

Demystifying LLMs

Prompting & Applications in Data Science



Agenda

- 1 Introduction to LLMs
- 2 Code Generation using LLMs
Case study: data science salaries
- 3 Information Extraction using LLMs
Case study: JioMart product metadata extraction
- 4 Text Summarization using LLMs
Case study: Delta Air Lines twitter customer support
- 5 Query Generating using LLMs
Case study: google analytics

Section 1

Introduction to LLMs

Attention Is All You Need

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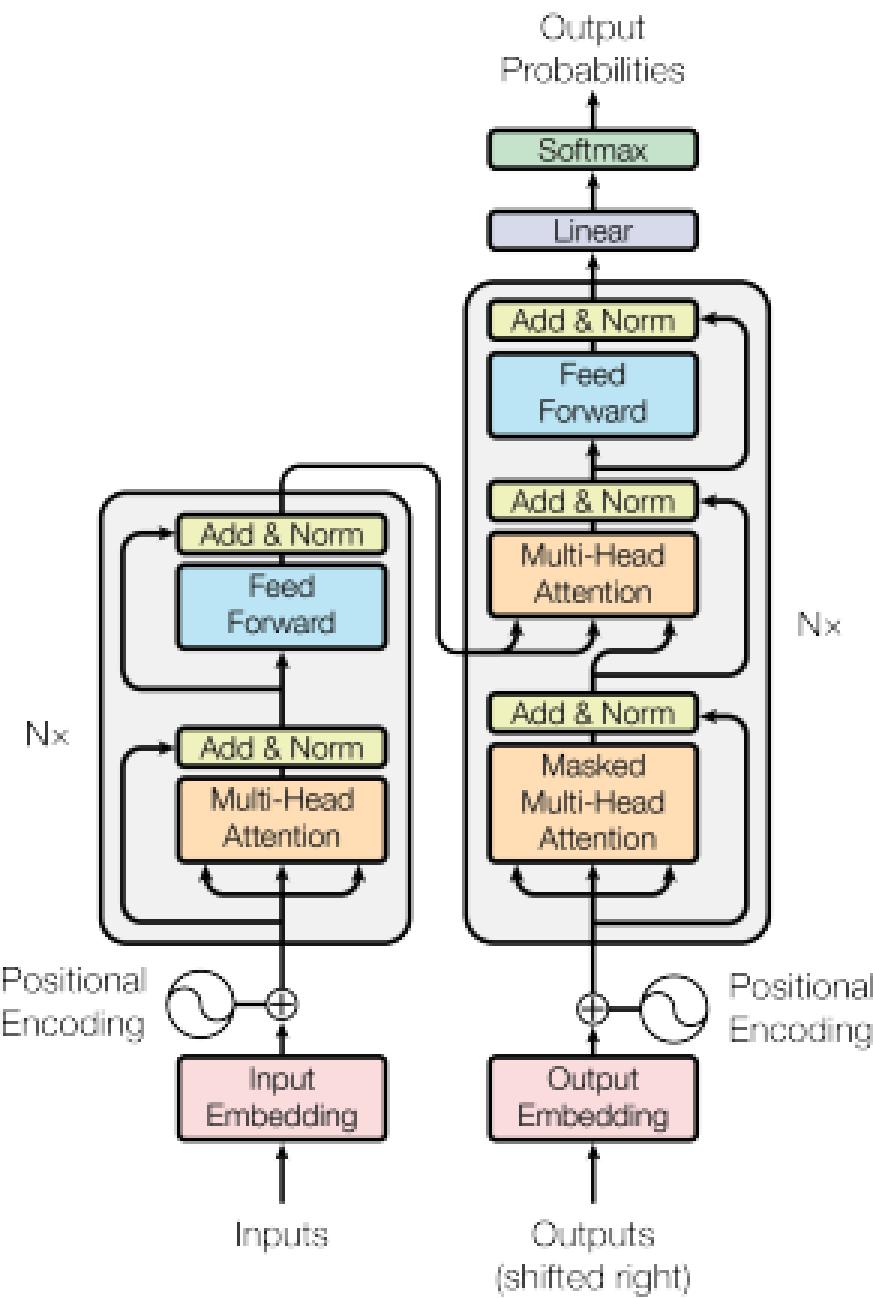
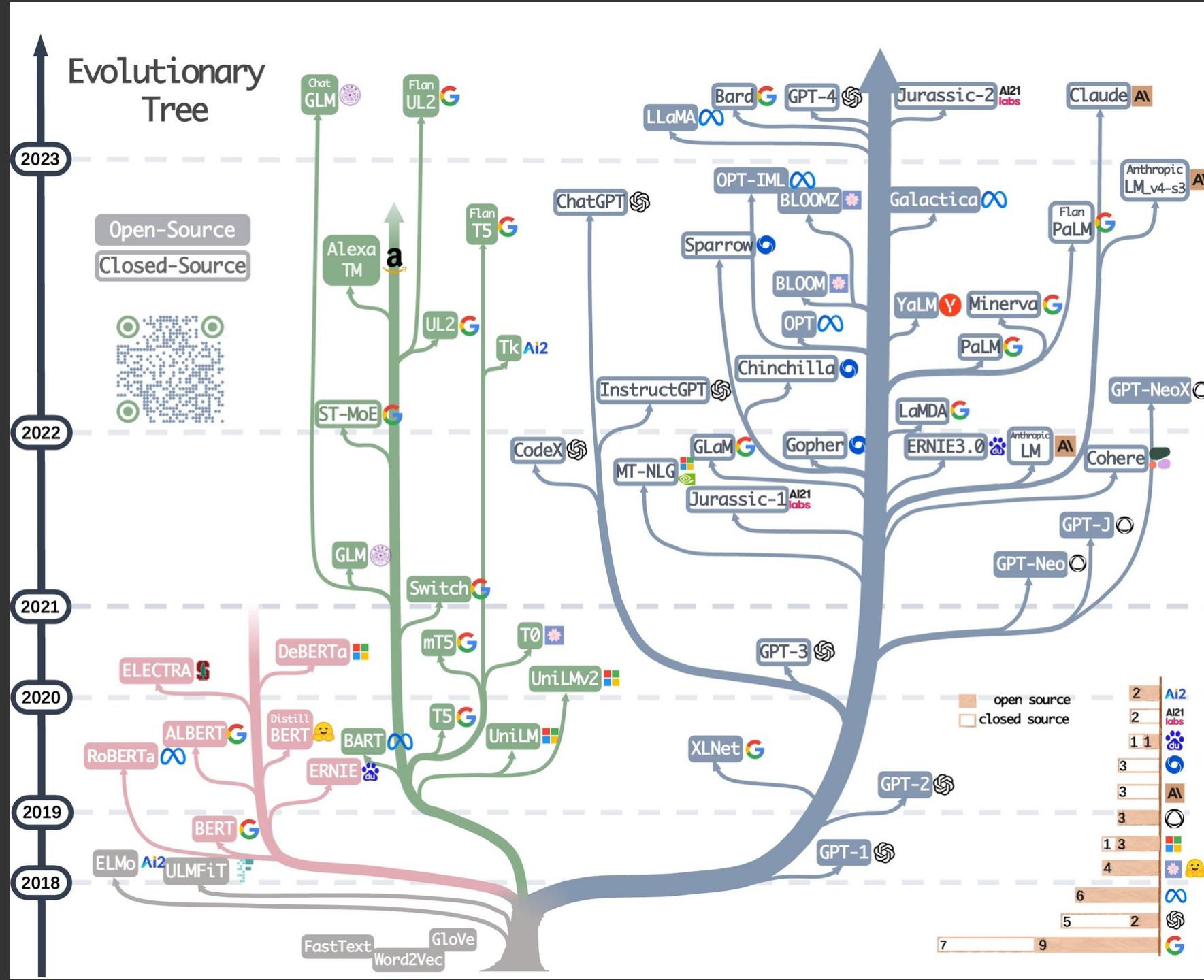
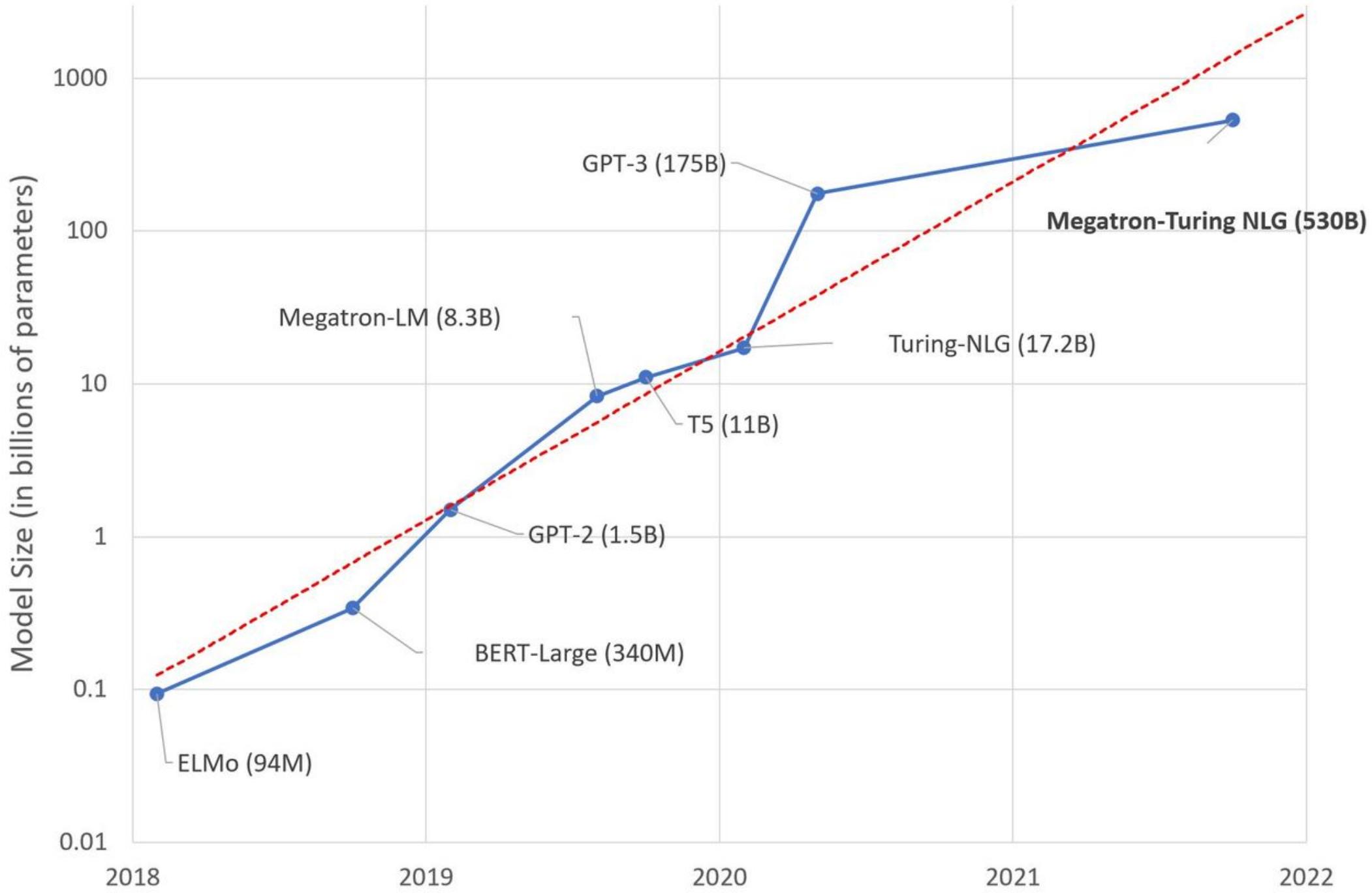


