WACUBO Women's Leadership Forum

Daniels College of Business
UNIVERSITY OF DENVER

ELEVATE WITH AI: PRACTICAL DATA LITERACY FOR LEADERS

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Daniels College of Business
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28 January 2025

Agenda

- Data Literacy & the New Data Mindset
- Fundamentals of GenAI
- Communicating Insights using GenAI

Format

Discussions

Hands-On Activities

Breaks

Housekeeping

Session Materials: GitHub repo

- Navigate to materials using QR code or bitly link

https://bit.ly/3DYIQAt

Backup: https://github.com/steflangehennig/wacubo/tree/main

Housekeeping

Reading: *The Digital Mindset: What It Really Takes to Thrive in the Age of Data, Algorithms, and AI* by Paul Leonardi and Tsedal Neeley

Tech Requirements:

- *Laptop with access to the Internet and a web browser (Chrome, Firefox, Edge, Safari)*
- *Microsoft Excel*
- *Access to ChatGPT*
  - Sign up for free account: https://chatgpt.com/

Housekeeping

Most importantly...

Be ready for high engagement! All participants should be ready to get involved during every section of the workshop (talking, showcasing examples, etc.)

DATA LITERACY & THE NEW DATA MINDSET

What is data literacy? How do we become more data literate?

Data Literacy

"The ability to read, write and communicate data in context, including an understanding of data sources and constructs, analytical methods and techniques applied, and the ability to describe the use-case application and resulting value."

Source: Gartner

Why do we care?

Contextualizing Data Literacy

It is part of a larger ecosystem geared toward *data maturity* in organizations.

What is data maturity?

Cultivating a company-wide data culture, becoming “data-driven”, having a “data” or “digital mindset”, etc.

Source: Alteryx

Contextualizing Data Literacy

Competencies – "hard"

- Data collection (web scraping, APIs)
- Managing data (cloud storage, databases)
- Manipulating data (SQL, Python, R)
- Statistics/data science models
- Data visualization (BI tools)

Competencies – "soft"

- Industry/discipline knowledge
- Teamwork
- Critical thinking
- Problem solving
- Communication
- Curiosity/skepticism

"Working with AI"

Contextualizing Data Literacy

From Qlik, Accenture, and Alation's data literacy questionnaires:

- 21% of employees said they are confident in their data literacy skills
- 37% of employees trust their decisions more when those decisions are data-based
  - *48% make business decisions based on gut feeling*
- **74% said they feel overwhelmed or unhappy working with data**
- **36% procrastinate on data-related tasks, while 14% avoid them altogether**
- **97% of leaders said revenue was lost, forecasting was poor, and investments were bad when they ignored data analytics**

DISCUSSION QUESTION

How data literate are you?

The “New” Data Mindset

Data literacy requires a *new data mindset:*

A set of attitudes and behaviors that enable people and organizations to see how data, alongside algorithms and AI technology, opens up new possibilities and charts a path for success in a business landscape increasingly dominated by data-intensive and intelligent technologies.

Source: Adapted from Neeley & Leonardi (HBR)

The “New” Data Mindset

Data literacy requires a *new data mindset:*

Requires your human brain!!!

*A **set of attitudes and behaviors that enable people** and organizations to see how data, alongside algorithms and AI technology, opens up new possibilities and charts a path for success in a business landscape increasingly dominated by data-intensive and intelligent technologies.*

Source: Adapted from Neeley & Leonardi (HBR)

DISCUSSION QUESTION

What types of attitudes or behaviors enable a new data mindset?

The Human-Data OS

Realizing the new data mindset!

Source: Brent Dykes

Realizing the New Data Mindset

- To enable change, start at the individual, *human* level
- Get buy-in early
- Strengthen skills
- Harness AI and data to enhance creativity, not replace human intelligence

With a shift in mindset, we develop data literacy so we can cheer it, not fear it.

BREAK

FUNDAMENTALS OF GENAI

How does it work? How can I use it effectively?

Generative AI

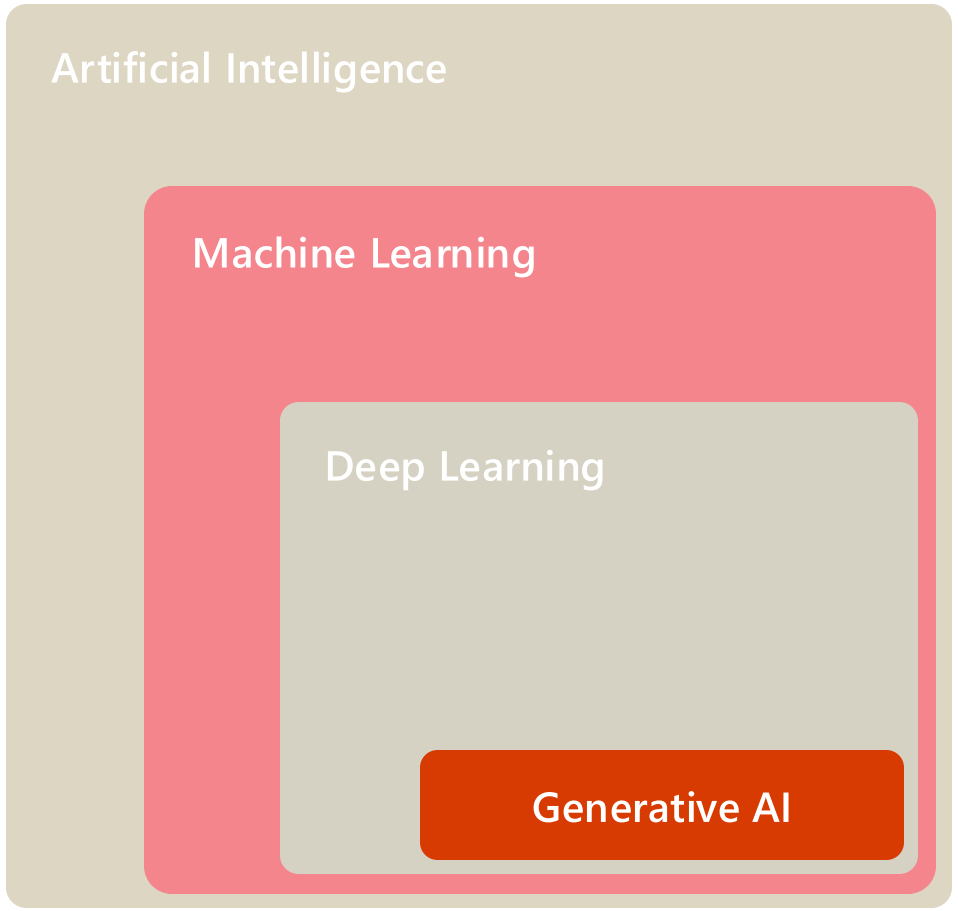
"...A type of AI that can create new content and ideas, including conversations, stories, images, videos, and music. It can learn human language, programming languages, art, chemistry, biology, or any complex subject matter. It reuses what it knows to solve new problems."

Source: AWS

What is Generative AI?

- Creates content by taking in natural language inputs + returning responses in several ways
  - Text, code, images
- Done with large language models (LLM) called generative pretrained transformers (GPT)
  - DALL-E, ChatGPT, Bing Chat, and many more
- Hype! Doom! Gloom! But we've been using AI for years...
  - Amazon's Alexa, Apple's Siri, chatbots, Netflix recommendations, social media, smart home devices

What is Generative AI?



1950s

Artificial Intelligence
the field of computer science that seeks to create intelligent machines that can replicate or exceed human intelligence

1990s

Machine Learning
subset of AI that enables machines to learn from existing data and improve upon that data to make decisions or predictions

2010s

Deep Learning
a machine learning technique in which layers of neural networks are used to process data and make decisions

2020s

Generative AI
Create new written, visual, and auditory content given prompts or existing data.

Source: Microsoft Learn for Educators (MSLE)

DISCUSSION QUESTION

How are you using GenAI?

Let's get technical!

Content inspired by/adapted with permission from Shard Goel, Dan Levy, & Teddy Svoronos at HKS.

Large Language Model (LLM)

Large language models [LLMs] are algorithms [like ChatGPT] that mimic human language.

At a high level, LLMs are built in three steps:

1. Collect a large **corpus of text** generated by humans;
2. Based on this text, **learn to predict** the next word in any given sequence of words;
3. **Fine-tune** the language model to **align** with desired behavior.

