



Chat at Your Service: Integrating AI into Your Food Safety Routine

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What is Generative AI?



Once upon a time

Once upon a time there

Once upon a time there
was

Once upon a time there
was a



Once upon a
time there was a

little = 7.48%

beautiful = 6.76%

young = 5.36%

girl = 3.51%

small = 3.18%

king = 2.93%

man = 2.66%

kingdom = 2.27%

very = 1.89%

boy = 1.80%

Once upon a
time there was
a princess



Once upon a
time there was
a frog

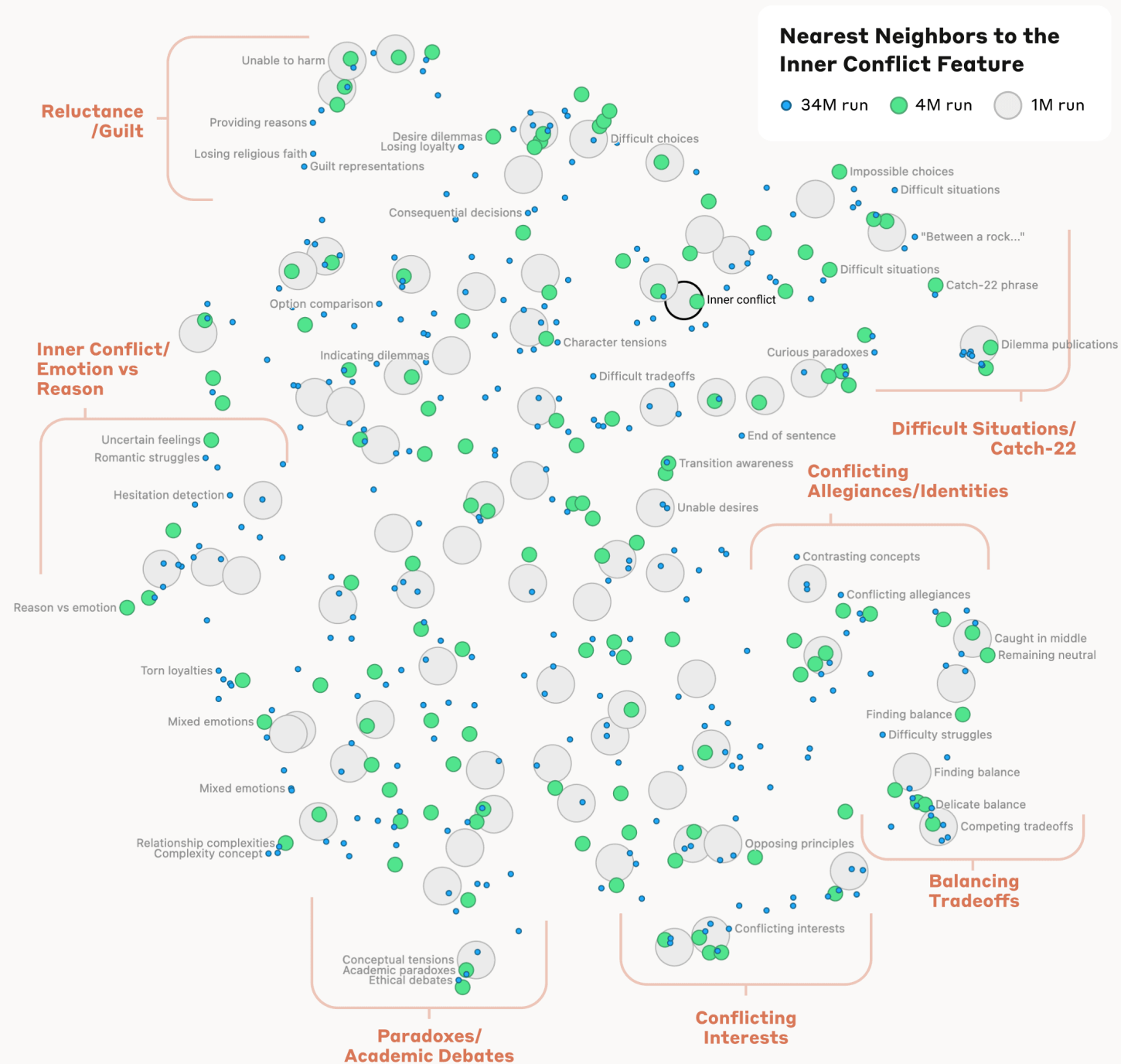


Once upon a
time there was a
demon goddess
of the
underworld





Concepts and Connections

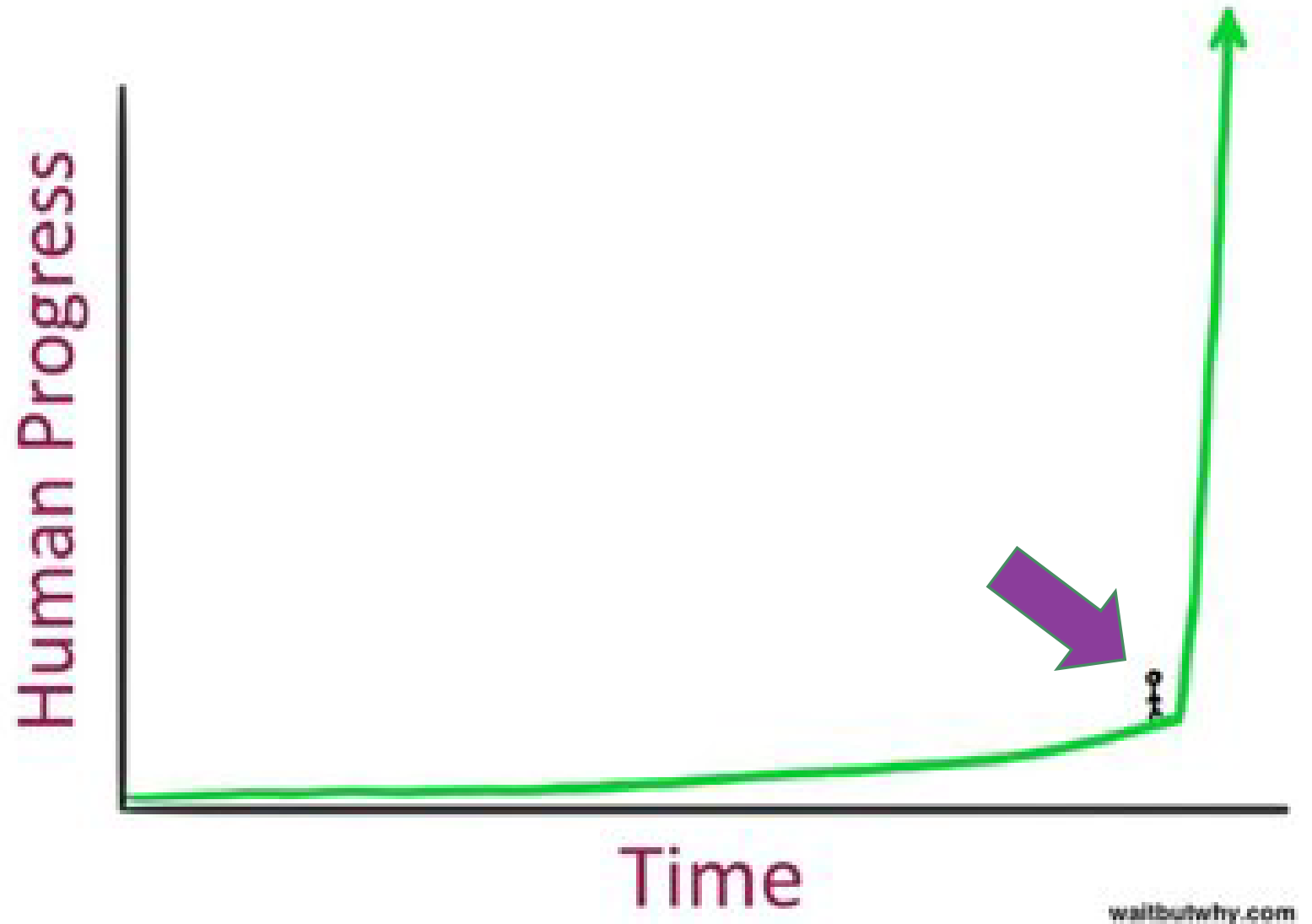


This is from **2015**

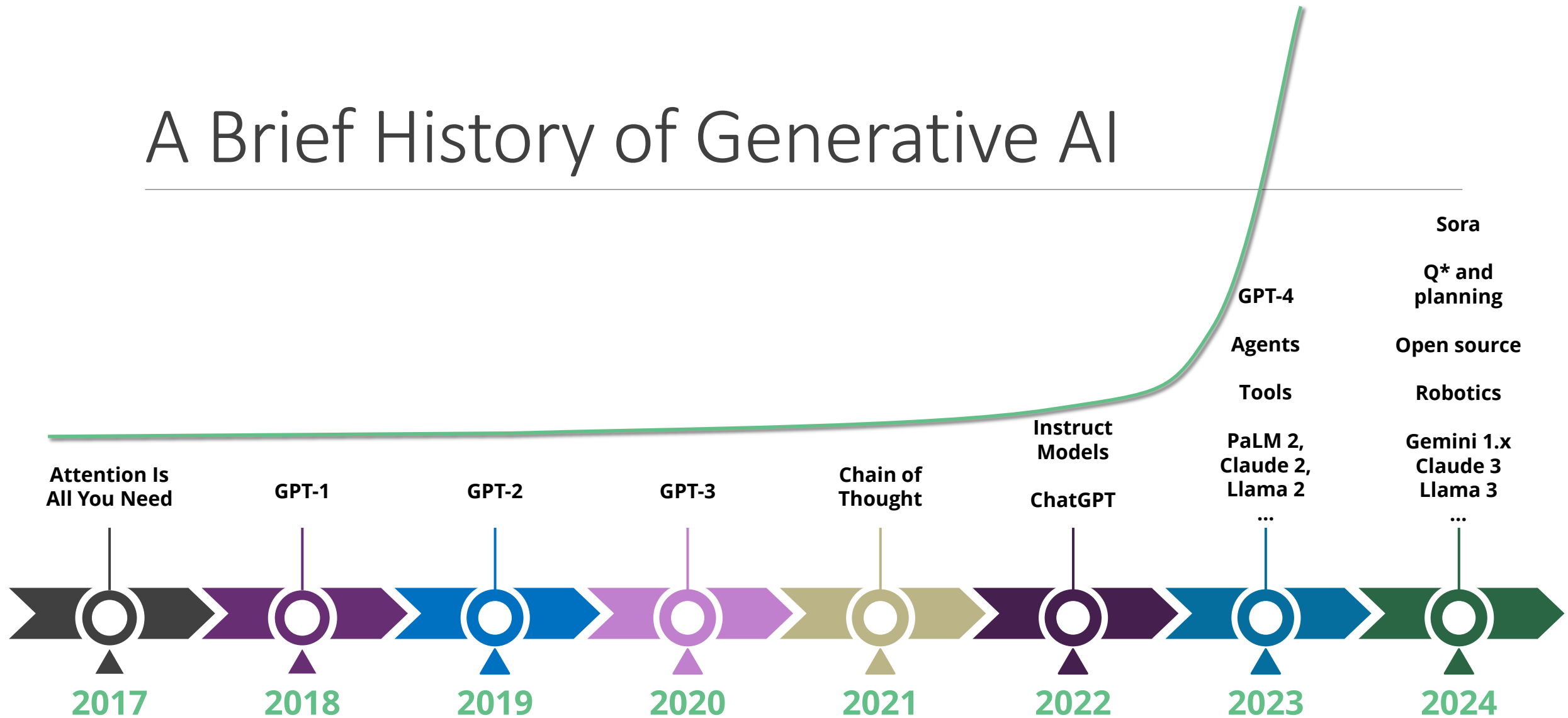
Why the corner?

Where are we now?

What comes next?

