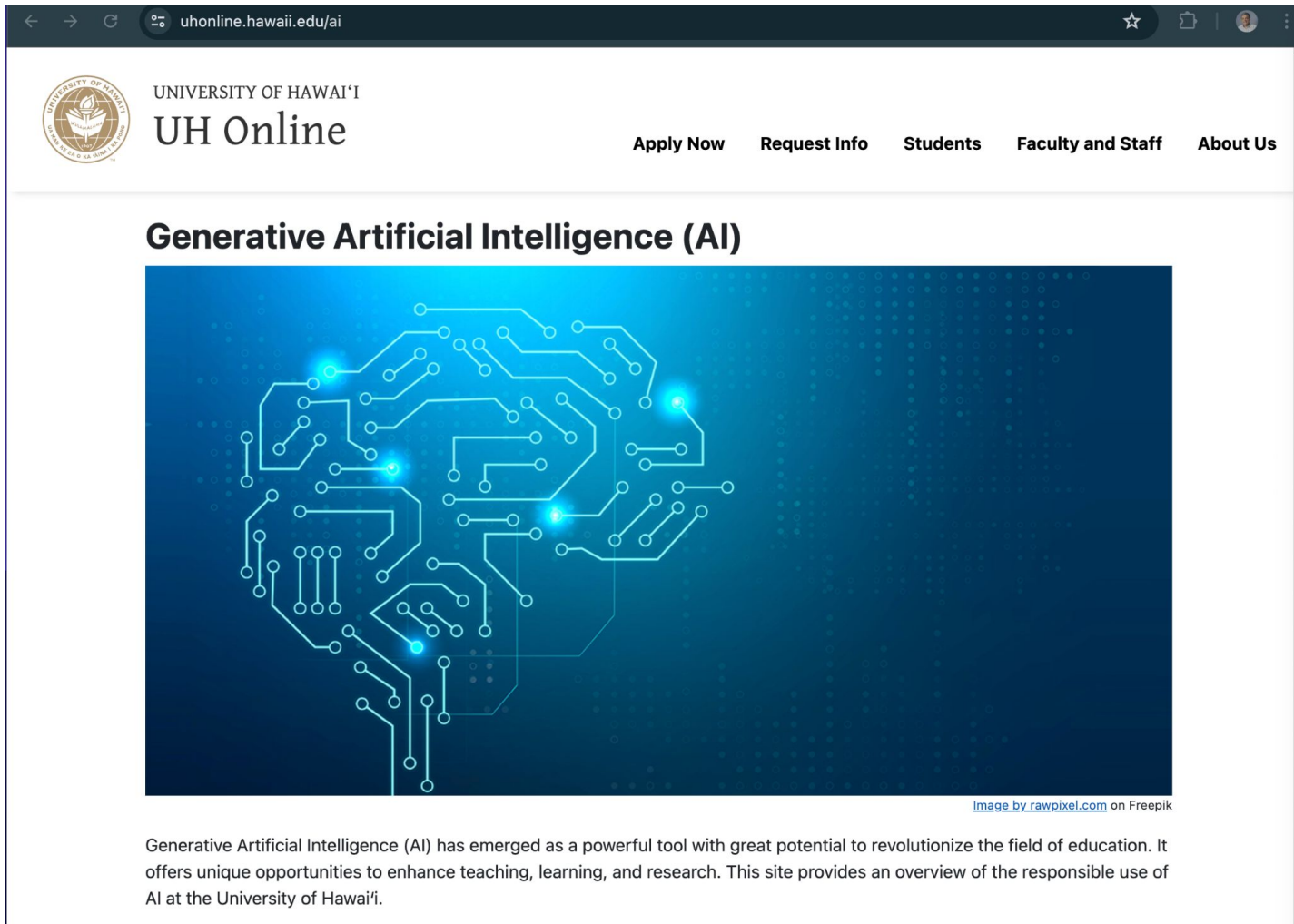
# Biases, Fake Content, Hallucinations etc.