Steps

1) **Collect *a lot* of text.** LLMs are typically trained on a massive dataset of web pages, online forums, books, and other content – comprising trillions of words of text.
2) **Learn to predict words.** By analyzing this massive corpus of text, an LLM learns to predict the next word in a sequence of words. By repeating this process over and over again, it can generate long strings of coherent text.
3) **Fine-tuning.** We want the language model to align with desired behavior.

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Language Models

Language models take as input a **sequence of words** and output a **probability distribution** over possible next words.
[Typically language models work on “tokens” not “words” but we’ll use words for simplicity.]

Technical components:
- N-grams
- Word Embeddings
- Neural Networks

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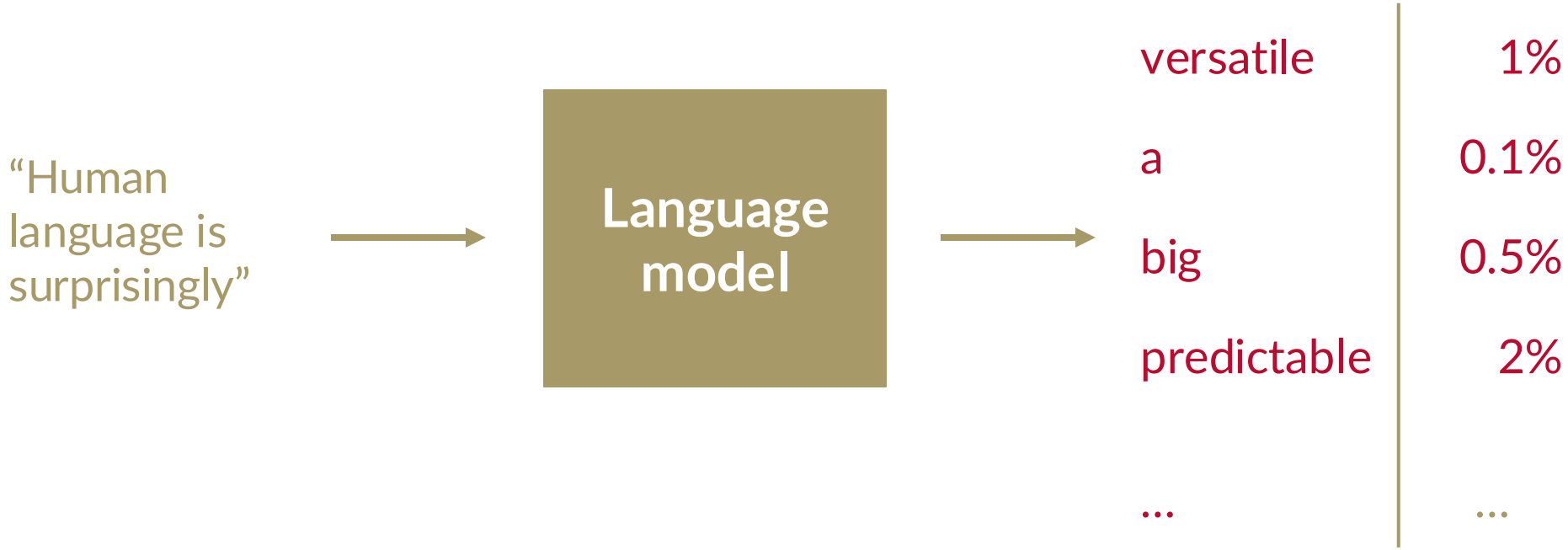

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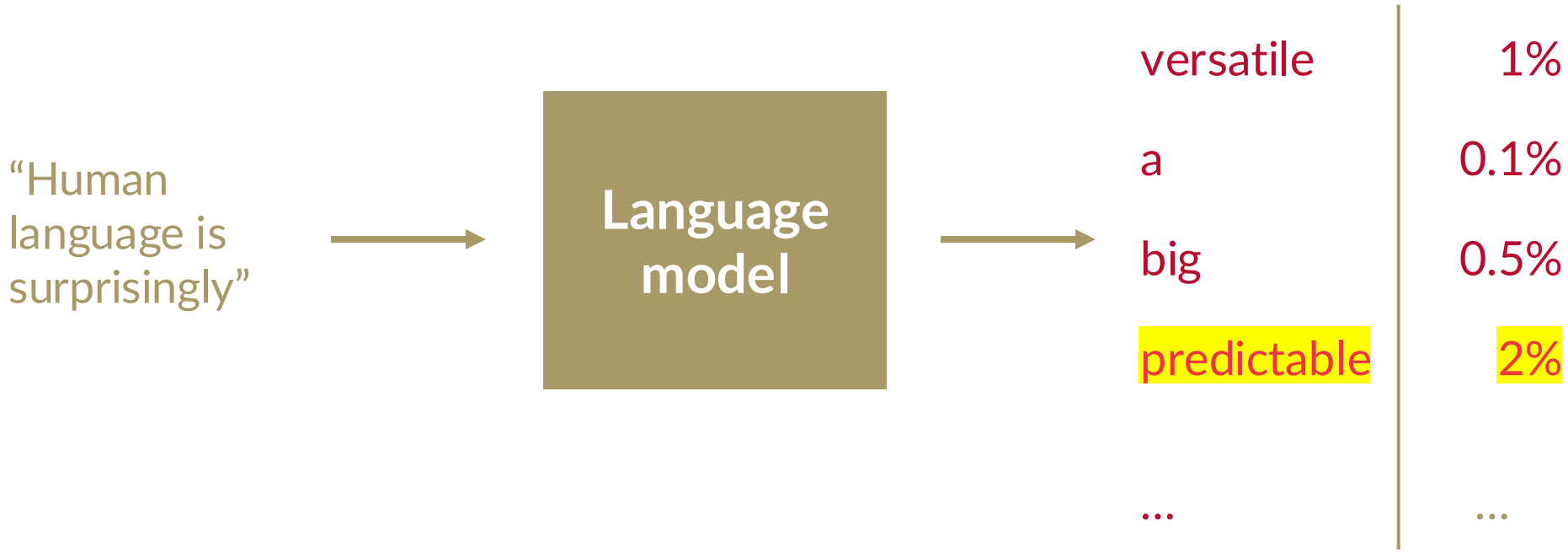


N-Gram Language Models

N-gram language models are among the simplest language models. [What we're calling "small language models".]

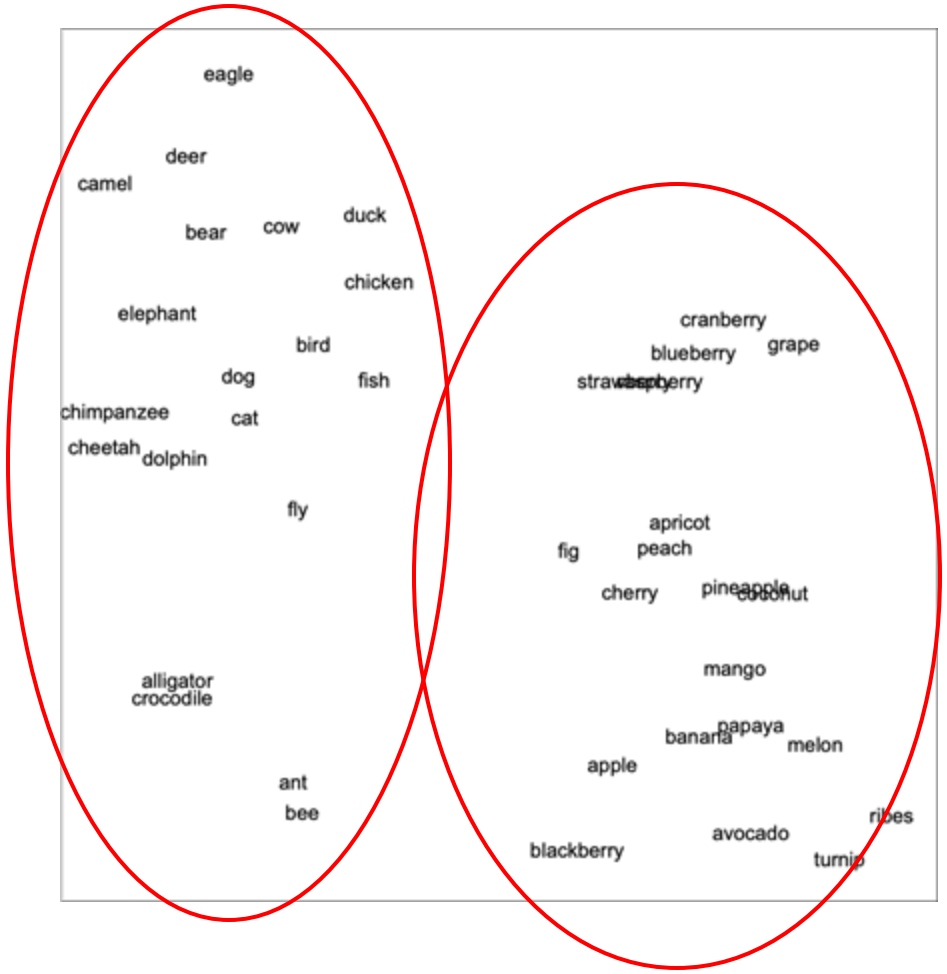
- These models make predictions by looking at only the **last few words** in a piece of text.
- To generate probabilities, n-gram models look for **exact matches** of those last few words in the **training data**.