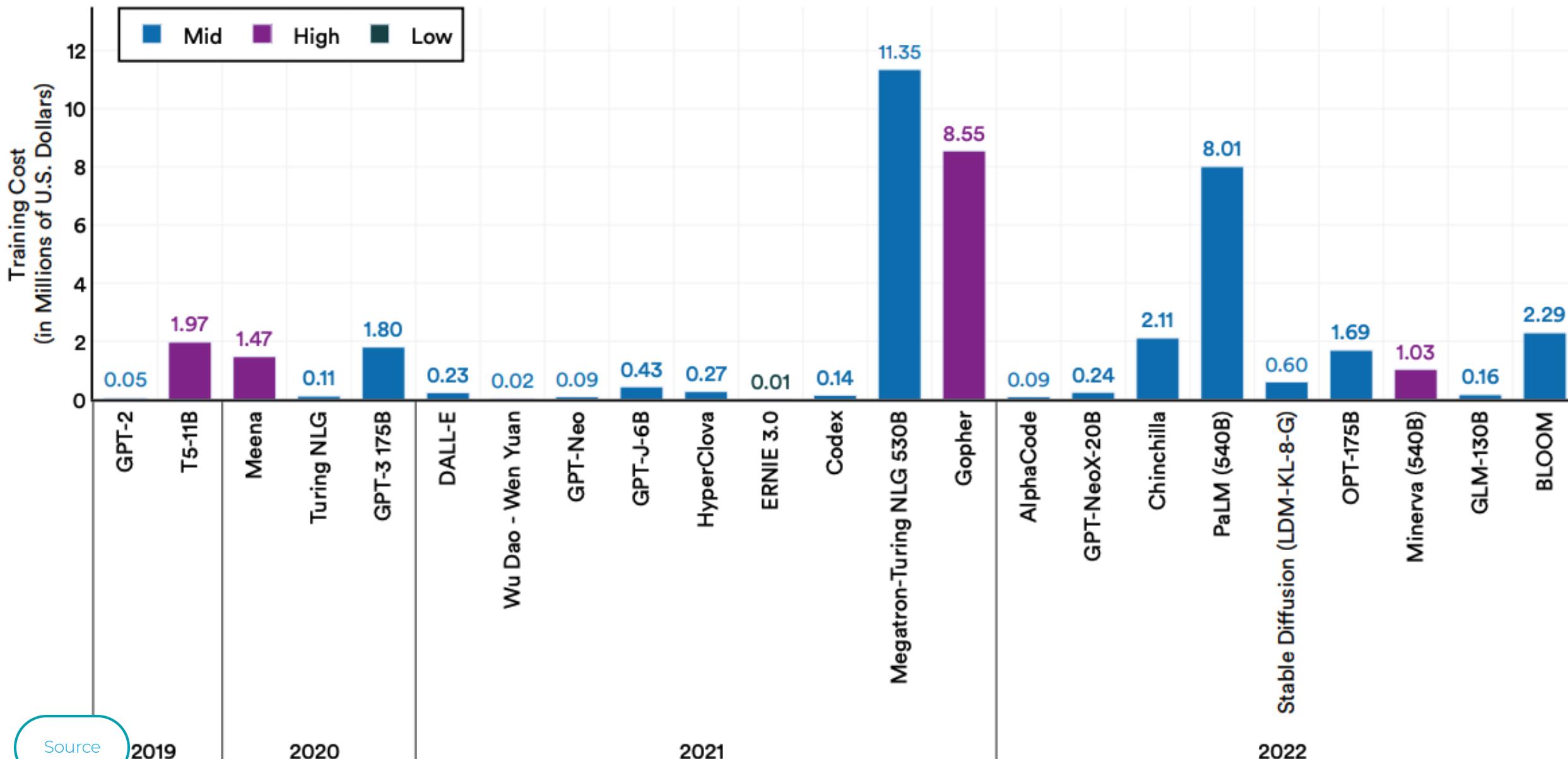
Figure 1: The Transformer - model architecture.