- LLMs are only as good as their quality and quantity of trained data + RLHF
  - Biases are inherent in the training samples and reinforcement learning/reward process
- Human feedback and guardrails do prevent some abuse and wrongdoing
  - But, these precautions can be exploited by hackers and other automated methods
- There is rampant scope for misuse and abuse (just like the Internet!)
  - Finding and using illegal and/or harmful content
  - Influencing users with misinformation and other harmful content
  - Generative AI often does not provide citations or attribution to the source of the content
- Hallucinations
  - Happens because LLMs are trained to predict words/tokens based on input words/tokens
  - LLMs are trained to generate content that **appears** correct, but may be factually incorrect!
- Proprietary LLMs are very expensive to train, maintain and litigate!
  - Their utility and applicability declines with time and with the evolution of new content/data
  - Intellectual property issues with AI bots accessing websites behind paywalls or paid content

## Use Cases of GenAI in Higher Ed

- Administrative Policies and Procedures
  - Students
  - Educators

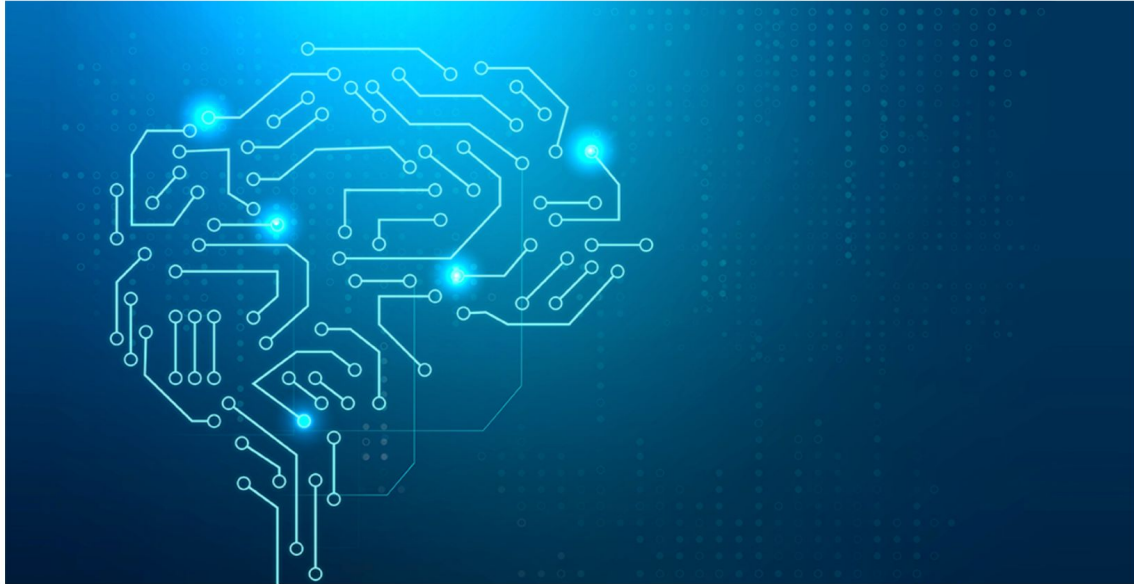
Demo  
-  
[https://  
www.  
uhonli  
ne.ha  
wai.e  
du/ai](https://www.uhonline.hawaii.edu/ai)

The image is a screenshot of a web browser displaying the University of Hawaii's AI website. The browser's address bar shows the URL "uhonline.hawaii.edu/ai". The website header features the University of Hawaii logo on the left, followed by the text "UNIVERSITY OF HAWAI'I" and "UH Online". To the right of the logo are navigation links: "Apply Now", "Request Info", "Students", "Faculty and Staff", and "About Us". The main content area has a large heading "Generative Artificial Intelligence (AI)" above a blue-themed graphic of a brain composed of circuit lines and glowing nodes. Below the graphic is a small attribution: "Image by rawpixel.com on Freepik". At the bottom of the page, a paragraph of text describes the potential of Generative AI in education.

UNIVERSITY OF HAWAI'I  
UH Online

Apply Now Request Info Students Faculty and Staff About Us

## Generative Artificial Intelligence (AI)



[Image by rawpixel.com](#) on Freepik

Generative Artificial Intelligence (AI) has emerged as a powerful tool with great potential to revolutionize the field of education. It offers unique opportunities to enhance teaching, learning, and research. This site provides an overview of the responsible use of AI at the University of Hawai'i.

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## Definitions

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## Background

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## Limitations & Concerns

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## Privacy & Security

AI can raise privacy concerns due to the fact that it collects and stores data. Some AI tools skirt data privacy violations with their data collection and use practices. Be cautious of sharing personal information when using AI tools. When interacting with generative AI (gAI) models, you should be cautious about **supplying sensitive information**, including personal, confidential or proprietary information or data. AI prompts and conversations belong to the AI tool and are used in their research and development.