Word Embeddings

Word embeddings try to capture the *essence* of words.

They represent words by points in space so that similar words are close to one another.

Here words are placed in two dimensions, but LLMs represents words by hundreds of dimensions.



Source: Stephen Wolfram

Contextual Word Embeddings

With the simplest word embeddings, each word is assigned to a single point in space. But words also derive meaning from their *context*.

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"I should turn **right** at the light, **right**?"

as opposed to "**left**" as in "**correct**"

Contextual Word Embeddings

With the simplest word embeddings, each word is assigned to a single point in space. But words also derive meaning from their *context*.

"I should turn **right** at the light, **right**?"

as opposed to "**left**" as in "**correct**"

***Contextual* word embeddings** capture the essence of words as used in their context.

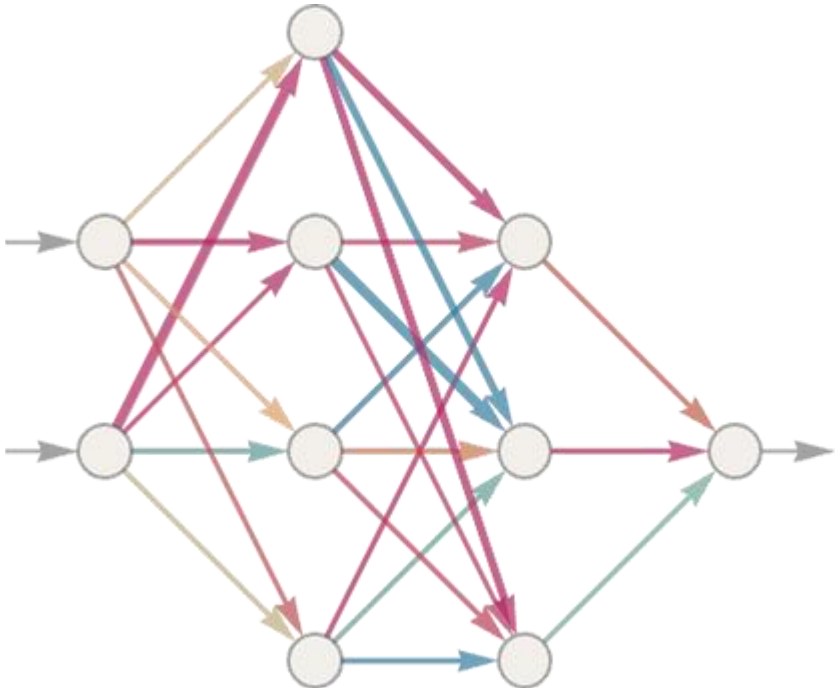
Neural Networks

the VERY VERY simplified version!

Artificial neural networks are mathematical abstractions of human brains.

Neurons successively *activate* neurons in each subsequent layer until reaching a final answer.

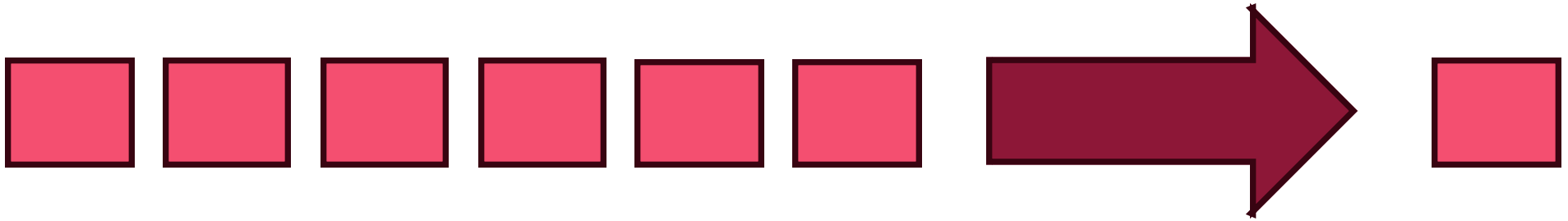
Words [represented with embeddings] are the input, and the next word is output.



Source: Stephen Wolfram

Pulling it All Together

- Conversational prompts are turned into tokens and assigned embeddings
- The LLM [via a neural net] analyzes what it thinks will come next based on its own tokens
- Tokens turned into output:



n tokens in

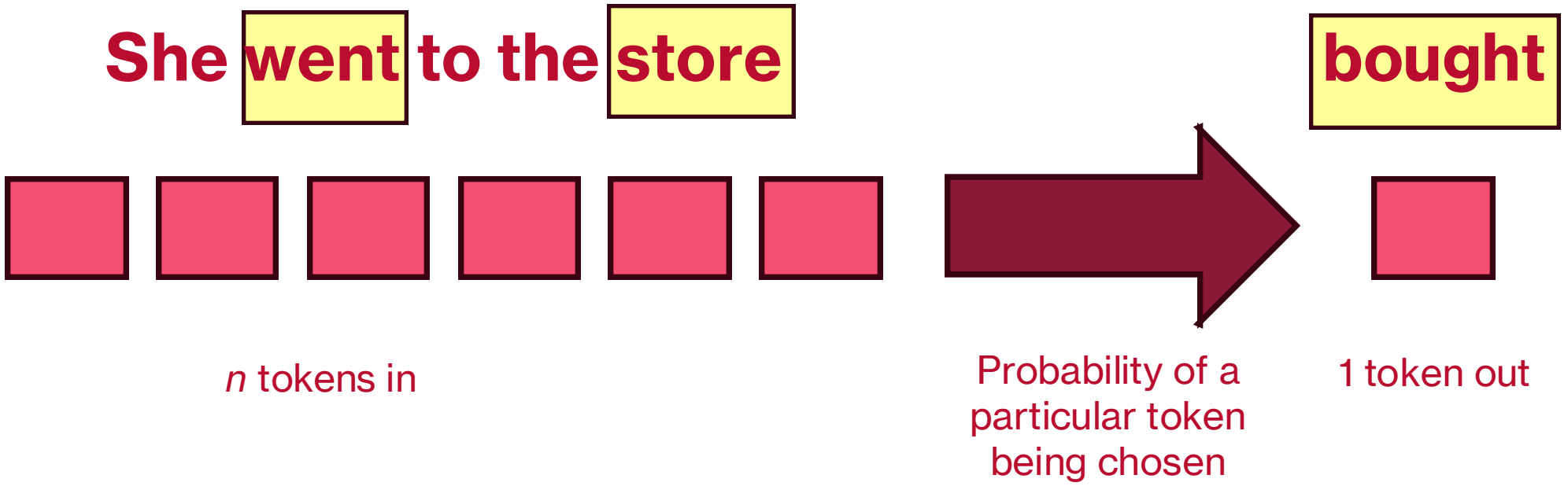
Probability of a particular token being chosen

1 token out

Sources: How GPT models work: accessible to everyone by Bea Stollnitz; An Introduction to Generative AI by Dr. Cori Faklaris. Retrieved 07 January 2024.

Pulling it All Together

- For every output, the model will keep analyzing the probabilities to decide what token comes out next:



Sources: How GPT models work: accessible to everyone by Bea Stollnitz; An Introduction to Generative AI by Dr. Cori Faklaris. Retrieved 07 January 2024.

Pulling it All Together

- The same inputs can produce different outputs:

Sources: How GPT models work: accessible to everyone by Bea Stollnitz; An Introduction to Generative AI by Dr. Cori Faklaris. Retrieved 07 January 2024.