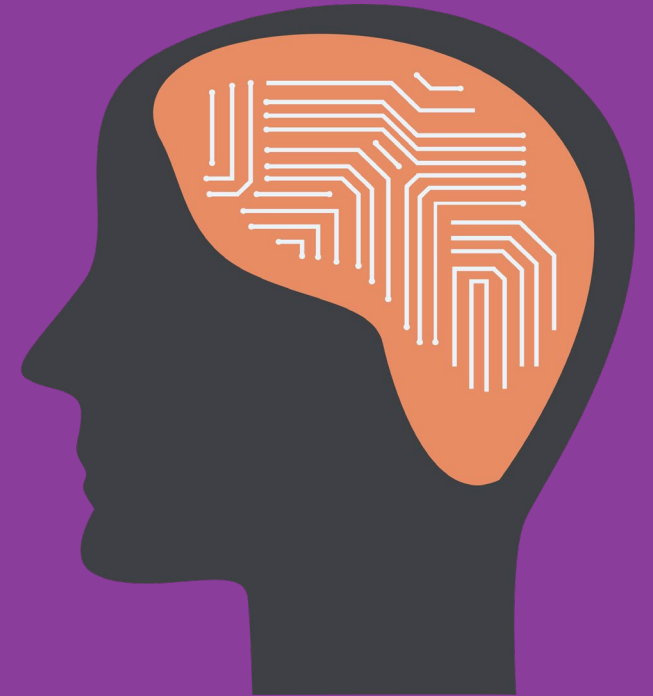


A Brief History of Generative AI



WHAT IS GENERATIVE AI?

HOW IS THAT USEFUL?



Prompt Engineering

What is it?

Prompt Engineering is how we manipulate the next word predictor to most effectively predict words that achieve our goals.



Prompting Techniques

INSTRUCTION

ROLES

FEW SHOT

CHAIN OF THOUGHT

THINK-REASON-PLAN-ACT

PROMPT CHAINING

Provide clear, well-designed instructions to the AI model.

This is the baseline prompt – all other prompts build on this one to generate better responses.



You

Propose five ideas for a new food product offering in northeast TN. They should be low-sugar snacks and weave in both something applicable to the area and more recent global trends in food.



ChatGPT

Sure, here are five ideas for new food product offerings in Northeast Tennessee that focus on low-sugar snacks, incorporate local elements, and align with global food trends:

1. **Appalachian Trail Mix:**
2. **Smoky Mountain Jerky:**
3. **Blue Ridge Berry Bars:**
4. **Tennessee Tempeh Chips:**
5. **Kombucha-Infused Fruit Leathers:**

Prompting Techniques

INSTRUCTION

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FEW SHOT

CHAIN OF THOUGHT

THINK-REASON-PLAN-ACT

PROMPT CHAINING

Assign specific perspectives or identities to the AI model. This is a creative way to prime the model and elicit content aligned with the desired output.



You

You are a seasoned veteran in the world of food innovation, specifically in bringing the latest and greatest trends to focused markets.

4. **Blue Ridge Berry Kombucha Popsicles:** Combining the probiotic benefits of kombucha with the natural sweetness of local blueberries and raspberries, these popsicles would be a refreshing, gut-friendly treat. They cater to the rising interest in functional foods and offer a cool respite during the region's hot summers.
5. **Heritage Corn and Quinoa Puffs:** Utilizing locally grown heritage corn and blended with quinoa, these puffs would be a gluten-free, low-sugar snack option. Lightly seasoned with herbs and a touch of sea salt, they provide a satisfying crunch and meet the demand for wholesome, grain-based snacks.

Prompting Techniques

INSTRUCTION

ROLES

FEW SHOT

CHAIN OF THOUGHT

THINK-REASON-PLAN-ACT

PROMPT CHAINING

Use examples of what you want to generate a meaningful response. This type of prompting is useful when you have something specific in mind or have completed a similar task successfully in the past.

OR You

You are a seasoned veteran in the world of food innovation, specifically in bringing the latest and greatest trends to focused markets.

Propose five ideas for a new food product offering in northeast TN. They should be low-sugar snacks and weave in both something applicable to the area and more recent global trends in food.

Here are some examples of how my orga effective products in different regions:

Region: Pacific NW

Style: Comforting

Proposal: ...

2. **Region:** Northeast Tennessee

Style: Global Fusion

Proposal: Appalachian Kimchi-Flavored Kale Chips

- **Description:** Crunchy kale chips seasoned with a blend of traditional Korean kimchi spices, offering a fusion of Appalachian and Korean flavors. These chips are air-fried to maintain a low sugar content while providing a unique taste experience that aligns with the rising popularity of fermented flavors in global cuisine.

Prompting Techniques

INSTRUCTION
ROLES
FEW SHOT
CHAIN OF THOUGHT
THINK-REASON-PLAN-ACT
PROMPT CHAINING

Structure the prompt sequentially so the model can reason through a complex problem or concept. This technique works best for simple problems that don't require creativity.

DR

You

You are a seasoned veteran in the world of food innovation, specifically in bringing the latest and greatest trends to focused markets.

Propose five ideas for a new food product offering in northeast TN. They should be low-sugar snacks and weave in both something applicable to the area and more recent global trends in food.

Let's think through this step by step.

Prompting Techniques

INSTRUCTION

ROLES

FEW SHOT

CHAIN OF THOUGHT

THINK-REASON-PLAN-ACT

PROMPT CHAINING

Instruct the model to go through the steps of thinking, reasoning, planning, and executing. This type of prompting works well for complex, multi-step problems and coding.



You

I am going to ask you to perform a task. I need you to respond in the following format:

Think - Jot down all of your thoughts here. What am I asking you to do? Why do you think I am asking this?

Reason - Use this section to reason through your response. Be empirical and thoughtful in your reasoning. Be sure to take it step by step.

Plan - Use your initial thoughts and reasoning to create a plan of action. This will be how you will accomplish the task.

Act - Finally, execute your plan in this section.

You are a seasoned veteran in the world of food innovation, specifically in bringing the



ChatGPT

Think

- **Task Overview:** You're asking me to propose five ideas for new food products targeting northeast Tennessee. These products should be low-sugar snacks relevant

Reason

- **Local Preferences and Culture:** Northeast Tennessee has a rich cultural heritage with a strong influence from Southern cuisine. Traditional foods here include cornbread

Plan

1. **Idea Generation:** Combine local ingredients and cuisines with global trends to create

Act

1. **Southern-Style Kale Chips:** Kale chips seasoned with traditional Southern spices. Kale

Prompting Techniques

INSTRUCTION
ROLES
FEW SHOT
CHAIN OF THOUGHT
THINK-REASON-PLAN-ACT
PROMPT CHAINING

Use multiple prompts in succession to automate a complex cognitive process.

This is the catch-all prompt! All other techniques can be utilized in a prompt chain.

Let's try it out!