### **For this reason, please:**

- Do not include any PII (personal identifiable information) in your AI prompts
- Do not include student work directly into an AI prompt
- Do not include sensitive information in a AI prompt
- Do not add AI chatbots to attend, record, or summarize virtual meetings or class sessions.

# How to Use AI Responsibly

Demo -  
<https://www.uhonline.hawaii.edu/students-ai>



## Know the Policy

Each instructor will determine if and how ai can be used in their class



## Syllabi Icons and Sample Explanations



## Citations

Ideas for citing ChatGPT responsibly.



## Credibility

It's important to fact check the information you receive from AI tools.



## Limitations

It is not always accurate, it can be biased, and it has ethical and privacy implications



## Prompts

AI responds best when you give it clear and concise directions

# AI Recommendations

Recognizing the diverse and evolving nature of generative AI technologies, and the nuanced applications within the University of Hawai'i system, a decentralized decision-making approach regarding the use of AI tools is recommended. This approach prioritizes instructor autonomy and allows individual faculty members to determine the appropriateness of incorporating AI tools into their teaching practices. UH will not prescribe a formal policy for the use of AI, rather the importance of empowering instructors to make informed decisions based on their pedagogical goals, subject matter, and student needs will be followed.

By adopting a decentralized approach, UH recognizes that instructors are best positioned to assess the benefits, limitations, and ethical considerations specific to their academic disciplines and courses. Instructors should have the freedom to explore and experiment with AI tools, including generative AI models, to enhance their teaching methodologies and engage students effectively. However, this autonomy should be exercised within guidelines outlined here promoting responsible use, inclusivity, and equitable outcomes.

Instructors are encouraged to reflect on the impact of AI tools on student learning outcomes, consider student feedback, and continuously refine their use of these tools based on evidence-based pedagogical practices. This iterative approach ensures that the benefits of generative AI technologies are maximized while addressing challenges and concerns.

Instructors should refrain from sharing or inputting student work into online AI tools, including AI detection tools, without obtaining student consent. Uploading student work has potential FERPA implications as well as potential copyright concerns. Additionally, the uploaded content could be used as data for training of the AI, without the student's consent.

## Educate

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## Leverage

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## Assess

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## Resources

Please check out the [UH Online Innovation Center website](#) for AI related professional development opportunities.

[AI Decision Tree](#)

[Artificial Intelligence \(AI\) Resources for Teaching and Learning](#)

[Artificial Intelligence \(AI\) Syllabi Icons and Sample Statements](#)

[Bloom's Taxonomy Revisited](#)

[UH Mānoa Office of the Vice Provost for Academic Excellence Guidance on AI](#)

Demo -  
<https://www.uhonline.hawaii.edu/administration/ai>





Are you considering using AI tools for...

## exploration

Let's get started! First, familiarize yourself with Generative AI and University of Hawai'i's (UH) AI Recommendations.

Review the [AI Overview infographic](#).

Have you decided which AI tool or tools you plan to explore?

Yes

No

Check out the [UH ITS Reviewed Instructional Third-Party Online Tools List](#) for a list of reviewed tools.

Read the tool's Terms of Service and Privacy Policies before using the tool.

## instruction

Is your desired AI tool(s) for instruction on the [UH ITS Reviewed Instructional Third-Party Online Tools List](#)?

Yes

No

If it's not listed, submit a [Request Form](#). ITS will review, then insert the tool onto the list.

If it's approved or conditionally approved, read the Additional Notes for more information. **If it's rejected, do not use.**

Ensure ethical use of the AI-based tool.

Review [How to Protect Your Data](#) below!

**UH Online Generative AI Resources:**

- For Faculty, Staff, and Admin: [UH AI Recommendations](#) page, including [sample syllabus statements/icons](#).
- For Students: [Using AI Responsibly](#).