Pulling it All Together

- And the model can “hallucinate”:

Sources: How GPT models work: accessible to everyone by Bea Stollnitz; An Introduction to Generative AI by Dr. Cori Faklaris. Retrieved 07 January 2024.

Whew! Recap:

- Language models predict the next word given any sequence of words.
- N-gram language models base their predictions on only a few preceding words, limiting their predictive power. [“Small language models”]
- Deep neural networks are mathematical abstraction of the human brain that learn patterns from data through interconnected layers of nodes.
- Large language models consider much more context, using deep neural networks to make highly accurate predictions.

BREAK

From science to practice…

Prompt Engineering

This is how we interact with GPT models

- "More of an art than a science" + "garbage in, garbage out"

We construct prompts to:

- Maximize accuracy and relevancy of responses
- Specify formatting and style of responses
- Mitigate bias and improve fairness

Source: Microsoft Learn for Educators (MSLE)

Anatomy of a Prompt

Though prompts can get very complex, they tend to boil down to three components:

- **Task**: What you want the AI to do
- **Instructions**: How you want the AI to do it
- **Context**: What you want the AI to know

Anatomy of a Prompt: Admissions Essay

[ ]: Task

( ): Instructions

{ }: Context

I am applying to the University of Denver's master's program in business analytics. I would like you to produce a first draft of one of my essays (250 word limit). The essay prompt is the following: "Describe a time when interactions with others and/or an experience caused you to change your mind or expanded your point of view." I would like you to write about my experience changing my mind about the potential of generative AI to transform education. I used to believe that it did not have much potential and now I believe that it has. An interaction with two faculty members and 3 students made me realize that I was wrong and they were right. Please produce an essay that is personal, crisp and persuasive. Please don't ask me any questions; just write the essay.

Anatomy of a Prompt: Admissions Essay

[ ]: Task

( ): Instructions

{ }: Context

Task: I will give you an essay prompt and you will write a first draft of an admissions essay.

Instructions: Produce an essay responding to the essay prompt, "Describe a time when interactions with others and/or an experience caused you to change your mind or expanded your point of view." It should be personal, crisp and persuasive. Please don't ask me any questions; just write the essay. Keep it under 250 words.

Context: I am applying to the University of Denver's master's program in business analytics. I used to believe that generative AI did not have the potential to transform online education. A conversation with two faculty members and three students made me realize I was wrong and they were right. [Add additional context]

Prompting Best Practices

	Description	Example
Direct language	You can get the most useful completions by being explicit about the kind of response you want.	"**Create a list** of 10 things to do in Edinburgh during August".
System messages	Describe how the chat should act.	"You're a **helpful** assistant that **responds in a cheerful, friendly** manner".
Providing examples	LLMs generally support *zero-shot learning* in which responses can be generated without prior examples. However, you can also provide a few example responses, known as *few-shot learning.*	"Visit the castle in the morning before the crowds arrive".
Grounding data	You can include *grounding* data to provide context.	Including **email text** with the prompt "Summarize my email".

Source: Microsoft Learn for Educators (MSLE)

It’s OK to Give AI *Some* Personality!

While we need to treat AI technology like technology, we can engage in human-agent teaming to make AI work better for us.

One of the most powerful uses of LLMs is to have it take on a persona with a particular set of goals and perspectives.

These personas can help you **step outside of your own perspective** by discussing with a virtual partner.

AI Personas

Persona	Role	Use case
Research Assistant	Gathers/processes information	Summarization, data analysis
Mentor	Provides feedback & suggestions	Improve an essay
Critic	Critiques your work	Find weak points in arguments
Tutor	Provides personalized instruction	Learn about a new topic
Student	Asks questions about content	Deepen your understanding and ability to explain ideas
Interviewer	Probes your thinking and asks for introspection	Help make a difficult decision
Simulator	Takes on a persona in a simulated environment	Practice a skill or interaction

Source: Modified from "Assigning AI: Seven Approaches for Students, with Prompts" (Mollick & Mollick, 2023)

Where to Prompt

A lot of options!

Some of the most popular (excluding ChatGPT):

Tool	Company	Best Use	Pricing	Primary Model
Gemini (AKA Bard)	Google	General & business use; ChatGPT's main competitor	Free or $24/mo	Gemini 1.5
Claude	Anthropic	General & business use	Free or $20/mo	Claude 3.5 Sonnet
Copilot	Microsoft	Interacting with Microsoft products	Free for users of Microsoft 365	Prometheus (GPT-4)
Perplexity	Perplexity	Deep dives on the web	Free or $20/mo	Perplexity (GPT-3.5)
Grok	xAI (Twitter)	Real time data pulled from X	$8/mo X Premium subscribers	Grok
Llama	Meta (Facebook)	Research, development	Free	Llama 3.2

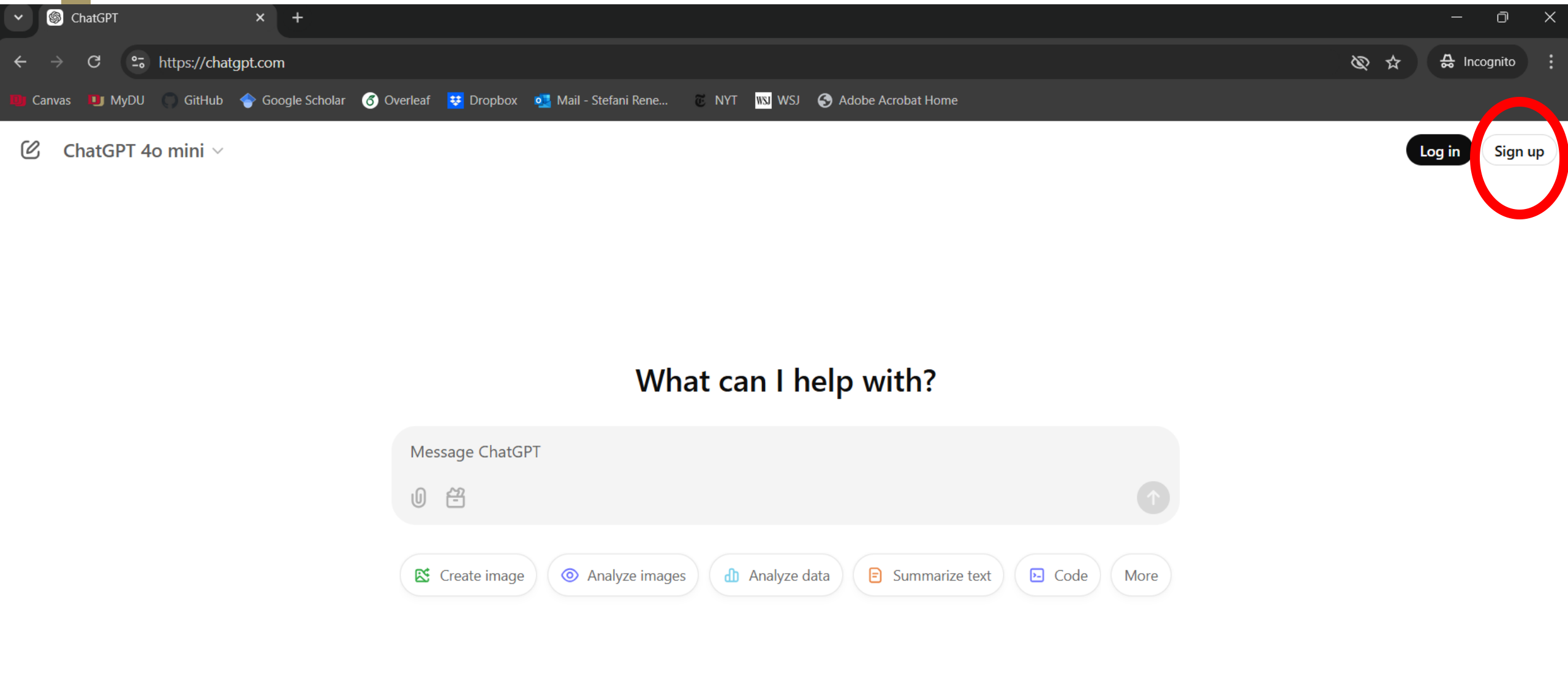
Where to Prompt: ChatGPT

- We are going to use OpenAI's ChatGPT model
- It is a "conversational-style" model, so it performs best when we communicate conversationally with it
- Open AI's models include GPT-3.5, GPT-4, etc. and are used in multiple tools

Sources: How GPT models work: accessible to everyone by Bea Stollnitz; An Introduction to Generative AI by Dr. Cori Faklaris. Retrieved 07 January 2024.
Logo image source: ChatGPT Wikipedia


Into the sandbox!