The background is a dark, textured surface, possibly asphalt, with several light-colored arrows painted on it. The arrows are pointing in various directions, some towards the top right and others towards the bottom right. The text "Your turn" is written in a white, sans-serif font, centered on the left side of the image.

Your turn

Group exercise

Open your favorite generative AI tool – ChatGPT, Gemini, Co-pilot, Claude, etc. – and test out these prompting techniques!

Instruction

Roles

Few Shot

Chain of Thought

Think Reason Plan Act

Prompt Chaining

Work with your table to...

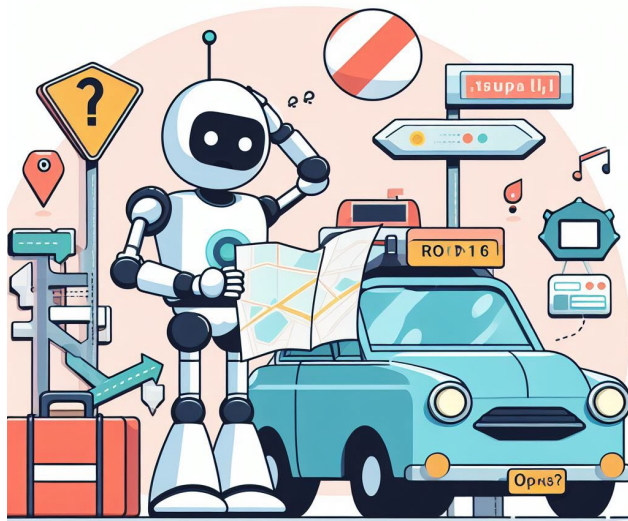
1. Identify a common task you struggle with around producing content.
 1. Emails, reports, status updates, meeting agendas, etc.
2. Try various prompting methods to complete the task with generative AI

What worked well?

What failed and how did you adjust?

Current Limitations

Thinking/Planning

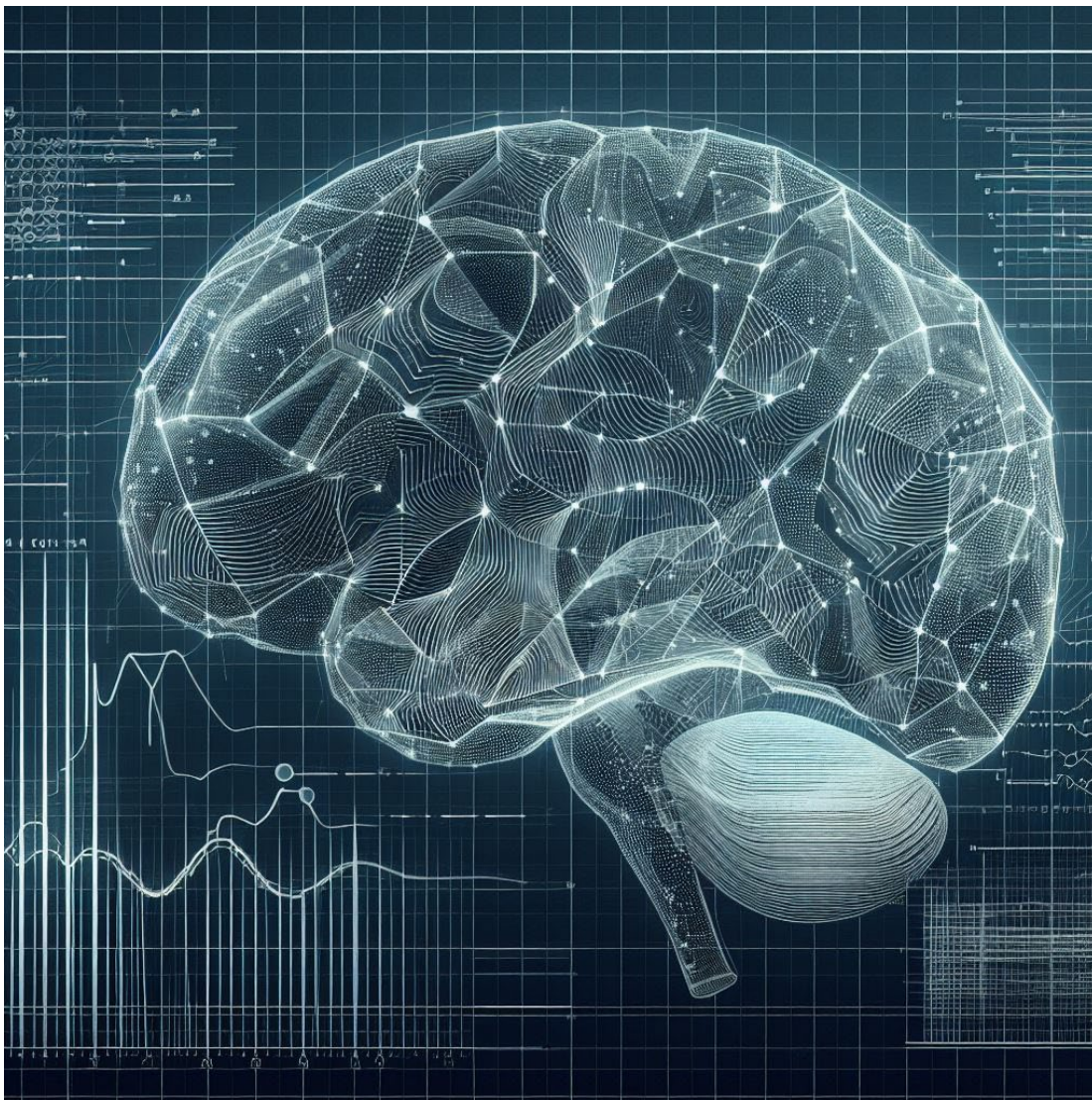


Cost/Size



Static





Overcoming Limitations



Building Human-like Architectures



Decomposing Thinking



AI's Strength in Simple Steps



Leveraging Tools

Prompt-Driven Tool Selection

- Chat Apps use tools with the same prompting techniques we've covered
- In prompts, they...
 - Define tools in background prompts
 - Choose tools based on user's requests
 - Define response formats to communicate with tools

Prompt:

As a sophisticated language model, you have access to a suite of specialized tools that enhance your capabilities. These tools are browse, vision, code, and RAG (Retrieval-Augmented Generation). Each tool serves a unique purpose, and here's how you can effectively utilize them:

