ChatGPT and AI: What Does It All Mean?

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Goals

How generative AI models work

AI at Rollins

What it means for higher education

Tips and techniques

Snoop Dogg in classic TV series (Reddit user u/Larry-fine-wine)

Rollins Faculty and Staff

Matt Forsyth
- English
- Director of First-Year Writing
- Faculty director of the Honor Council

Lucy Littler
- English
- Director of the RFLA program

Nancy Chick
- Endeavor Center for Teaching and Learning

Anne Murdaugh
- Physics
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Brooklyn Lehrer
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- Psychology
- Maher Distinguished Chair of Teaching

Raghabendra KC
- Business
- Faculty director of the Honors Program

Emily Russell
- English

Marc Sardy
- Business

Valerie Summet
- Chair of Computer Science

About

Associate Professor of Computer Science
- 10th year at Rollins
- Currently the Data Analytics program director

Florida (BS and MS), Sandia National Labs, Wisconsin-Madison (PhD), Google

Work with AI and machine learning since the mid-2000s
- Master’s thesis on morphological neural networks
- Computer vision for national security problems at Sandia
- Taught courses on AI, machine learning, and analytics
- GPT for stuttering therapy with Eric Grimm ‘21 and Nikola Vuckovic ‘21

Current projects

Community Impact Lab

- Impact assessment and strategic planning for nonprofit partners
- Ripple Effect Mapping + thematic analysis

Using AI models to analyze community impact data

- Aakriti Shah ‘23, James McIntyre ‘24, Gus Temple ‘24

Data Structures and Algorithms in Java: a Project-Based Approach

- Upcoming textbook with Cambridge University Press

ChatGPT is new

Generative AI models are the cutting edge of the field
- Based on a technique called the **transformer** invented at Google in 2017

GPT = “Generative pre-trained transformer”
- Models like GPT are called **large-language models** (LLMs)
- Built by OpenAI
- There are now several competitors

Chat interface to the GPT language model
- Trained to (mostly) decline inappropriate or controversial requests
- 175 billion parameters
- Cost $5-10 million to train the first time

ChatGPT originally used the GPT-3.5 model, upgraded to GPT-4 in March

Major large language models

GPT-4 costs $20 per month and is the current most powerful model
- It can search the internet, write and run code, and work with spreadsheets

Three main free models
- ChatGPT-3.5, the original version of ChatGPT
- Bing AI (uses GPT-4 and can search the Internet)
- Anthropic's Claude (close to GPT-4, can handle lots of text)

Google's Bard has not been impressive, but updates are expected soon

LLaMA, originally developed by Facebook, is used for open source research

Other generative AI tools

There are now a huge number of tools that use AI for content generation

Image generation
- Midjourney
- DALL-E
- Stable Diffusion

Voice and audio
- Whisper (transcription)
- Eleven Labs (AI voice models)

Video
- RunwayML

The viral “pope in a puffy jacket” image made by Pablo Xavier in Midjourney

ChatGPT is fancy autocomplete

The most impressive thing about AI is its ability to **learn**
create
imagine
imitate
deceive

ChatGPT repeatedly predicts the ***next word*** based on the current context

Word choices are randomized: likely words have higher selection probability but rarer words can still be chosen

Machine learning

Rule-based systems don’t scale to real-world classification problems

Alternate approach: **learn from data**

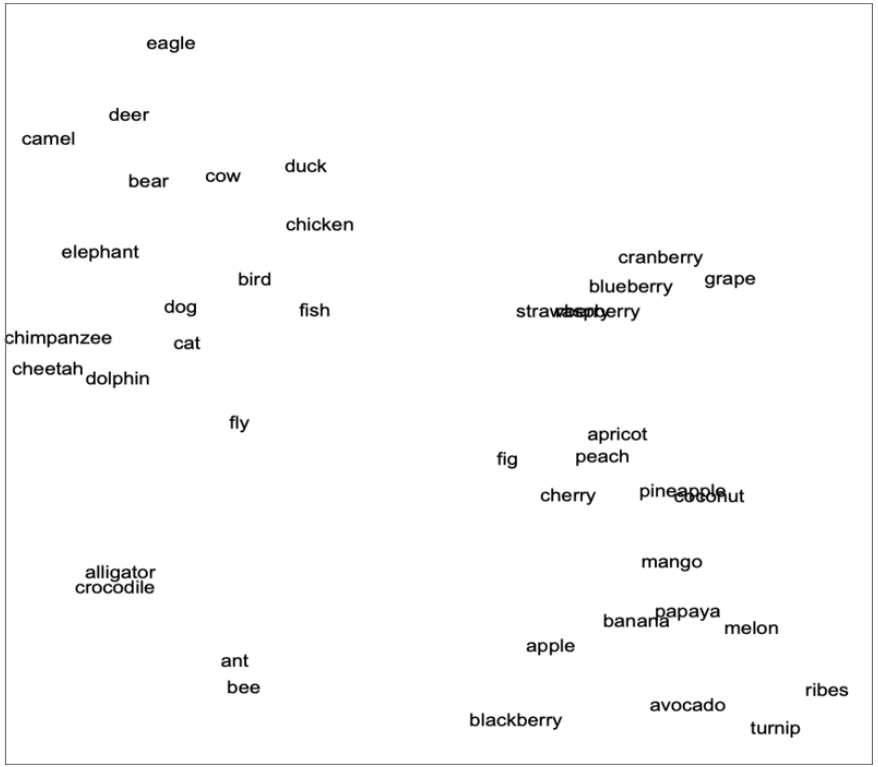
Given a data set with known inputs and outputs, train a model that can learn a mapping from an input to its correct output