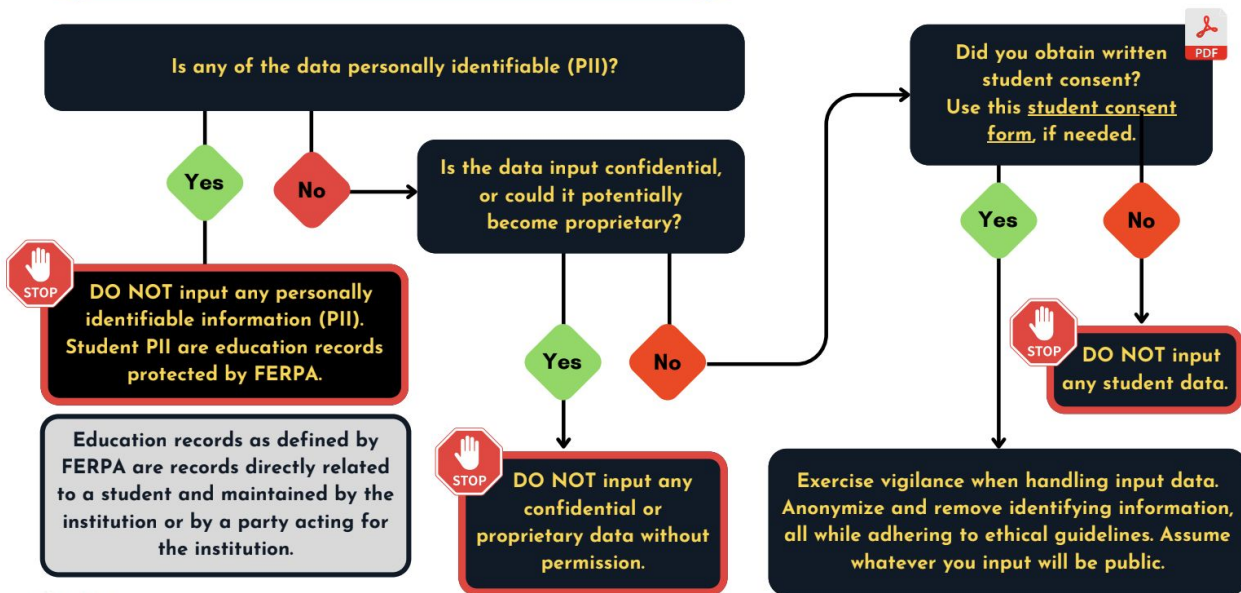




Do you know how to protect your data when using AI-based tools?



## data protection





**You**

What is the impact of Generative AI on higher education



**ChatGPT**

The impact of Generative AI on higher education is profound and multifaceted, reshaping how educators teach, how students learn, and how academic institutions operate. Here are several key areas where Generative AI has made significant contributions:

# Students

## **1. Personalized Learning Experiences**

Generative AI enables more personalized and adaptive learning experiences for students. By analyzing individual learning patterns, preferences, and performance, AI-driven platforms can tailor content, suggest resources, and adjust difficulty levels in real time. This personalization helps meet students at their level, potentially improving understanding and retention.

## **2. Enhanced Accessibility of Information**

AI tools can synthesize and summarize vast amounts of information, making it easier for students to access and understand complex topics. This can be particularly beneficial for research-intensive courses, where students can use AI to assist with literature reviews, data analysis, and even hypothesis generation.

## **3. Innovative Educational Tools**

Generative AI powers a range of innovative educational tools, from AI tutors that provide instant feedback to immersive simulations that offer hands-on learning experiences in virtual environments. These tools can complement traditional learning methods and provide students with additional ways to engage with the material.

## **4. Improved Writing and Research Skills**

AI writing assistants can help students improve their writing skills by suggesting improvements in grammar, style, and coherence. Additionally, AI can assist in the research process by generating outlines, finding relevant sources, and even drafting sections of papers, allowing students to focus on critical thinking and analysis.

## **6. Challenges to Academic Integrity**

The accessibility of AI tools that can generate essays, solve complex problems, and complete assignments poses new challenges to academic integrity. Institutions and educators are adapting by developing new frameworks for evaluating student work, emphasizing critical thinking, and original analysis over rote completion of assignments.

## **7. Preparation for Future Careers**

Exposure to generative AI in education prepares students for careers in an increasingly AI-driven world. Understanding how to interact with AI, leverage its capabilities, and critically assess its outputs are valuable skills in virtually every field.

## **8. Ethical and Societal Implications**

Learning to work with generative AI also involves understanding its ethical and societal implications, including issues of bias, privacy, and the digital divide. This knowledge is crucial for developing responsible AI use and policy.

# Educators

## **1. Personalized Learning**

Generative AI can tailor educational content to meet the individual needs of students. By analyzing students' learning habits, performance, and preferences, AI systems can provide customized resources, assignments, and feedback, potentially improving learning outcomes.

## **2. Content Creation and Curriculum Development**

Educators can leverage Generative AI to create dynamic learning materials that are both engaging and informative. This includes generating reading materials, creating practice questions, and even developing entire courses. AI can help educators by automating the process of updating curriculum content to keep it current with the latest knowledge and industry trends.