Estimated Training Cost of Select Large Language and Multimodal Models

Source: AI Index, 2022 | Chart: 2023 AI Index Report



Source

2019

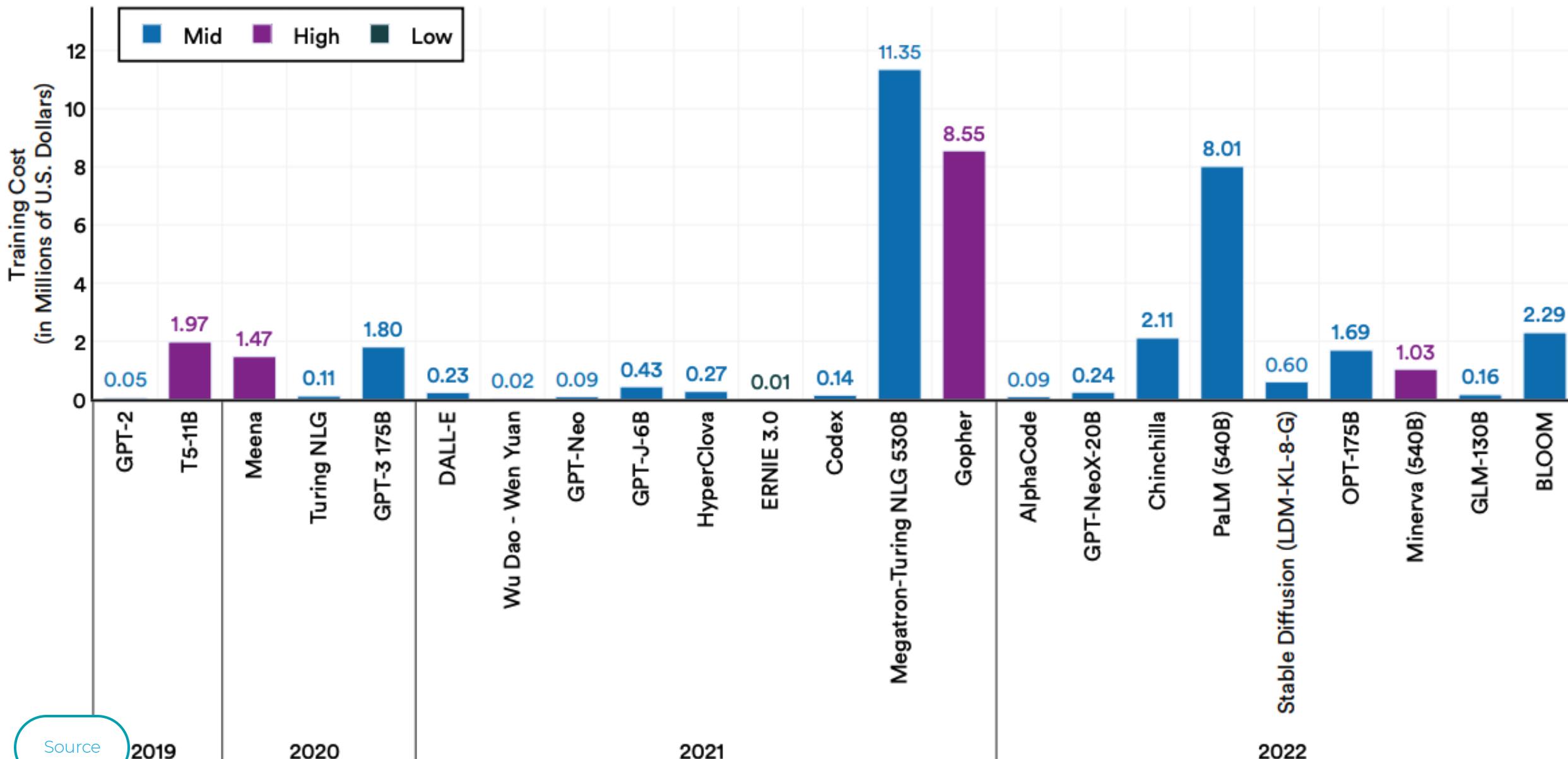
2020