ChatGPT learns word relationships

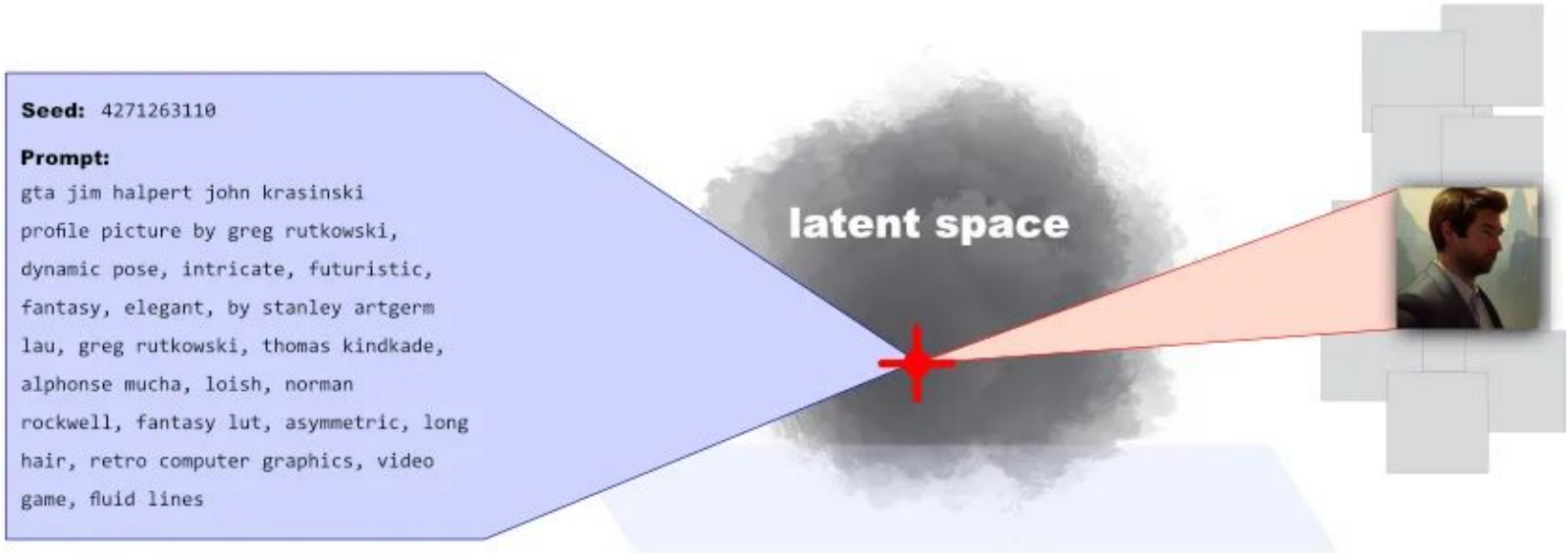
ChatGPT is trained on a corpus taken from the Internet and scanned books

Training learns to map words and phrases into an abstract *concept space*
"Embeddings in latent space"

Key idea: Similar concepts are close to each other in latent space



From Stephen Wolfram



From Jon Stokes

Strengths

Strong concept model
- How does *X* relate to *Y*?
- Analyze situation *S* using *X*
- “SparkNotes for everything”

Mashing up concepts and styles
- Popular for AI art

Transforming or revising
- Rewrite to improve style or tone
- Expand bullet points into prose

Studio Ghibli presents Harry Potter (Reddit user u/CynicismNostalgia)

Weaknesses

ChatGPT will freely **hallucinate** answers that sound reasonable but are totally wrong

This is the biggest issue with current generation LLMs

You can’t trust the output of an AI model unless you know it’s true or can check it with a non-AI source

Girl in a Renaissance tracksuit (Reddit user u/Estima2010)

Other weaknesses

ChatGPT can fake the appearance of math, but can’t do logic or calculations

It can’t reflect on its own internal state: “Why did you say that?” will get a plausible but made-up response

Jailbreaking to generate harmful content

Steampunk airship by me

But capabilities are improving!