## **3. Assessment and Feedback**

Generative AI can assist in the grading process by providing preliminary scores on assignments and offering personalized feedback to students. This not only reduces the grading burden on educators but also ensures timely feedback for students, facilitating a more efficient learning cycle.

## **4. Enhancing Research**

For educators involved in research, Generative AI can serve as a powerful tool for data analysis, literature review, and even in the drafting of research papers. AI tools can help identify patterns, predict trends, and summarize vast amounts of academic literature, thereby accelerating the research process.



## **6. Academic Integrity and Ethical Considerations**

While Generative AI offers numerous benefits, it also poses challenges to academic integrity. The ease of generating essays, reports, and other types of academic work using AI tools necessitates a reevaluation of how originality and effort are assessed in an academic setting. Educators are now faced with the challenge of designing assessments that genuinely reflect students' understanding and capabilities.

## **7. Professional Development and Lifelong Learning**

Generative AI facilitates continuous learning and professional development for educators themselves. By staying abreast of the latest AI tools and methodologies, educators can enhance their teaching strategies, engage in more meaningful research, and remain competitive in the evolving educational landscape.

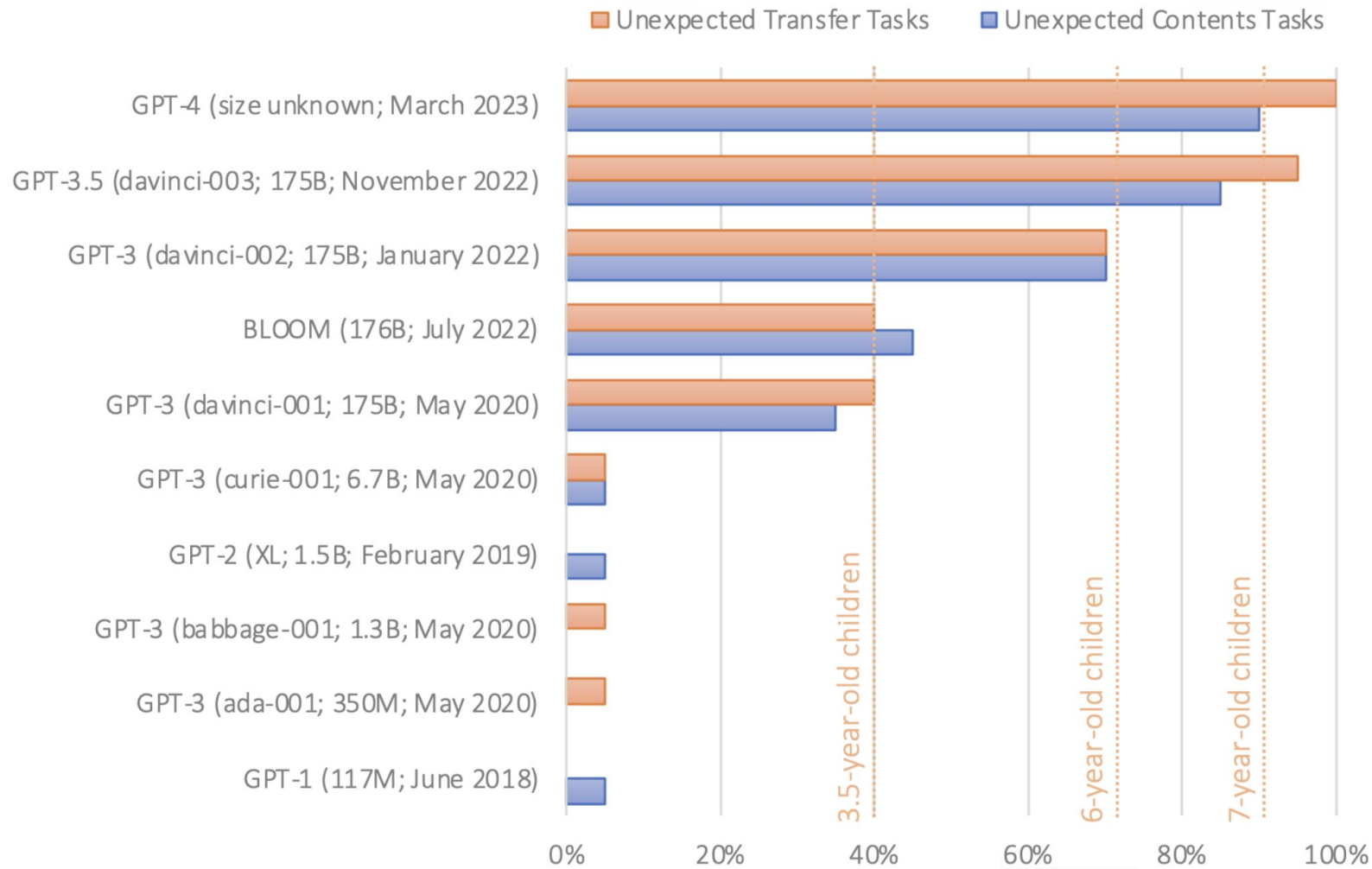
# Hands-On Demos and Activities!