ChatGPT sign up



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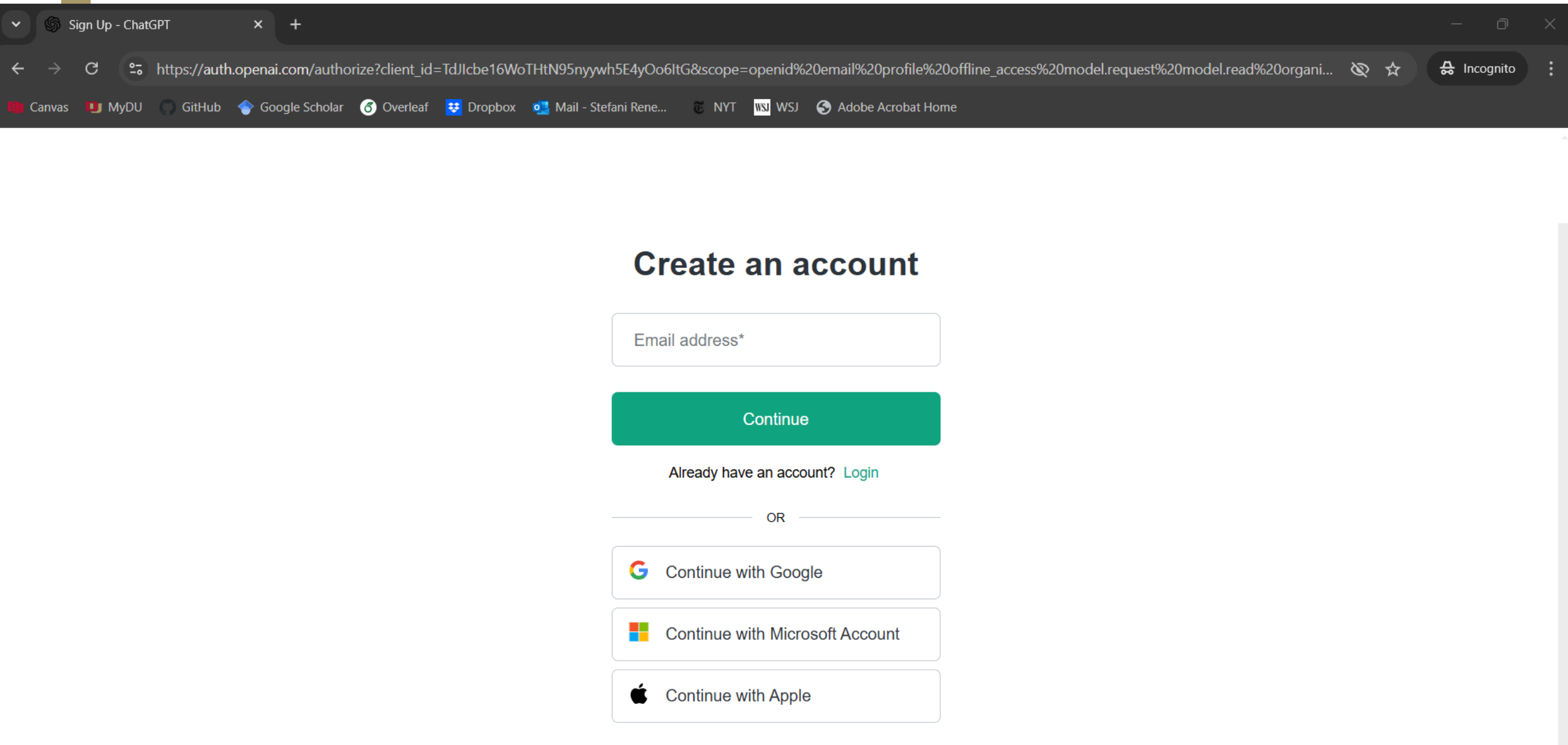
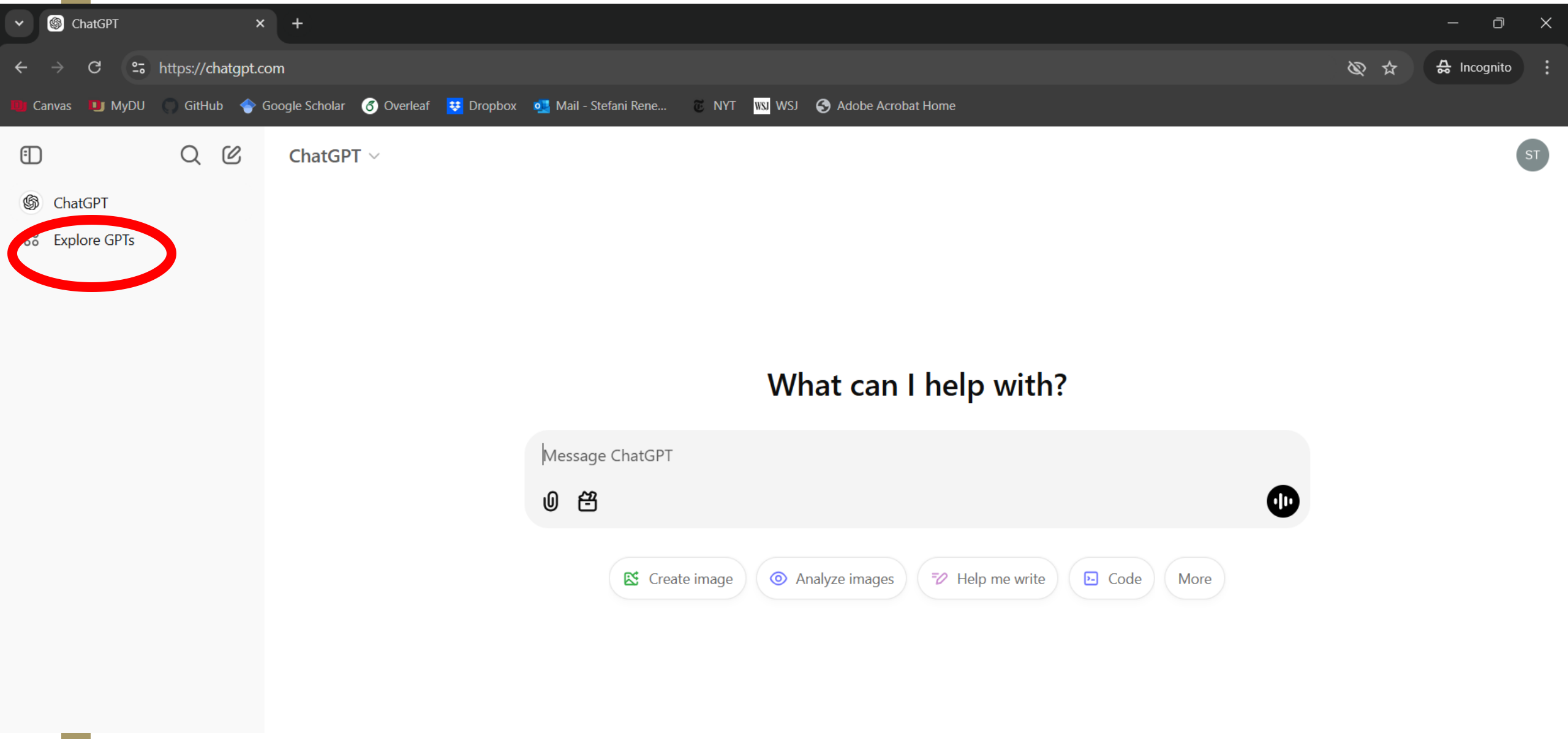


