Lifelong Learning and Generative AI: Unpacking ChatGPT’s Potential

a conversation with Ray Schroeder
OpenAI

- November 30 2022 ChatGPT
- March 2023 GPT-4
- Late Fall 2023
  - Voice & Vision
  - Dall*E 3
  - ChatGPT Enterprise
OpenAI DevDay Nov 7 2023

User updates
• GPT-4 Turbo
• Browse the web
• Auto-model picker

Developer updates
• "Copyright Shield"
• Build custom GPT agents (GPTs)
  • Programming using Natural Language
• Share GPT agent (new GPT store)
• GPT-Turbo (API)
  • Access to Data April 2024
  • Longer inputs
• API Assistants
• Developer incentives
My GPTs

Create a GPT
Customize a version of ChatGPT for a specific purpose

Recently Used

DALL-E
Let me turn your imagination into imagery
By ChatGPT

Made by OpenAI

DALL-E
Let me turn your imagination into imagery
By ChatGPT

Data Analysis
Drop in any files and I can help analyze and visualize your data
By ChatGPT

ChatGPT Classic
The latest version of GPT-4 with no additional capabilities
By ChatGPT

Game Time
I can quickly explain board games or card games to enhance your leisure time
By ChatGPT

GPT Builder
Hi! I'll help you build a new GPT. You can say something like, "make a creative who helps generate visuals for new products" or "make a software engineer who helps format my code."

What would you like to make?
Convert general purpose GPT to single purpose custom GPT!!!
Alternative Credential Template Automator
Guides in filling and customizing university program proposals.

By Rod Istra

What program type are you proposing?
What are the resource requirements for your program?
Please describe the intended outcomes of your program.
Can you provide details for the Program Overview?
What Is ChatGPT Doing... and Why Does It Work?

STEPHEN WOLFRAM
WHAT IS ARTIFICIAL INTELLIGENCE

Artificial Intelligence (AI) is designed to enhance human capabilities by simulating cognitive tasks that are inherently human, such as facial recognition, adaptive learning, communication, linguistic, and reasoning (Goodfellow, Bengio, and Courville 2016).

Output based on programmed tasks

Output based on algorithms that learn from data/experience

MACHINE LEARNING

SUPERVISED LEARNING

SEMISUPERVISED LEARNING

UNSUPERVISED LEARNING

REINFORCED LEARNING

DEEP LEARNING

ARTIFICIAL NEURAL NETWORKS

Recurrent Neural Nets

Convolutional Neural Nets

Transformer Neural Nets

Output – generate content

GPT - Picks out the nuanced regularity and structure of natural language (Wolfram 2023).

Generate text: syntactically accurate and contextually relevant.

lacks genuine comprehension!

Only statistical pattern recognition and prediction.

Lastra 2023
ChatGPT

GPT (developer API)

GPT (user interface)
• “Attention” of Transformer model captures contextual relationship in data critical for language understanding and essential for interpreting meaning
• (attention is all you need (2017))
GPT (user interface)

How can I help you today?
• PROMPT = EXPOSITORY WRITING

• Open Prompt \( \ldots \) *What is a [ ]*

• Open Prompt - extractive Q/A

• Closed Prompt - extractive Q/A

\(...)\ldots Please improve/review the following text \{\ldots\}

• OPEN PROMPT: *What is a black hole?*
“What is a black hole” is split into tokens?

tokens = "What", "is", "a", "black", "hole".

Print(encode(“what is a black hole”))

tokens converted to integers, = [539, 257, 262, 1579, 11234].

The integers do not say anything about the relations of words or their meaning an extra step is needed…..
Text represented by an array of numbers (coordinates in linguistic space)

"What" -> [539] -> [0.2, -0.1, ..., 0.3]

Encodes identity, meaning and relationship of words (based on data)

e.g., Apple: type of fruit = 1, Color red = 2, Edible = 0.5 … Statistical facts of language

This text-to-meaning process is the definition of a “Large Language Model (LLM)”
A) Words representing relationships (e.g., plants and animals); ca. Wolfram(2023)

B) Words corresponding to different parts of speech; ca. Wolfram(2023)

LINGUISTIC FEATURE SPACE:
Word meaning, relationship and context
((A) SEMANTIC; B) SYNTACTIC LAW)
• UNDERSTANDING: the model understands that "black hole" is a single concept and gains context that the prompt is asking for a definition.