2021

2022

Estimated Training Cost of Select Large Language and Multimodal Models

Source: AI Index, 2022 | Chart: 2023 AI Index Report



Source

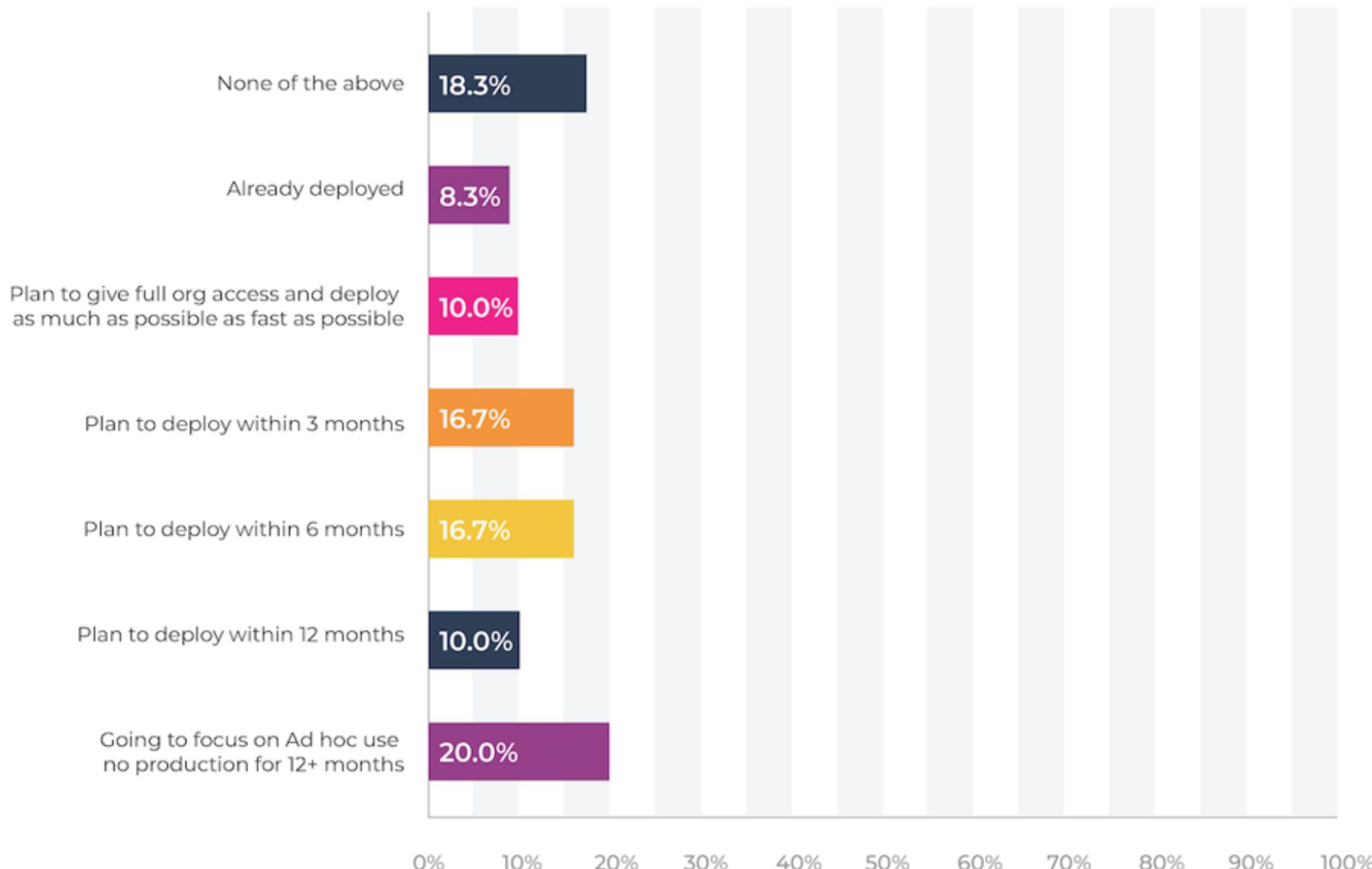
2019