ACTIVITY

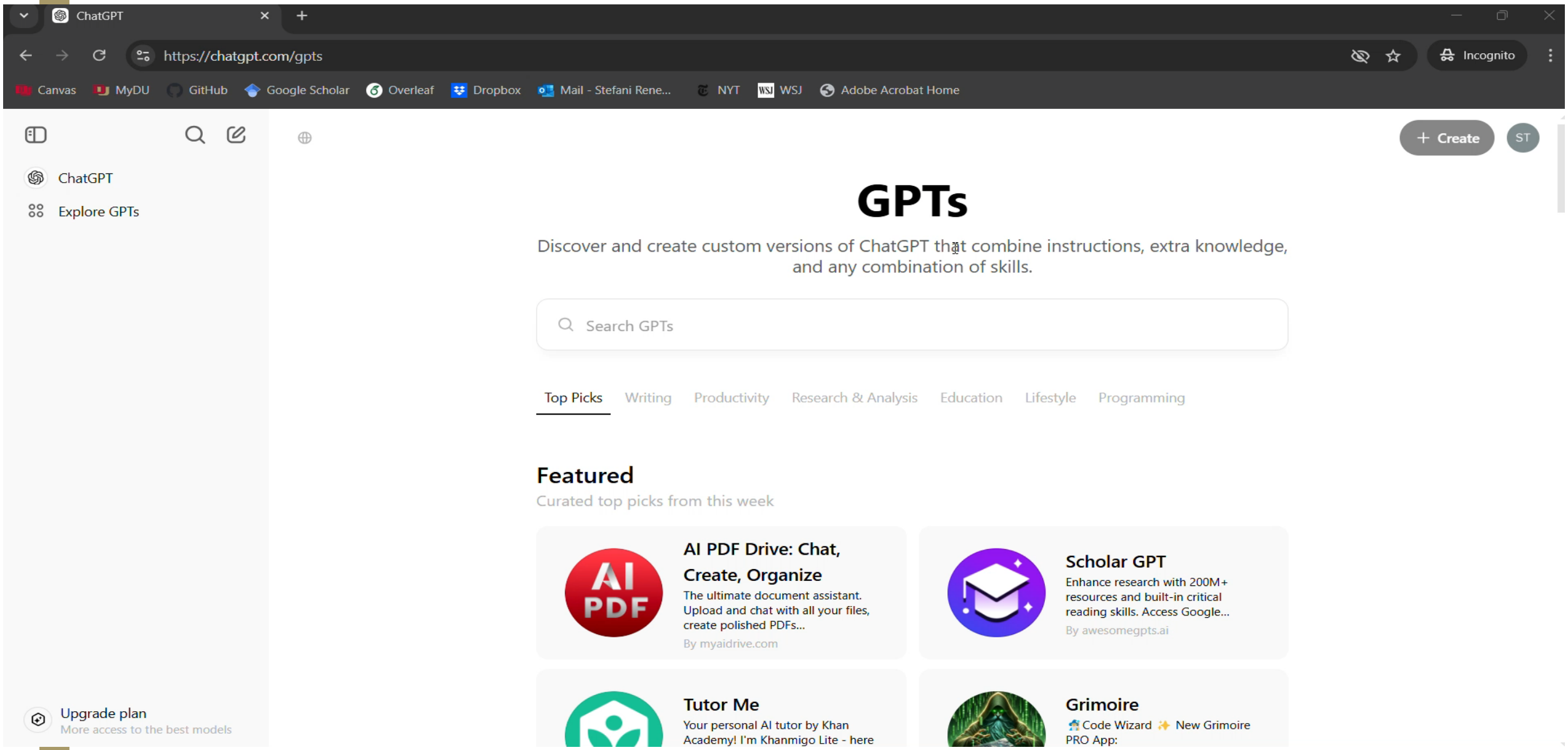
🔍 Job Search

- You are looking for a job. In small groups, use ChatGPT to brainstorm the types of positions you might want to apply for given your interests. After choosing some types of positions, ask for suggestions of organizations that you should look into.
- If instead your group already has a job in mind, write a cover letter for it using the principles of effective prompting when doing so.

ChatGPT sign up



Exploring GPTs



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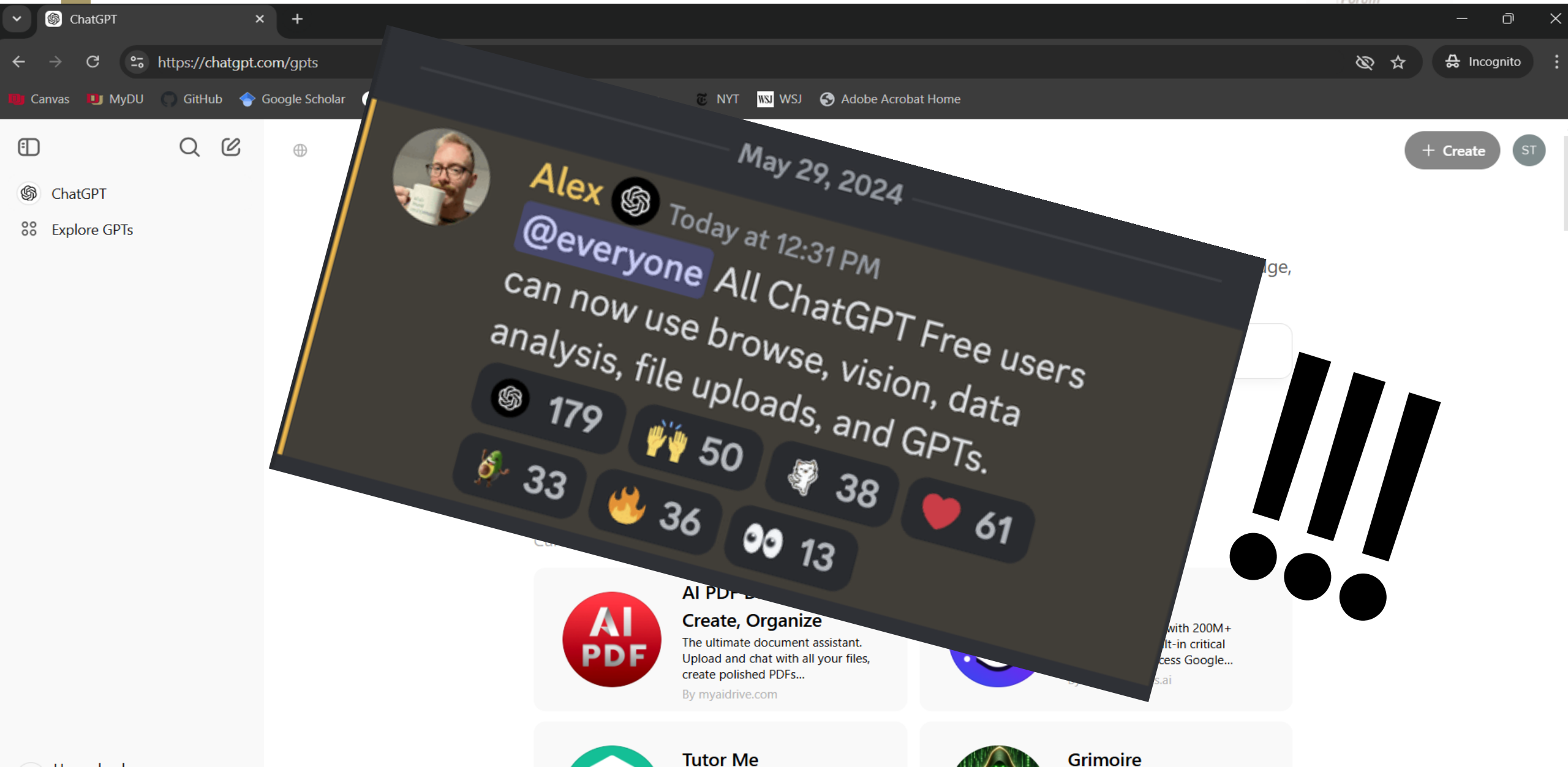


BREAK

COMMUNICATING INSIGHTS USING GENAI

How can we use GenAI to more effectively communicate insights?

Data Insights

"The deep understanding an individual or organization gains from analyzing information on a particular issue. This deep understanding helps organizations make better decisions than by relying on gut instinct."

Source: Qlik

DISCUSSION QUESTION

How are you currently communicating insights at work?

Data and Technology

AI Can Help Leaders Communicate, But Can't Make Employees Listen

A chatbot might be able to write emails that sound human, but can the technology respond to staff questions just like the boss would? Research by **Prithwiraj Choudhury** shows that while a chatbot may save leaders time, employees might not view the communications as credible.

Featuring Prithwiraj Choudhury. By Ben Rand on November 5, 2024.