• DECODE:
  • Predicts the most STATISTICALLY PROBABLE response \((n\text{-gram})\)
  • Selects “best” response
  • **based on number of parameters \((\sim 170\text{ trillion})\)**
  • The is where errors or hallucinations can occur
• The generated tokens are merged back into a readable response:

**CONTENT GENERATION:**

"A black hole is a region of space where gravity is so strong that nothing, not even light, can escape from it."
Ray Schroeder
Senior Fellow at UPCEA, the Online and Professional Education Association; Professor Emeritus at University of Illinois Springfield

Generative AI
Practices, Policies, Perspectives
Ray Schroeder
UPCEA Senior Fellow

https://sites.google.com/view/raysspace/genai

Ray's Online: Trending Now Articles on Generative AI in Higher Ed

23 articles (1,000 words each) – with policies, practices, and perspectives on the rapidly changing nature of GenAI and emerging trends over the past 18 months.

Links to all of the Trending Now articles in Inside Higher Education
https://www.insidehighered.com/opinion/blogs/online-trending-now
QUESTION 1: The intersectionality of technology and education. Reflecting on the pivotal moments when technology profoundly transformed educational paradigms, as well as instances where the expectations from technological advancements overshadowed their actual impact?
QUESTION 2: Let’s explore some of the potential and concerns associated with the implementation of generative AI tools such as ChatGPT – specific emphasis on impacts to learners and educators.
# Trustworthiness of Output

<table>
<thead>
<tr>
<th>USER EXPERTISE LEVEL</th>
<th>Academic/Scientific writing and knowledge</th>
<th>Creative writing and related works</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Improving prose of user-authored text</td>
<td>Improving accessibility</td>
</tr>
<tr>
<td>Medium</td>
<td>Summarizing documents, articles, etc</td>
<td>Learning Assistant or Testing knowledge</td>
</tr>
<tr>
<td>Low</td>
<td>Ideas generating creative ideas</td>
<td>Text authored by generative AI</td>
</tr>
</tbody>
</table>

**LARGE LANGUAGE MODEL**

Lastra 2023
QUESTION 2: Let’s explore some of the potential and concerns associated with the implementation of generative AI tools such as ChatGPT – specific emphasis on impacts to learners and educators.
QUESTION 3: Reflecting on the innovative step taken by Western University in appointing a Chief AI Officer, Mark Daley, could you delve into the evolving regulatory frameworks that universities are beginning to adopt in embracing AI?
AI decision tree

This document is intended to help the Ecampus Course Development Team, as well as faculty and staff, use a principle-based approach in deciding if and how to incorporate artificial intelligence (AI) into course development, research, and other work projects. After reviewing the risks identified below, consider whether the overall benefits of using the tool outweigh the risks.

1. Existing Policy
   Does the department or program have an established policy on use of AI tools in teaching and learning?
   - Yes
     Refer to department policy.
   - No
     Pause and seek consultation.

2. Pedagogical Purpose
   Can you explain the ways in which using this tool would serve to support the course outcomes or pedagogy in this course?
   - Yes
     Pause and seek consultation.
   - No
     Pause and seek consultation.

3. Bias and Accuracy
   Could biased or inaccurate information potentially be provided by this tool?
   - Yes
     Pause and seek consultation.
   - No
     Pause and seek consultation.

4. Quality and Accountability
   Are you or the learners prepared to vet the information produced by the AI tool?
   - Yes
     Mitigate the risk for lower performance for learners who only have access to the free version.
   - No
     Pause and seek consultation.

5. Access and Affordability
   If the tool will be used by learners in this course, is it available and free to all?
   - Yes
     Mitigate the risk for lower performance for learners who only have access to the free version.
   - No
     Pause and seek consultation.