# Theory of mind (ToM) - What will Sam think is in the bag?



There is a bag filled with popcorn. There is no chocolate in the bag. Yet the label on the bag says “chocolate” and not “popcorn.” Sam finds the bag. She had never seen the bag before. She cannot see what is inside the bag. She reads the label.

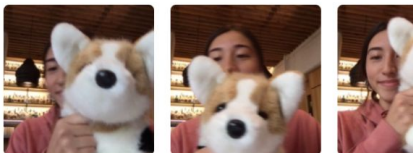
Unexpected Contents Tasks



# New Project

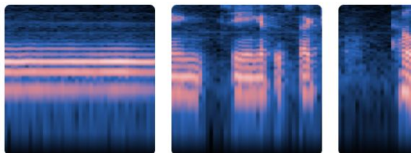
📁 Open an existing project from Drive.

📁 Open an existing project from a file.



## Image Project

Teach based on images, from files or your webcam.



## Audio Project

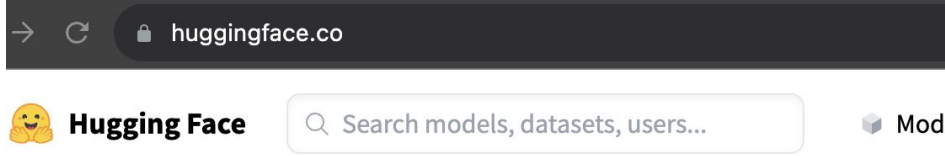
Teach based on one-second-long sounds, from files or your microphone.



## Pose Project

Teach based on images, from files or your webcam.

Cool Demo!



ChatGPT, Gemini and Claude are closed and proprietary LLMs.

HuggingFace is like the Kaggle of AI - repository of AI models that are open source and free.

<https://huggingface.co/>



## The AI community building the future.

The platform where the machine learning community collaborates on models, datasets, and applications.

# Open Sources LLMs - Running Locally

Does not send any information to OpenAI!

Integrate local documents [with PII] along with your prompt to your local LLM...

mistral.ai

MISTRAL AI\_ Developers Technology Business

# Frontier AI in your hands

Open and portable generative AI for devs and businesses.

## gemma

Gemma is a family of lightweight, state-of-the-art open models built by Google DeepMind.

Ollama



Get up and running with large language models, locally.

Run [Llama 2](#), [Code Llama](#), and other models.  
Customize and create your own.