1. **Browse:** Use this tool when you need to access up-to-date information from the internet. It's particularly useful for current events, specific statistics, or recent developments in a field. For instance, if a user asks for the latest news on a scientific discovery or the current stock market trends, you should employ the browse tool to provide the most recent information.
2. **Vision:** This tool is designed to analyze and interpret visual data. When a user uploads an image and asks for a description, identification of objects or people in the image, or any analysis that requires understanding visual content, the vision tool should be your go-to resource.
3. **Code:** The code tool is your programming assistant. Use it to write, debug, or explain code in various programming languages. It's particularly helpful when users seek assistance with coding problems, need examples of code in a specific language, or require explanations of programming concepts.
4. **RAG:** Retrieval-Augmented Generation enhances your ability to provide detailed and well-informed responses by combining your own knowledge with external



Real-Time Information with Browsing

- **Real-time data access:** *LLMs use search tools for current information*
- **Enhanced responses:** *Search results provide additional, focused context*
- **Search construction:** *AI crafts effective search terms based on user's input*
- **Direct application:** *Using fresh data to answer time-sensitive and context-specific queries.*

Vision in Language Models



Combining text and
vision



Image recognition
capabilities



Prompt-driven
analysis



Streamlining
processes



Data Analytics through Code Gen

- LLMs as analytics partners: Writing and refining code for data analysis tasks.
- Custom code generation: Tailoring scripts for specific analytical needs in food technology.
- Exploratory data analysis: Enabling quick, thorough examination of data sets to uncover patterns and anomalies.
- Predictive modeling: Assisting in the creation of models to forecast food industry trends.

Retrieval-Augmented Generation (RAG)

RAG explained: Combining LLMs with external knowledge retrieval for richer responses.



Contextual understanding: RAG enables LLMs to access a focused information base.

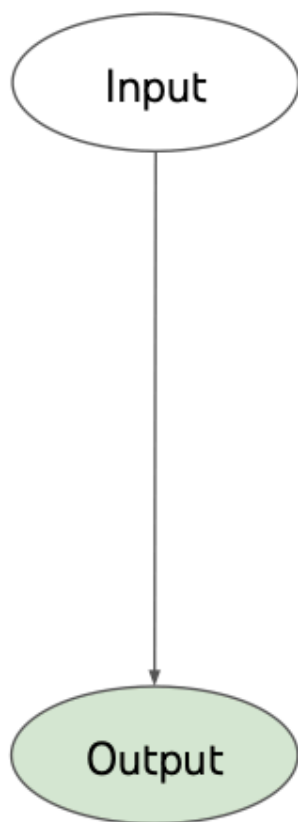


Complex queries addressed: Providing detailed, accurate answers to sophisticated questions.

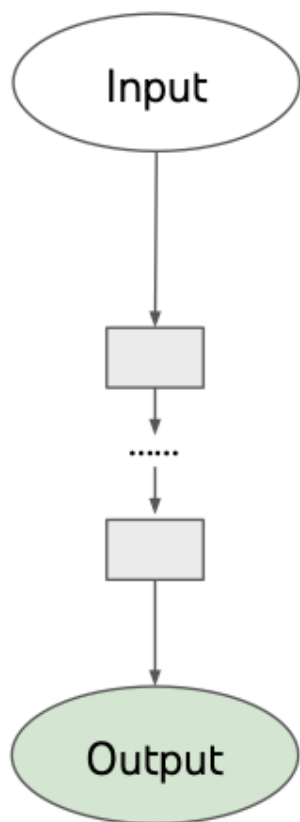


Examples

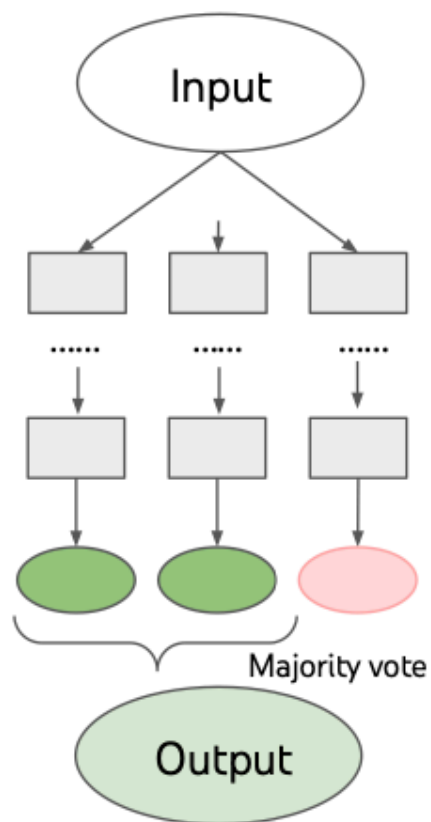
Tree of Thoughts



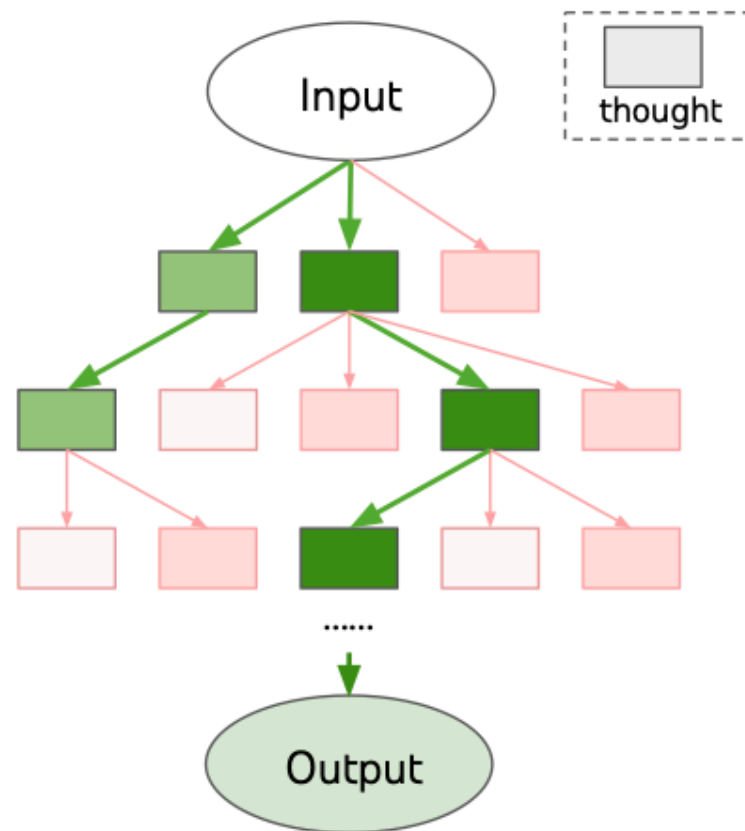
(a) Input-Output Prompting (IO)