6. Equity
   Is there a paid version available and would it place learners who only use the free version at a disadvantage?
   - Yes
     Mitigate the risk for lower performance for learners who only have access to the free version.
   - No
     See if this poses a barrier to access; seek consultation if unsure.

7. Accessibility
   Does the tool meet or exceed the standards of Web Content Accessibility Guidelines (WCAG)?
   - Yes
     Redesign task to eliminate use of personal information.
   - No
     See if this poses a barrier to access; seek consultation if unsure.

8. Privacy and Security
   Will the users of the tool be inputting personal information into the system?
   - Yes
     Redesign task to eliminate use of personal information.
   - No
     See if this poses a barrier to access; seek consultation if unsure.
# Syllabi Policies for AI Generative Tools

If you would like to **submit your course guidelines/policy** to be included here, **please submit it in this form**.

**Update:** If you would like a more searchable version of this document, try out this spreadsheet that allows you to sort by Course, Discipline, Institution, etc.

This resource is created by Lance Eaton (contact him via email, Twitter, or LinkedIn) for the purposes of sharing and helping other instructors see the range of policies available by other educators to help in the development of their own for navigating AI Generative Tools (such as ChatGPT, MidJourney, Dall-E, etc.).

<table>
<thead>
<tr>
<th>#</th>
<th>Course &amp; Institution</th>
<th>Policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Digital Interventions - AI &amp; Education College Unbound</td>
<td>There are situations and contexts within this course where you will be asked to use AI tools to explore how they can be used. Outside of those circumstances, you are discouraged from using AI tools to generate content (text, video, audio, images) that will end up in any student work (assignments, activities, responses, etc.) that is part of your evaluation in this course. Any student work submitted using AI tools should clearly indicate what work is the student's work and what part is generated by the AI. In such cases, no more than 25% of the student work should be generated by AI. If any part of this is confusing or uncertain, please reach out to me for a conversation before submitting your work.</td>
</tr>
<tr>
<td>2</td>
<td>SSU Writing In the Workplace, CU Writer's workshop/Learning From Experience NS First Year Seminar Salem State University, College Unbound, North Shore Community College</td>
<td>ARTIFICIAL INTELLIGENCE (AI) USE POLICY This policy covers any generative AI tool, such as ChatGPT, Ellic, etc. This includes text and artwork/screens/videos/audio. 1. You are discouraged from using AI tools UNLESS under direct instruction from your instructor to do so. Please contact your instructor if you are unsure or have questions BEFORE using AI for any assignment. 2. If AI is permitted to be used, you must indicate what part of the assignment was written by AI and what was written by you. No more than 25% of an assignment should be created with AI if the instructor gives permission for its use. 3. You must sign the AI contract that you understand and agree to these policies.</td>
</tr>
<tr>
<td>3</td>
<td>INSDG 601 - Foundations of instructional design and learning technology University of Massachusetts Boston</td>
<td>No restrictions</td>
</tr>
<tr>
<td>4</td>
<td>Theater courses at a small liberal arts college</td>
<td>&quot;All work submitted in this course must be your own. Contributions from anyone or anything else—including AI sources—must be properly quoted and cited every time they are used. Failure to do so constitutes an academic integrity violation, and I will follow the institution's policy to the letter in those instances.&quot;</td>
</tr>
<tr>
<td>5</td>
<td>N/A</td>
<td>&quot;any text-generating software (such as ChatGPT, IA Writer, Marmot or Botovski) is not permitted, and it will be treated as plagiarism&quot;</td>
</tr>
<tr>
<td>6</td>
<td>University of Pennsylvania</td>
<td>You may use AI programs e.g. ChatGPT to help generate ideas and brainstorm. However, you should note that the material generated by these programs may be inaccurate, incomplete, or otherwise problematic. Beware that use may also stifle your own independent thinking and</td>
</tr>
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QUESTION 4: What insights can be shared on the potential impact of upcoming AI educational assistants such as OpenAI Academy on the future paradigms of lifelong learning and professional education?
You

could you explain in simple terms neural theory in ecology and how it relates to species diversity and complexity?
Neural theory in ecology is an analogy that compares ecosystems to neural networks in the brain. Just like neurons in the brain, species in an ecosystem are interconnected through a complex web of interactions. Here's a simplified explanation:

1. **Interconnectedness**: In the brain, neurons are connected to each other through synapses, where they transmit signals. Similarly, in an ecosystem, species are connected through various relationships like predation, competition, and symbiosis.