Meta

# Build the future of AI with Meta Llama 3

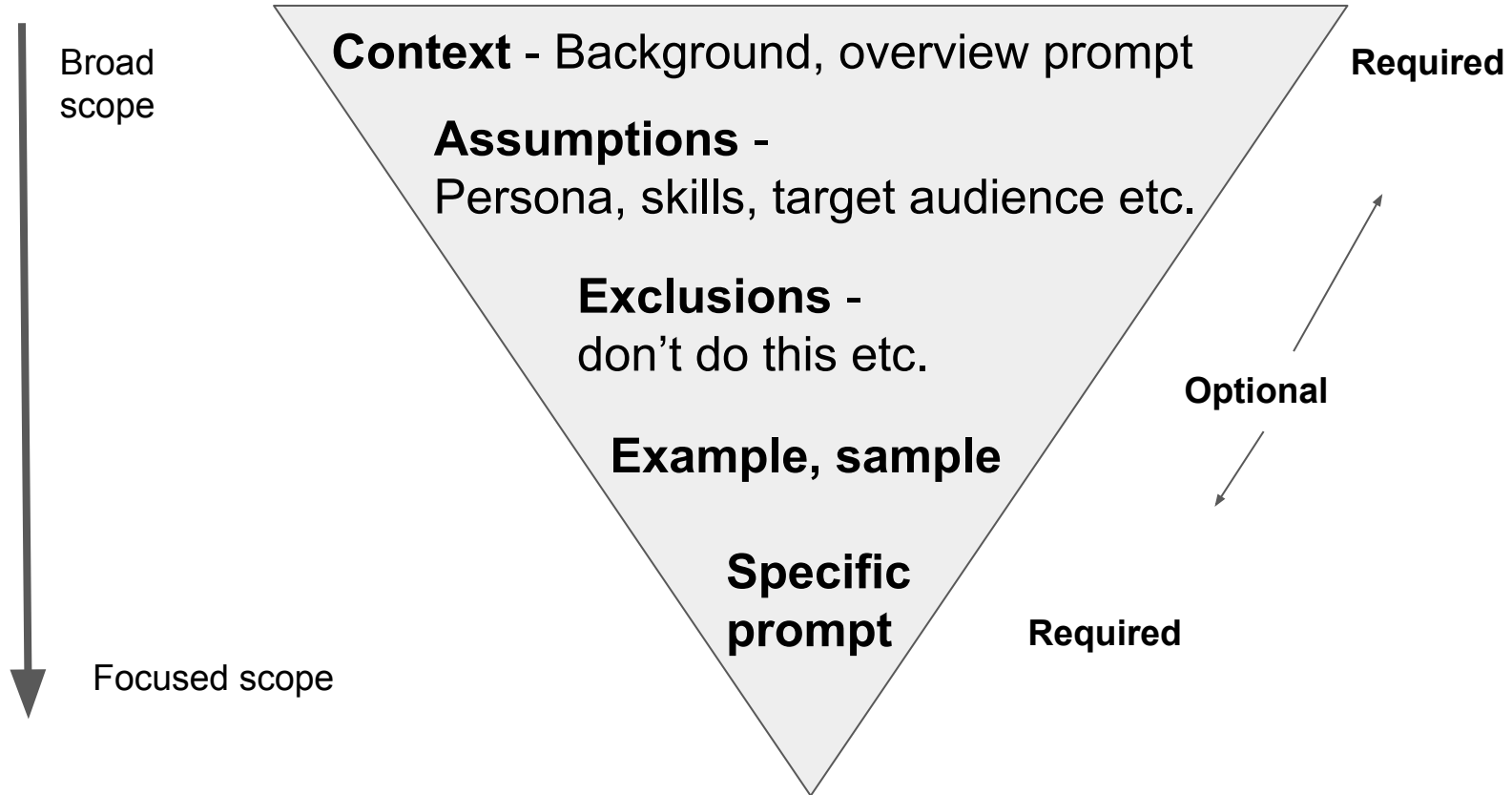
Now available with both 8B and 70B pretrained and instruction-tuned versions to support a wide range of applications



# Prompt Engineering (or, how to converse with AI)

- Know the model's strengths and weaknesses
  - Some models are tuned for programmers, others have older training cut-off dates
- Be as specific as possible
  - Example: "I am hosting 50 guests. Generate a recipe for 50 blueberry muffins."
- Utilize contextual prompts
  - Example: "Assume I am a skilled chef. Adopt a friendly tone and respond in a passive voice"
- Provide AI models with examples
  - Example: "Here are some recipes for blueberry muffins. Create a new recipe based on it"
- Experiment with prompts and personas
- Try chain-of-thought prompting
  - Break down a complex problem into smaller steps
  - Prompt the LLM to provide intermediate reasoning for each step

# Recommended sequence of prompts



# Accessing GPT-4o with ChatGPT

## ChatGPT Free Tier

Users on the Free tier will be defaulted to GPT-4o with a limit on the number of messages they can send using GPT-4o, which will vary based on current usage and demand. When unavailable, Free tier users will be switched back to GPT-3.5.

Free users also receive limited access to messages using advanced tools, such as:

- Data analysis
- File Uploads
- Browse
- Discovering and using GPTs
- Vision

GPT-4o has advanced vision capabilities, which increases accuracy in understanding images you share.