2020

2021

2022

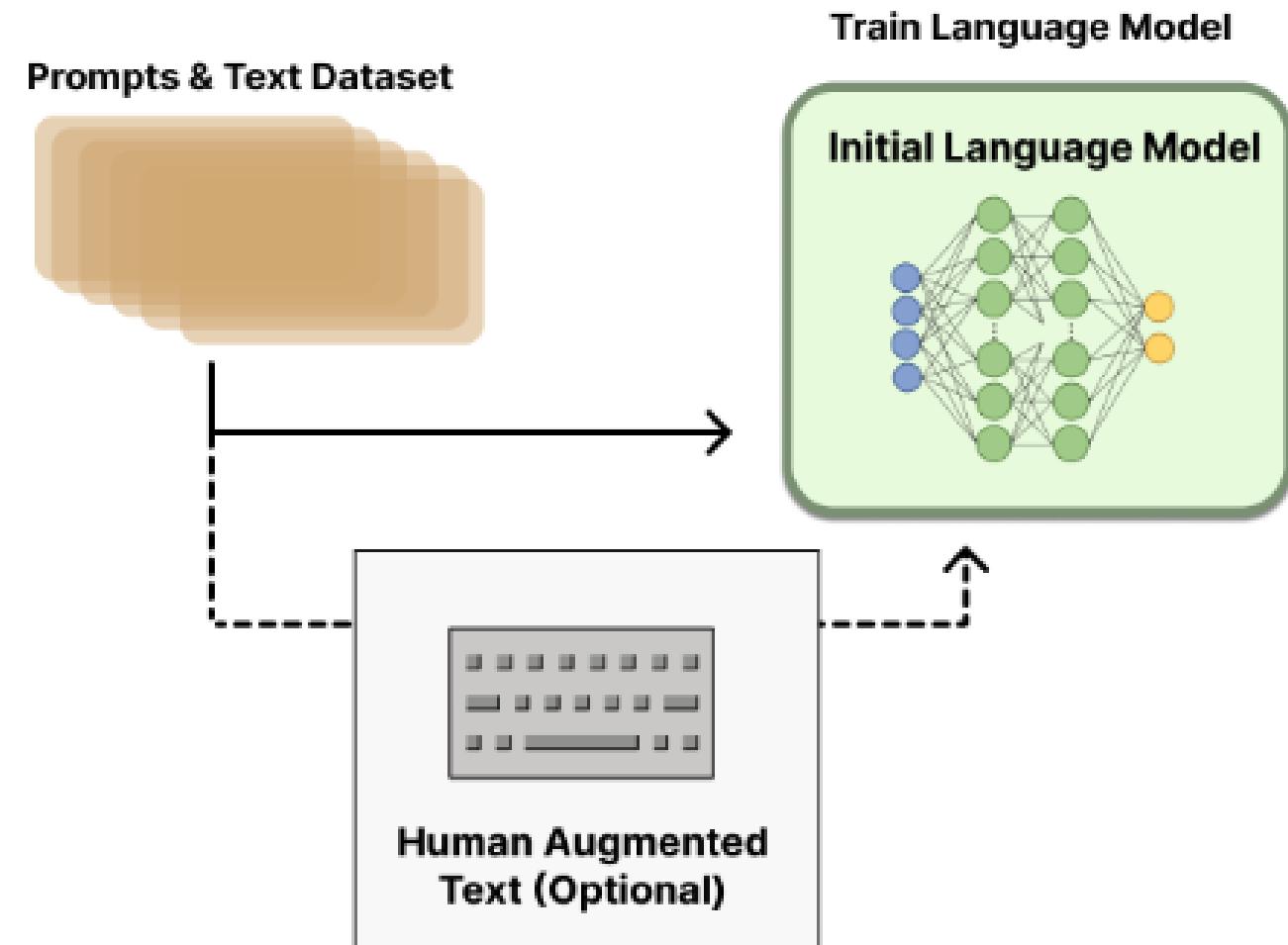
WHAT ARE YOUR PRODUCTION DEPLOYMENT PLANS FOR NEXT
12 MONTHS WITH REGARD TO LARGE LANGUAGE MODELS (LLMS)
LIKE OPENAI'S GPT-4?