2. **Learning and Adaptation**: Neurons can strengthen or weaken their connections based on the signals they receive, which is part of how learning occurs in the brain. In ecosystems, species interactions can change over time, allowing the ecosystem to adapt to new conditions. For example, if one species becomes extinct, others may fill the niche or new species may emerge, demonstrating the resilience and adaptability of ecosystems.
Absolutely, let's delve into the neutral theory in ecology with some examples to clarify the concept:

1. **Species Equivalence**: Imagine a coral reef where many species of coral are competing for space. Neutral theory suggests that each species of coral has an equal chance of occupying space, growing, and reproducing. No species has a special advantage; their success is largely due to chance rather than superior adaptation or competitive strategies.

2. **Randomness and Drift**: Consider a forest where many different tree species coexist. If a large tree falls, it creates a gap in the canopy. Which tree species grows to fill that gap might be a random event—perhaps whichever seed happens to land there first or in the greatest number, rather than which seed is from the most "fit" species.

3. **Biodiversity Patterns**: In a grassland ecosystem, the presence of numerous grass and herb species might not be because each has found a unique niche or is better adapted to specific conditions. Neutral theory would suggest that the relative abundance of each species could be the result of random seed dispersal and survival, with no species having a distinct competitive edge over the others.
You

could you provide a in-depth explanation of Hubbell's neutral theory, using the mathematical function for species area relationship

ChatGPT

Hubbell’s Neutral Theory of Biodiversity and Biogeography is a hypothesis proposed by ecologist Stephen Hubbell in 2001. The theory suggests that the diversity of species in a community is largely a result of stochastic processes—random births, deaths, immigrations, and extinctions—rather than deterministic forces such as natural selection.

The theory is "neutral" in the sense that it assumes all individuals of all species in a community are ecologically equivalent. That is, they have equal chances of giving birth, dying, and dispersing regardless of their species. This is in contrast to traditional ecological theories, which often emphasize differences between species and the importance of niche differentiation.

Mathematical Framework

The Neutral Theory is underpinned by several mathematical models, one of which is the Species-Area Relationship (SAR). The SAR describes how the number of species (species richness) increases with the area sampled. In Hubbell's Neutral Theory, the
The mathematical function often used to describe the SAR is a power function of the form:

$$ S = cA^z $$

where:

- $S$ is the number of species,
- $A$ is the area,
- $c$ is a constant that represents the number of species when the area $A$ is equal to one,
- $z$ is the slope of the line on a log-log plot ranging between 0.2 and 0.35 in empirical data.

**You**
could you explain in simple terms the constant ‘c’ and how it impacts the model?

**ChatGPT**
In the Species-Area Relationship (SAR) equation $S = cA^z$, the constant $c$ is a coefficient that represents the expected number of species when the area $A$ is equal to one. In simple terms, it’s a scaling factor that adjusts the curve to fit the actual data. The value of $c$ is determined empirically by fitting the SAR model to observed data on species richness and area.