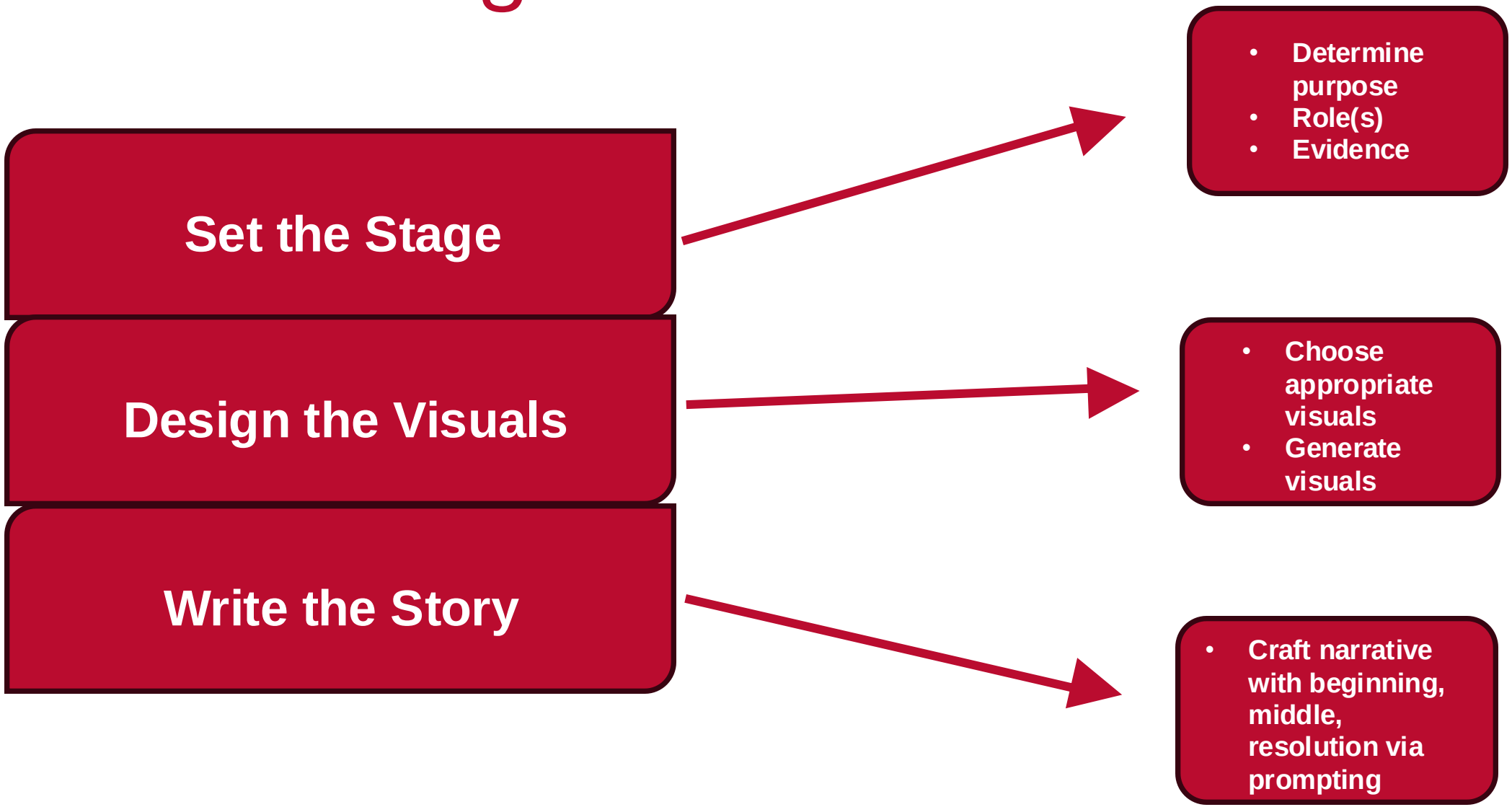
Source: HBR (05 November 2024)

Communicating with GenAI

How can it help us?

- ❑ Efficiency
- ❑ Non-technical communication
- ❑ Consolidation of insights
- ❑ Customization
- ❑ Visual enhancements
- ❑ “Objectivity” and “creativity”?

Communicating with GenAI

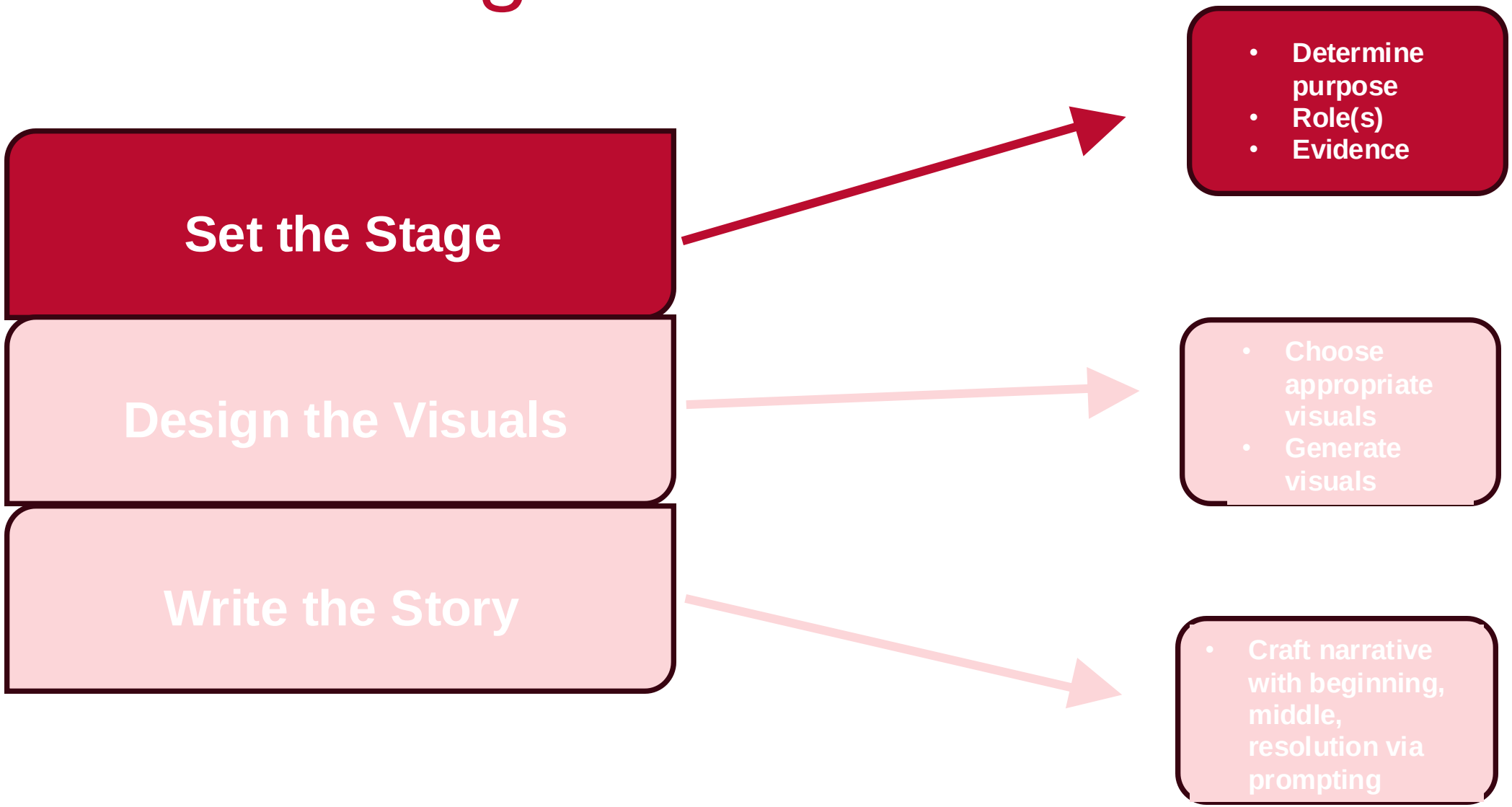


ACTIVITY

🔍 Current Climate of University Business Officers

- Because of budget cuts, your boss is concerned about the climate on campus among university business officers.
- They want to take a data-driven approach to understand where the issues are and what can be done. They've asked you to put together a presentation on this.