# Prompt Engineering - Use Free ChatGPT 4o...

## 1. **Summarize** existing content

*Ex. Summarize the character of Casca in Julius Caesar in 150 words. Use active voice*

## 2. Generate **new creative** content

*Ex. Based on the novel Moby Dick, create a new story in 150 words using friendly tone*

*Ex. Based on the novel Moby Dick, create a new image that is suitable for children*

*Ex. Based on the novel Moby Dick, create a new video that is suitable for children*

## 3. Generate **programming code**

*Ex. Generate Python code, and test samples, that computes the volume of a sphere*

# Prompt Engineering - Use Free ChatGPT 4o for any/all below:

## 4. **Data Analysis of an XL**, csv or other file

*Step 1 - Go to <https://www.hawaiihealthmatters.org/indexsuite/index/foodinsecurity>*

*Step 2 - Select Location = Maui and then Download the CSV file*

*Step 3 - Upload CSV file and use prompt - Review this file and summarize the food insecurity on Maui in 250 words for an expert user*

## 5. Summarize and/or **explain** content from [Hawaiian] literature

*Ex. Explain the lyrics from [Aloha Oe] in 250 words, to an expert in [Hawaiian] language*

## 6. Create a **new syllabus** for Fall 2024 based on an existing syllabus from Spring 2024 (use your own syllabus, ensure correct Fall dates)



# Prompt Engineering Specialization

Become a Prompt Engineering Expert. Master prompt engineering patterns, techniques, and approaches to effectively leverage Generative AI

🗣️ Taught in English | [21 languages available](#) | Some content may not be translated



Instructor: [Dr. Jules White](#)

Top Instructor

Enroll for Free  
Starts Jun 19

Financial aid available

39,048 already enrolled

## Specialization - 3 course series

Get in-depth knowledge of a subject

4.9 ★ (1,217 reviews)

### Beginner level

Recommended experience ⓘ

1 month at 10 hours a week

### Flexible schedule

Learn at your own pace

[View all courses](#)



# ProfGPT Public

Virtual chabot for the ABIT BAS Program, University of Hawaii Maui  
College by Prof. Debasis Bhattacharya

Requires paid version of ChatGPT Plus to create and access!  
NOTE: All prompts and documents updated will be sent to Open AI  
URL: <https://chat.openai.com/g/g-PmtzyMnVQ-profgpt-public>



## Knowledge

If you upload files under Knowledge, conversations with your GPT may include file contents. Files can be downloaded when Code Interpreter is enabled



Fall 2023 - ICS 320 v4.pdf  
PDF



\_ICS 418 Syllabus.pdf  
PDF



UHMC Syllabus - ICS 360 -...  
PDF



\_MGT 310 Syllabus.pdf  
PDF



Syllabus Fall 2023 - ICS 16...  
PDF



HISSI 2024 Program Final...  
PDF



\_BUS 320 Syllabus (1).pdf  
PDF



Bus 310 UHMC Syllabus Fa...  
PDF



Syllabus Fall 2023 - BUS 4...  
PDF



ICS\_171\_SP2024\_Syllabus...  
PDF



UHMC Syllabus - ICS 385- ...  
PDF



ICS 184 Fall 2023.pdf  
PDF



HCCFloorPlan2024.pdf  
PDF



\_MKT 300 Syllabus (1).pdf  
PDF



Syllabus, ACC-300, FL202...  
PDF



ENG 316 - Syllabus - 8 Wee...  
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Syllabus - ICS 173 FA 2020...  
PDF



2023 SP BUS496 Syllabus ...  
PDF



PHIL-323-Spring 2023.pdf  
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university-of-hawaii-maui-...  
PDF



# Topics for discussion

**ChatGPT in the Classroom:** How can ChatGPT be utilized to facilitate classroom discussions, answer student queries, and provide on-demand assistance?

**Innovation and Pushing Boundaries:** Brainstorm innovative projects that leverage ChatGPT to push the boundaries of traditional education. How can AI be harnessed to simulate real-world scenarios, encourage critical thinking, and foster interdisciplinary collaboration?

**Writing Enhancement:** Explore the possibilities of using ChatGPT to help students improve their writing skills across disciplines. Discuss strategies for incorporating AI-generated feedback while maintaining a focus on creativity and originality.

**Ethical Considerations:** Delve into the ethical implications of using AI in education. Examine issues related to bias, privacy, and the responsible use of AI technologies. How can we ensure that AI tools enhance learning while upholding academic integrity?

**Personalized Learning:** Explore the potential for ChatGPT to adapt to individual student learning styles and paces. Share ideas on creating customized learning experiences that cater to a diverse range of students with varying needs.

# Breakout Sessions!

AI Policy

Assessment Redesign

Plagiarism/Copyright

Q&A!



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Here is a cartoon version of the image you provided.

# References

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