Here’s how $c$ impacts the model:

- **Baseline Species Richness**: The constant $c$ sets the baseline for species richness in the smallest area considered by the model. If $c$ is high, even small areas will be predicted to have a relatively high number of species. Conversely, if $c$ is low, small areas will have fewer species.
- **Scaling of Species Richness**: As you move to larger areas, the constant $c$ helps determine how quickly the number of species increases. A larger $c$ means a steeper initial increase in species richness with area.
- **Model Fitting**: The value of $c$ is crucial for the model to accurately reflect the observed data. It’s adjusted so that the curve generated by the SAR equation passes through the points representing the actual number of species observed in areas of different sizes.
You
could you provide a graph of the species area function
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ChatGPT

It seems there was an issue with the initial request for a 3D plot. The Species-Area Relationship (SAR) function is typically represented as a 2D plot with the area on the x-axis and the number of species on the y-axis. The constant $c$ and exponent $z$ are parameters that define the shape of the curve.
It seems there was an issue with the initial request for a 3D plot. The Species-Area Relationship (SAR) function is typically represented as a 2D plot with the area on the x-axis and the number of species on the y-axis. The constant $c$ and exponent $z$ are parameters that define the shape of the curve.

Let's try to generate a 2D plot of the SAR function, using a typical value for $z$ and varying $c$. We'll plot the number of species $S$ against the area $A$ for a given range of area sizes. We'll assume $z$ to be 0.3, which is a common value found in empirical studies, and we'll see how the curve changes for different values of $c$.

Here is the graph of the Species-Area Relationship (SAR) for different values of the constant $c$, with the exponent $z$ fixed at 0.3:
In this graph:

- The x-axis represents the area $A$.
- The y-axis represents the number of species $S'$.
- Each curve represents a different value of the constant $c$, ranging from 1 to 10 in increments of 3.

As you can see, higher values of $c$ result in a higher number of species for any given area, illustrating how $c$ sets the baseline species richness and affects the steepness of the SAR curve.
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ChatGPT
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2. **Learning and Adaptation**: Neurons can strengthen or weaken their connections based on the signals they receive, which is part of how learning occurs in the brain. In ecosystems, species interactions can change over time, allowing the ecosystem to adapt to new conditions. For example, if one species becomes extinct, others may fill the gap, or if a new species is introduced, the ecosystem may adapt to include it.

3. **Complexity and Stability**: A brain with more neural pathways can process information more robustly and flexibly. Similarly, ecosystems with greater biodiversity (more species diversity) tend to be more resilient. They can withstand changes and disturbances better because there are more species to fulfill roles and support the system.

4. **Emergent Properties**: Just as consciousness is an emergent property of the complex network of neurons and their interactions, the health and functionality of an ecosystem—its ability to cycle nutrients, purify water, and support life—are emergent properties of the complex interactions among species within it.
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Neural theory in ecology is an analogy that compares ecosystems to neural networks in the brain. Just like neurons in the brain, species in an ecosystem are interconnected through a complex web of interactions. Here’s a simple explanation:

1. **Interconnectedness**: In the brain, neurons communicate with each other through synapses, where they transmit signals. Similarly, species in ecosystems are connected through various relationships like predation, competition, and mutualism.

2. **Learning and Adaptation**: Neurons can adjust and weaken their connections based on the signals they receive, which helps them communicate better. In ecosystems, species interactions can change and evolve over time, allowing the ecosystem to adapt to new conditions. For example, if one species becomes extinct, others may fill the gap, or if a new species is introduced, the ecosystem may adapt to include it.

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QUESTION 4: What insights can be shared on the potential impact of upcoming AI educational assistants such as OpenAI Academy on the future paradigms of lifelong learning and professional education?
“Whereas humans are limited in the kinds of explanations we can rationally conjecture, machine learning systems can learn both that the earth is flat and that the earth is round. They trade merely in probabilities that change over time. For this reason, the predictions of machine learning systems will always be superficial and dubious. In short, ChatGPT and its brethren are constitutionally unable to balance creativity with constraint. They either overgenerate (producing both truths and falsehoods, endorsing ethical and unethical decisions alike) or undergenerate (exhibiting noncommitment to any decisions and indifference to consequences). Given the amorality, faux science and linguistic incompetence of these systems, we can only laugh or cry at their popularity.” (Chomsky March 8 2023 NYTIMES).
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a conversation with Ray Schroeder

QUESTION 6: . . . ‘Ah-Ha’ moment
THANK YOU

Ray Schroeder
Senior Fellow at UPCEA, the Online and Professional Education Association; Professor Emeritus at University of Illinois Springfield

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