Reinforcement Learning from Human Feedback

1: Pre trained LLM

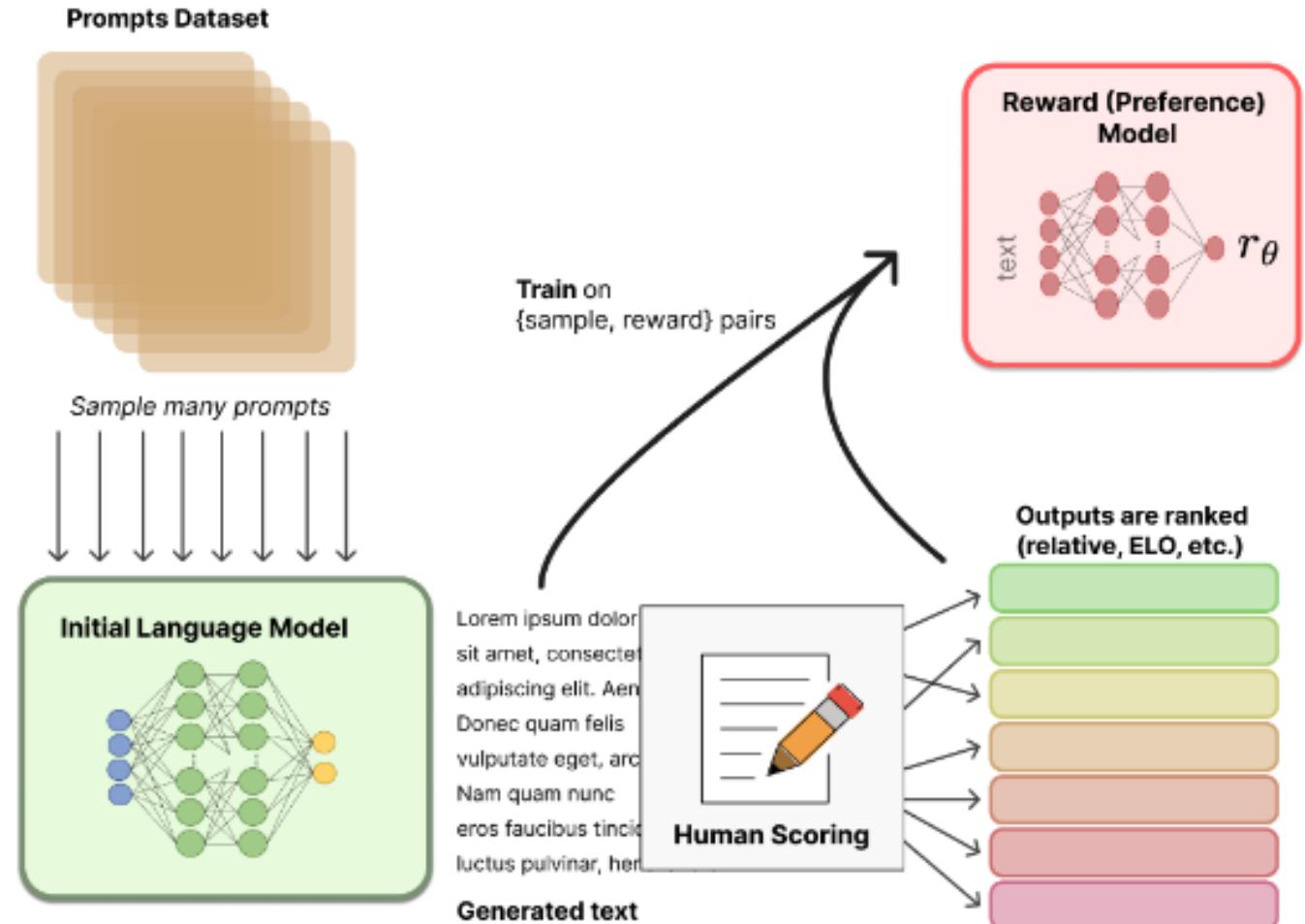
- take pre-trained LLM
- could be any transformer based model like GPT3, Gopher