Communicating with GenAI

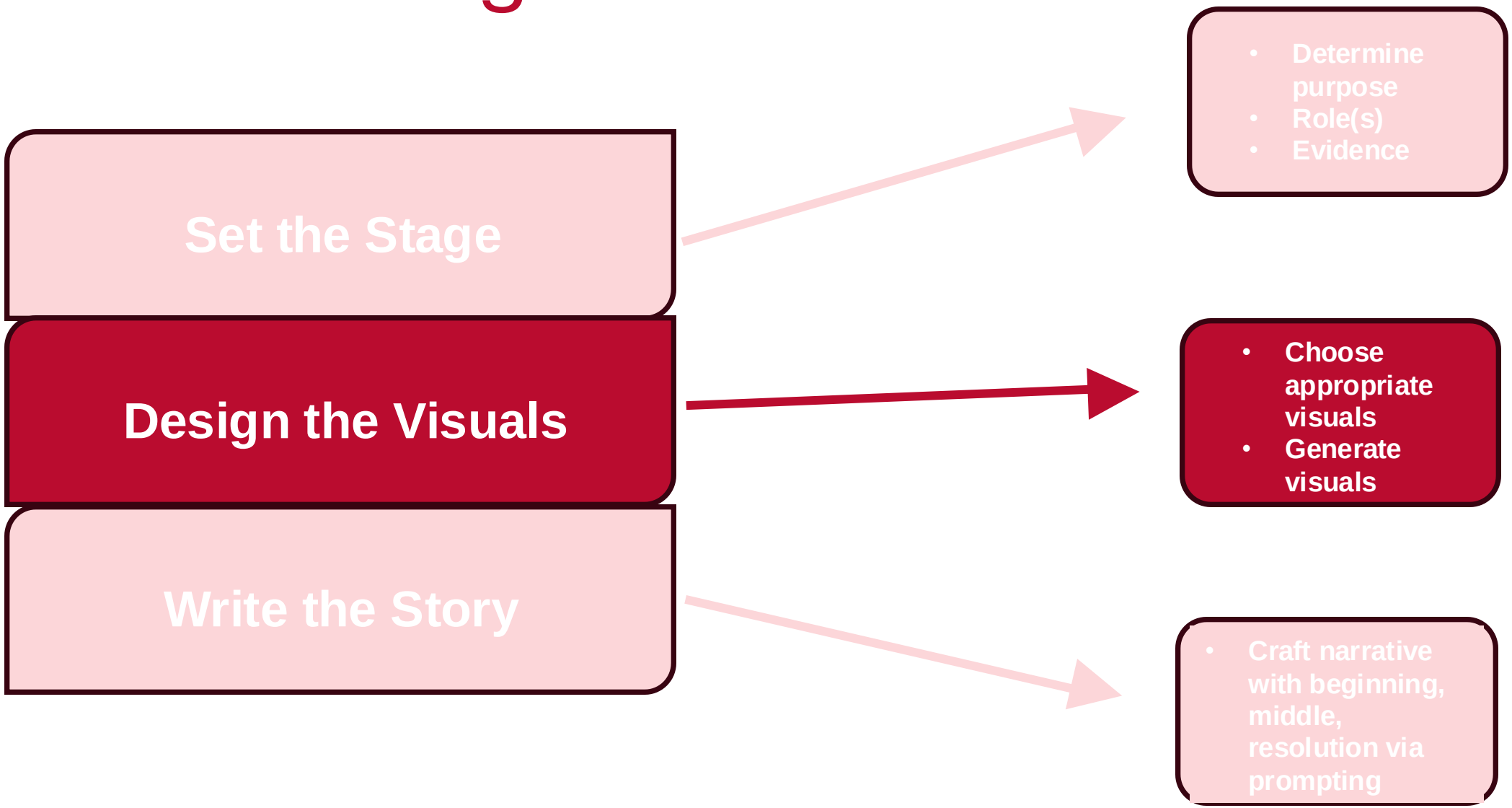


ACTIVITY

🔍 Current Climate of University Business Officers

- Use the data analysis feature + our data to formulate a purpose for your presentation.
- Once you've determined your purpose, produce presenter roles for you and/or individuals on your team.
- Finally, use the data you've uploaded to provide some high-level statistics for a few of your columns as evidence for your presentation.

Communicating with GenAI

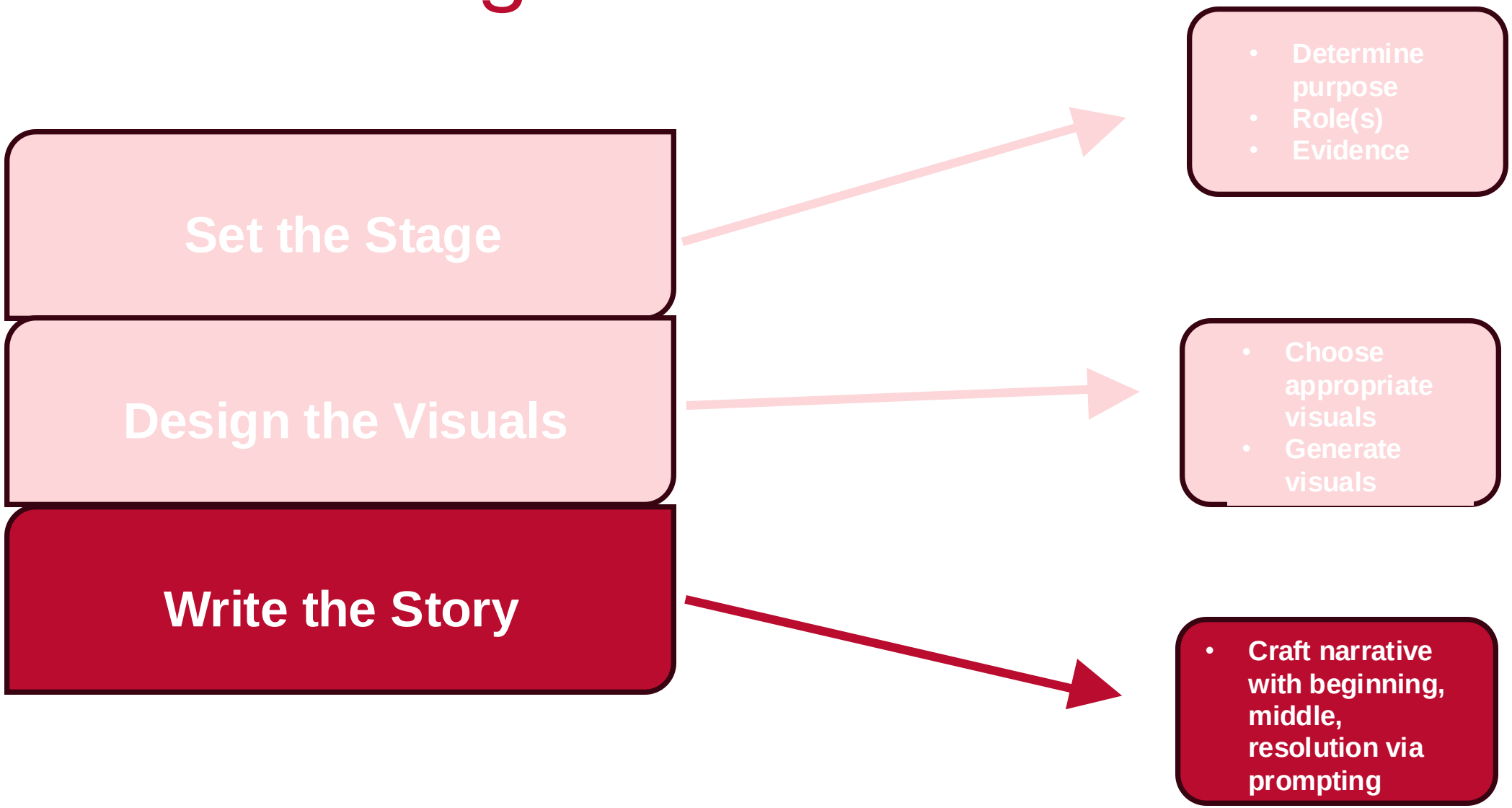


ACTIVITY

🔍 Current Climate of University Business Officers

- Your boss is a visual learner, which means they want figures that showcase the most important aspects of your presentation.
- Using our dataset and the purpose you generated before, create 3 different visuals *and* refine them using our prompt engineering best practices.

Communicating with GenAI



ACTIVITY

🔍 Current Climate of University Business Officers

- Surprise! Your boss invited the Vice Chancellor of University Financial Services to watch your presentation.
- Create a data story *that is appropriate for the audience*. Use the context you've created from setting the stage and creating your visuals to pull everything into a compelling narrative.

DISCUSSION QUESTION

What did you find? What worked? What didn't?

WRAP-UP

Thank you!

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