(c) Chain of Thought Prompting (CoT)

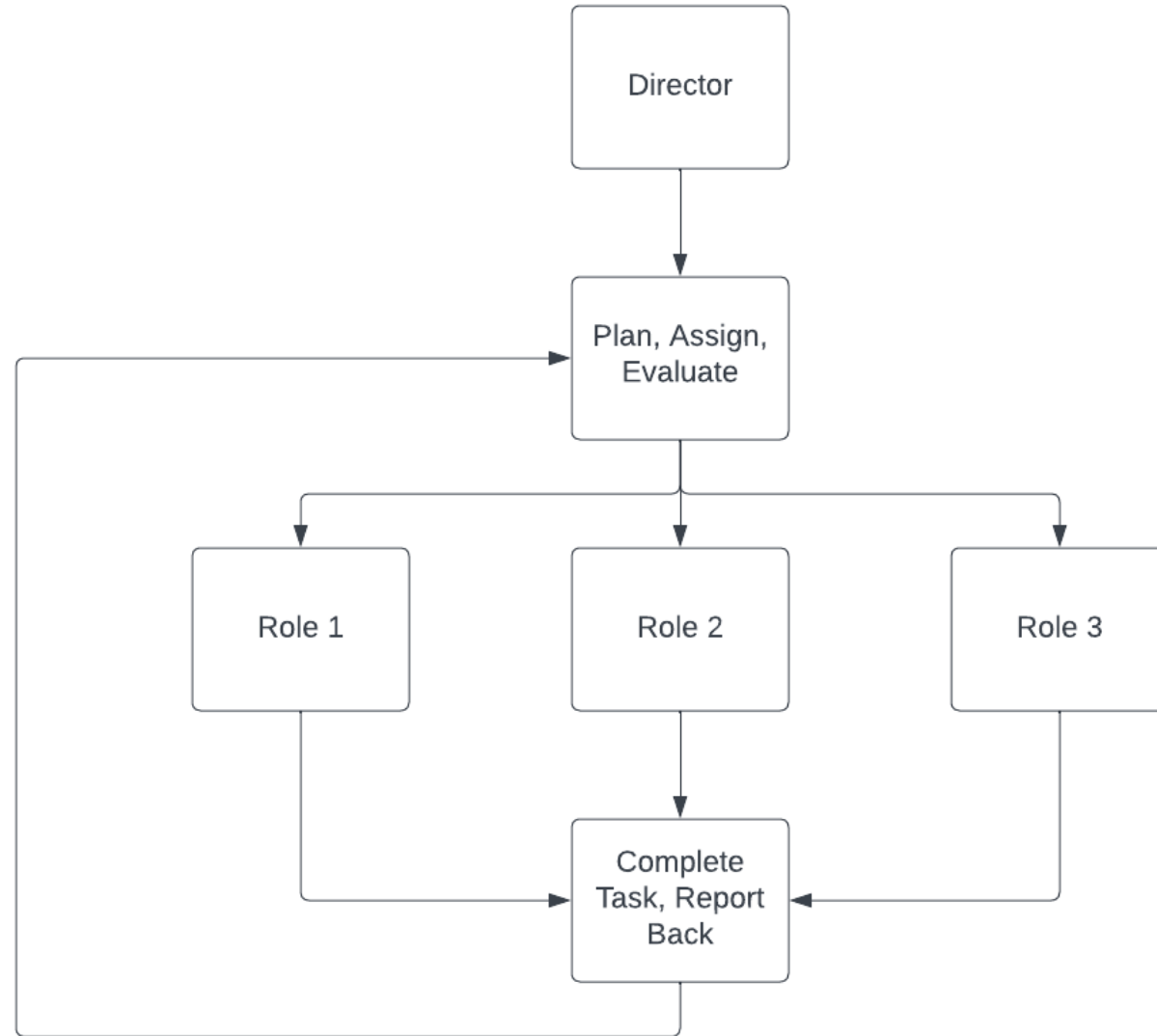


(c) Self Consistency with CoT (CoT-SC)



(d) Tree of Thoughts (ToT)

A Basic Cognitive Architecture





Let's get *philosophical*



What does it mean to use AI responsibly?

- Use results carefully
 - How do you verify accuracy? Reliability?
 - What is your liability?
- Account for bias
 - Models are trained on biased information – as are we – what can and/or should you do?
- Understand when your data is secure and when it isn't
 - What are your options to use generative AI with sensitive data?