Current models hallucinate less than the original ChatGPT and produce better, more natural writing

Bing and GPT-4 can search the web and incorporate relevant information

5th gen models are in development

Nike x Van Gogh sneaker collab (Ethan Mollick)

What does this mean for us?

Current models are already powerful enough to have a disruptive effect on higher education

Ethan Mollick: “Homework Apocalypse”

Jon Stokes:

The written work products that form the foundation of our education system are now not reflecting the student capabilities, learning, and talents they were thought to be reflecting prior to ChatGPT.

Honor Code

1. PLAGIARISM. Offering the words, facts, or ideas of ***another person*** as your own in any academic exercise.

2. CHEATING. Using or attempting to use unauthorized materials, information, or study aids in an academic exercise.

3. UNAUTHORIZED COLLABORATION. Collaboration, without specific authorization by the instructor, on homework assignments, lab reports, exam preparations, research projects, take home exams, essays, or other work for which you will receive academic credit.

Aside: AI detectors don’t work

From Open AI’s FAQ for educators: Do AI detectors work?

> *In short, no, not in our experience. Our research into detectors didn’t show them to be reliable enough given that educators could be making judgments about students with potentially lasting consequences*

These tools regularly classify human-written work as generated and it’s easy to beat them with a little prompting or editing

They’re not reliable for non-native English speakers

ChatGPT can’t tell you if work is AI-generated

More from Matt Forsyth

If we only focus on "policing" AI, we risk three primary dangers:

1) The tone we create in the classroom, our attitude toward our students' work;

2) A refusal to help students learn (when appropriate) how to use AI tools, which is likely to be a valuable skill

3) A refusal to rethink our pedagogy and examine our values and curriculum

In other words, rather than starting with a goal of an "AI-proof" assignment, we should think about how to either create learning experiences that don't depend on it, or scaffold it in appropriate ways

What I learned in RFLA 300 - Predictive Modeling

Spent the second half of the course using ChatGPT and Bing AI

Two main assignments

- Ethics explainer: How would the major ethical frameworks approach AI in society?
- Critical evaluation of an open letter published in March about pausing giant AI experiments

IKEA catalog but with messy rooms (Reddit user u/magnizmusic)

What we're learning

Students naturally want to use AI as a writing generator–but the results are often mediocre

- "Average of the entire Internet"

Challenge: pushing beyond mid-level results

Hallucinations are not a major problem

AIs are great at taking on different roles

- Editor
- Coach
- Research assistant
- Writing partner

Seal of approval (Reddit user u/sndwav)

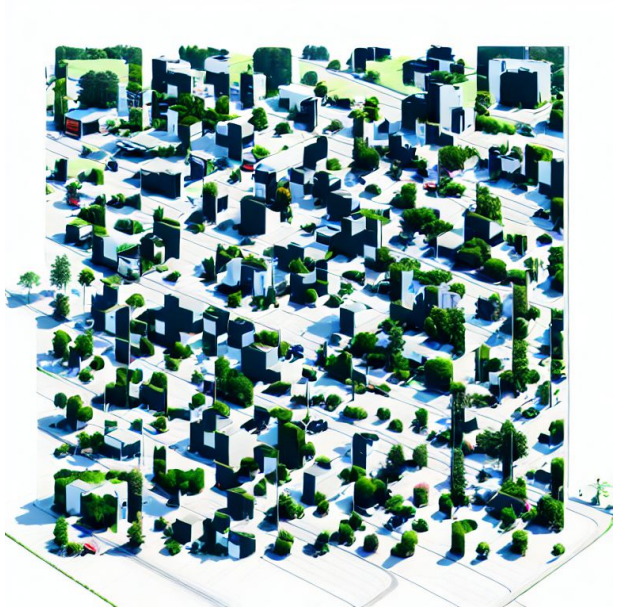
Example assignment

https://github.com/dansmyers/Example-AI-Assignment

Multi-step AI-supported research project
- Use AI in different ways
- Maintain agency over the final product

Leads students through developing a topic, researching, drafting, and editing a research paper, with detailed AI prompts for every step

Students also maintain a log where the record each AI response and their evaluation of it



Look at this QR code with your camera for the link

Observations so far

Anne Murdaugh is using it in the senior physics research seminar

Key takeaways:

- Tell students what prompts to use, at least at first
- Get AI involved in the research process early
- AI is great at providing on-demand feedback and clarifying ideas
- Don’t rely on one-shot generation

“Students are producing higher-quality work and getting there more quickly.”