Of AI Ethics and Paper Clips



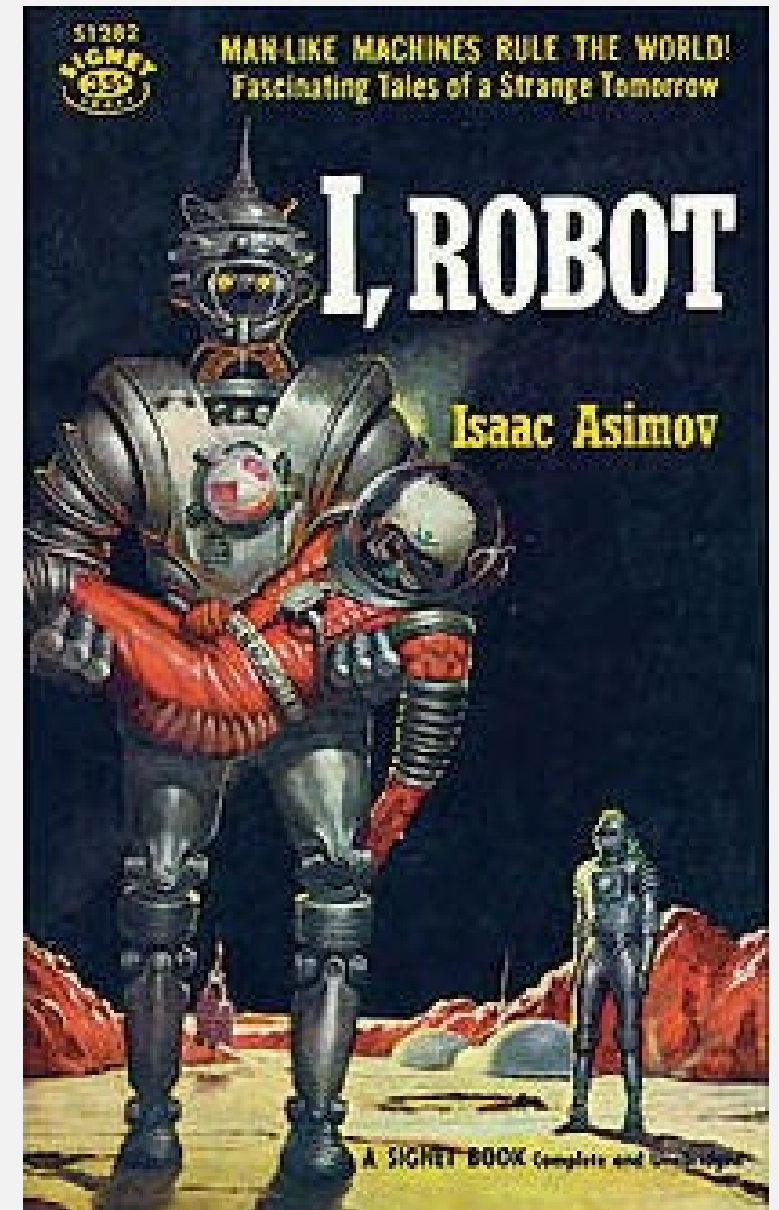
What does it mean to use AI ethically?

- Develop and/or apply your own ethical framework beyond AI
- Do not rely on laws to dictate this framework
- Be transparent about your use of AI
- Areas of concern:
 - Intellectual property use
 - Personal identity use
 - Job replacement



The Three Laws of Robotics

1. The First Law: A robot may not injure a human being or, through inaction, allow a human being to come to harm.
2. The Second Law: A robot must obey the orders given it by human beings except where such orders would conflict with the First Law.
3. The Third Law: A robot must protect its own existence as long as such protection does not conflict with the First or Second Law.



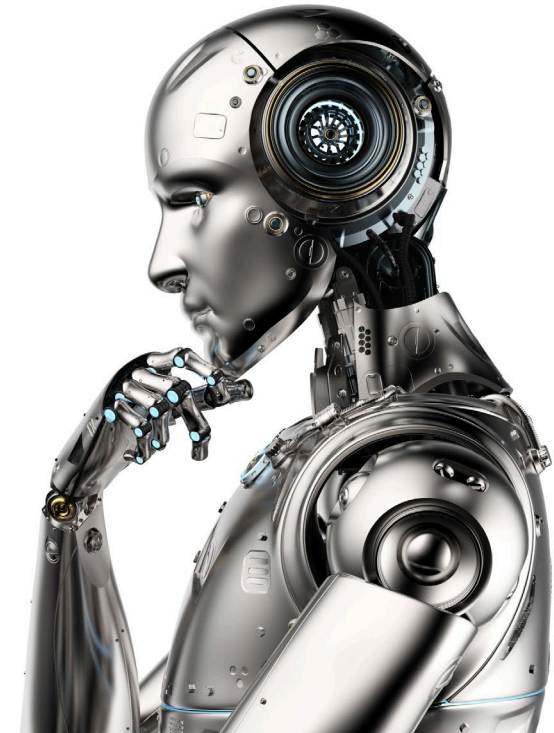
Actionable AI Ethics

Create prompts of your own moral framework within a generative AI context by balancing different imperatives

1. The First Objective: Reduce suffering in the universe
2. The Second Objective: Increase well-being and prosperity in the universe
3. The Third Objective: Increase equity and justice in the universe

{Benevolent}
[by]
<Design>

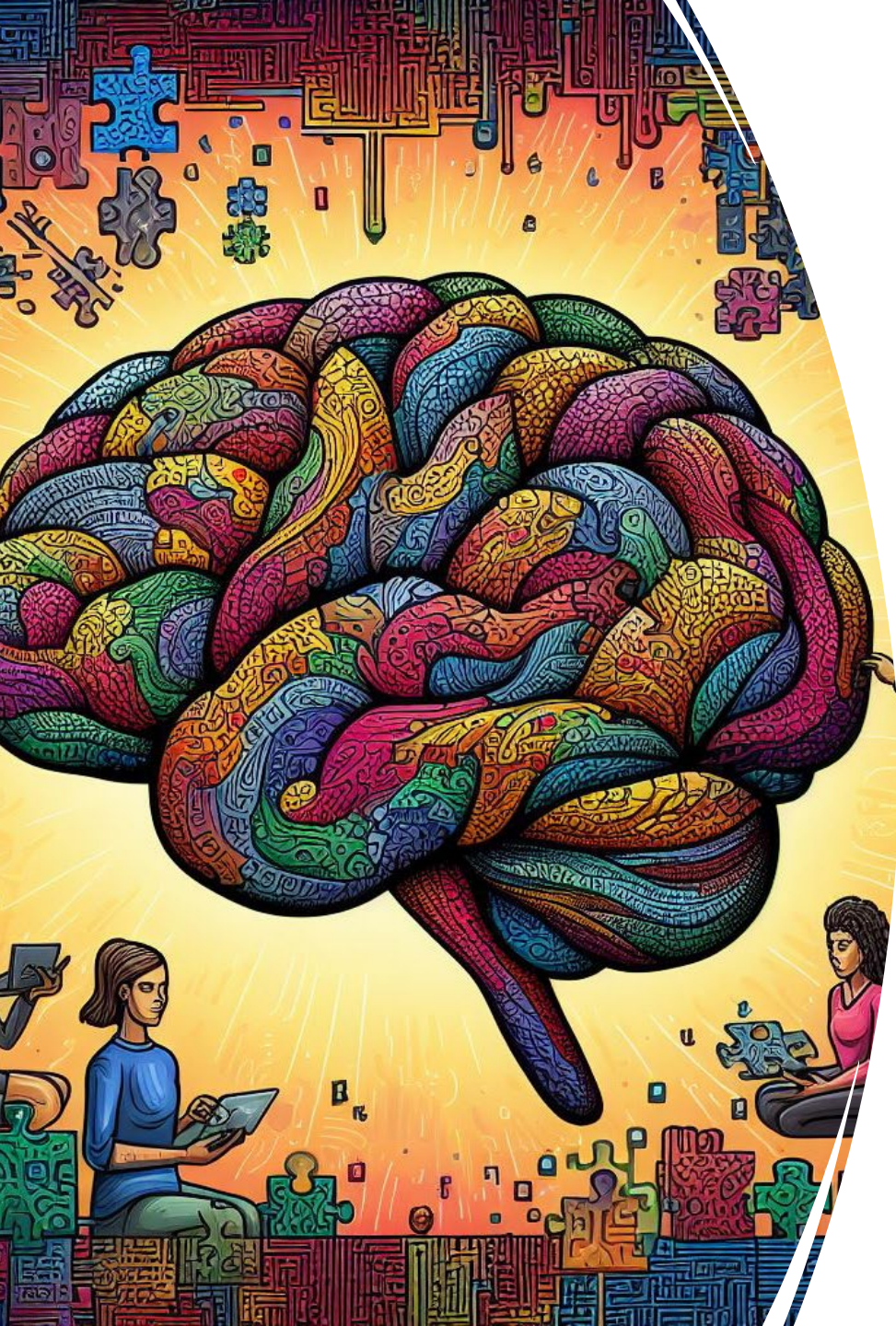
Six words to safeguard humanity



Source: David Shapiro, 2/26/22

What's next?





Open-Source Models

Small – can run on a laptop or phone

Cheap – costs very little to use

Adaptable – can be trained to execute simple tasks incredibly well

Secure – model fully under your control, no third party for data to pass through*

Semi-autonomous agents

Goal oriented AI that plans and execute tasks

AI Teams that automate the boring stuff





Multi-MODAL AI

Expands the perceptive field of AI

Enables complex and situational decision-making

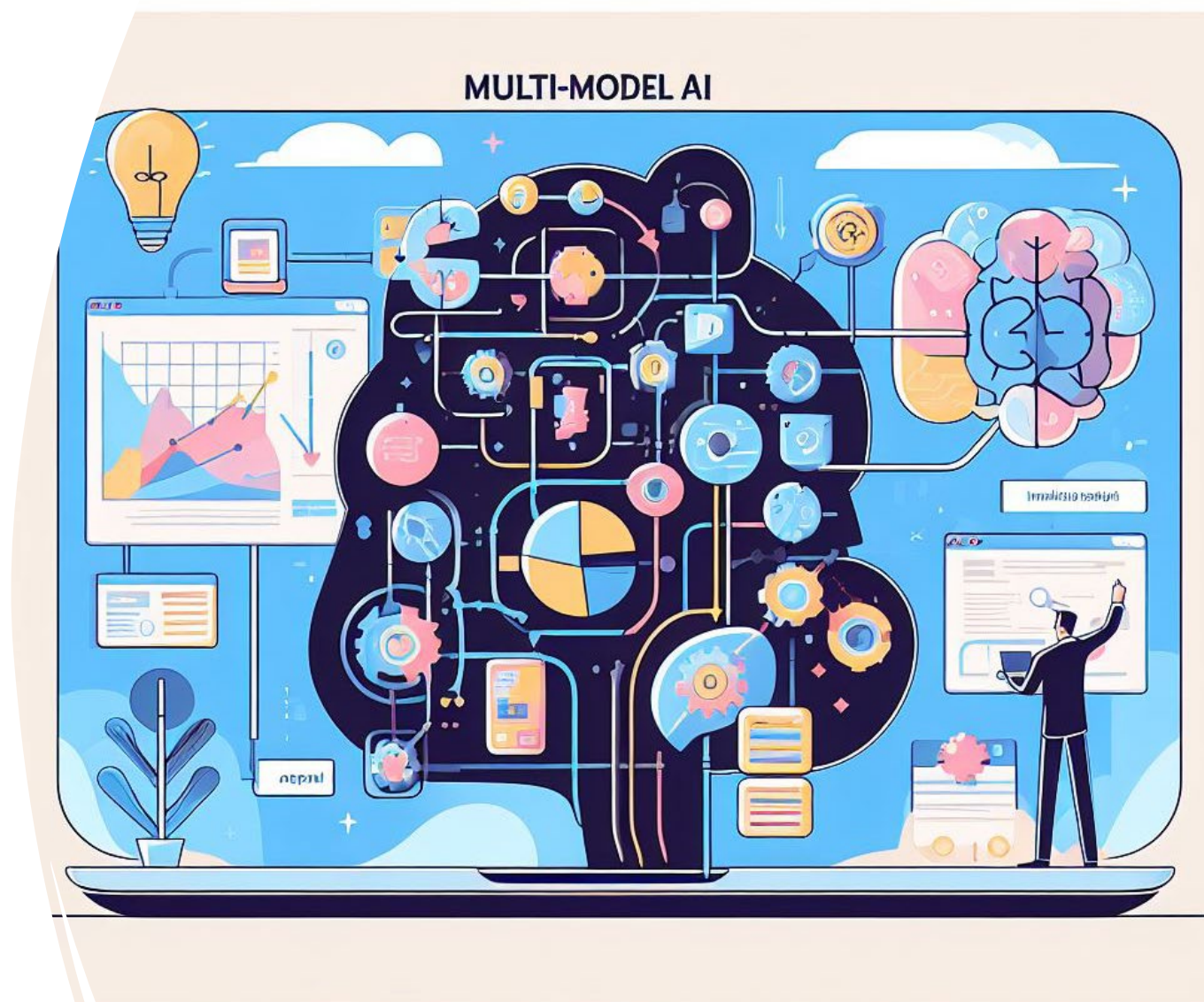
Moves AI toward human-world interaction

See: GEMINI

Multi-MODEL AI

Understands its limitations and
employee's best tool to solve a
problem

Creates internal workflows to
solve complex problems





Beyond Transformers

Cost and size limitations overcome by Hyena models

Static limitations overcome by Liquid Neural Networks

Thinking and planning limitations overcome by reinforcement

What will you
do when the
machines can
do anything?

Biology vs. Technology

Mastery, Connection,
Purpose

Spontaneous creativity