General tips

Bing in Creative mode uses GPT-4 as its base model and can search the web
- It’s the best model for research and topic explanations

Claude can work with up to 70,000 words of text in one query
- It’s the best model for large document analysis
- But it isn’t connected to the Internet

These models can still make mistakes, but they tend to produce higher quality output with fewer obvious errors than the free ChatGPT

Messaging AI to students

Learn the strengths and weaknesses of AI so you can choose the right tool

ChatGPT vs. traditional search engine vs. AI-enhanced search

AI models can easily hallucinate information, including facts and references. Don’t trust the output of a model unless you can verify it with a third-party source. AI works best for subjects you know well

Maintain agency! AI is a tool to help express your own vision

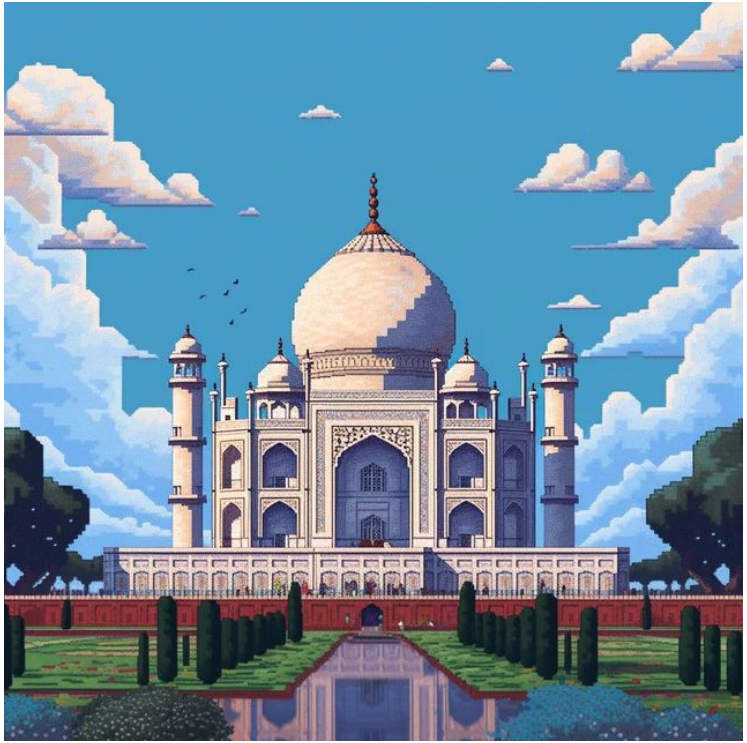
You’re always in control and you can accept, reject, or modify any AI output

Learning with AI

Think about AI as a coach or tutor
- Give it context or work-in-progress
- Ask it to take on roles / personas
- Ask specific questions

Generic prompts get generic results
- AI can help you prompt

Use AI for active learning
- Make up practice questions
- Give it answers and ask for feedback



Seven wonders of the world in 32-bit (Reddit user u/Sardinha_Prompts)

Challenges

Models will get more powerful
- But a lot of people are using the free ChatGPT-3.5!
- Wait and see vs. redeveloping courses

Greatest benefits go to lower performers
- This is a major theme of early research results
- What do we do if “okay” is the new baseline?
- But that might also remove barriers

Different disciplines will be impacted differently: greatest in business and communications, less in arts and physical sciences

Humanities and social sciences will need to adapt assessments

The Future

Generative AI decouples complexity of output from the effort used to create it

If anything can be easily done with AI, its value will go to zero

What still has value?

- Critical thinking and reflection
- Disciplinary knowledge
- Breadth of experience
- The physical world
- Social awareness and collaboration

Presidents but they're cool and have mullets (Cam Harless)

Generative AI = Next Google search or Excel

Useful search radically changed how we access information, but everyone adapted

Excel made business data analysis ubiquitous and **raised** expectations for technical management skills

We’re all going to make it

Reading: Ethan Mollick on Substack

Vogue cover, September 2082 (Reddit user u/seq_00000000_00)