Reinforcement Learning from Human Feedback

2: Reward Model

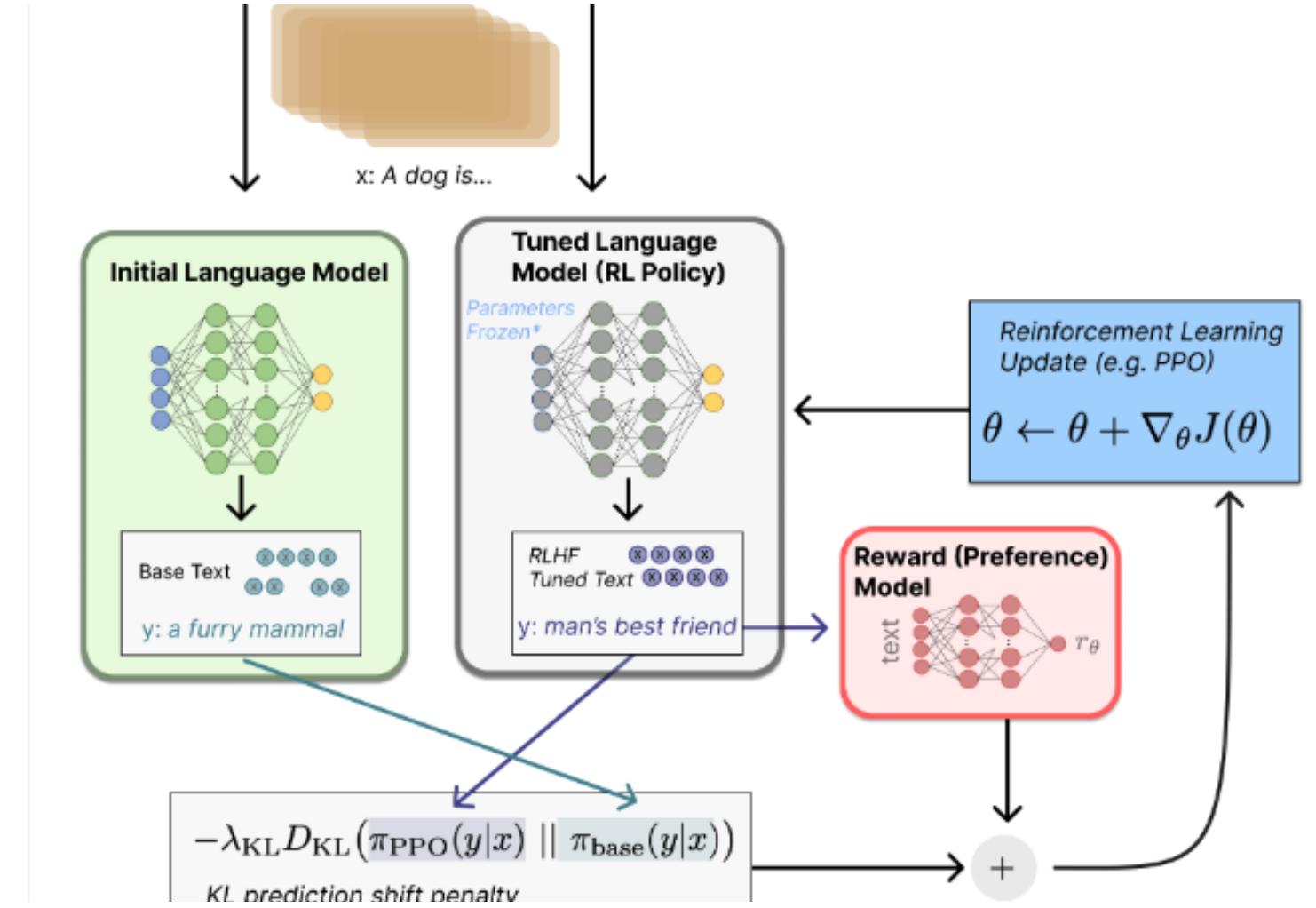
- model output => numeric score
- annotators ranked generated output from multiple models
- Elo system used
- 6B param reward model



Reinforcement Learning from Human Feedback

3: Fine tuning w/RL

- Proximal Policy Optimization (PPO)
- fine tune using reward model



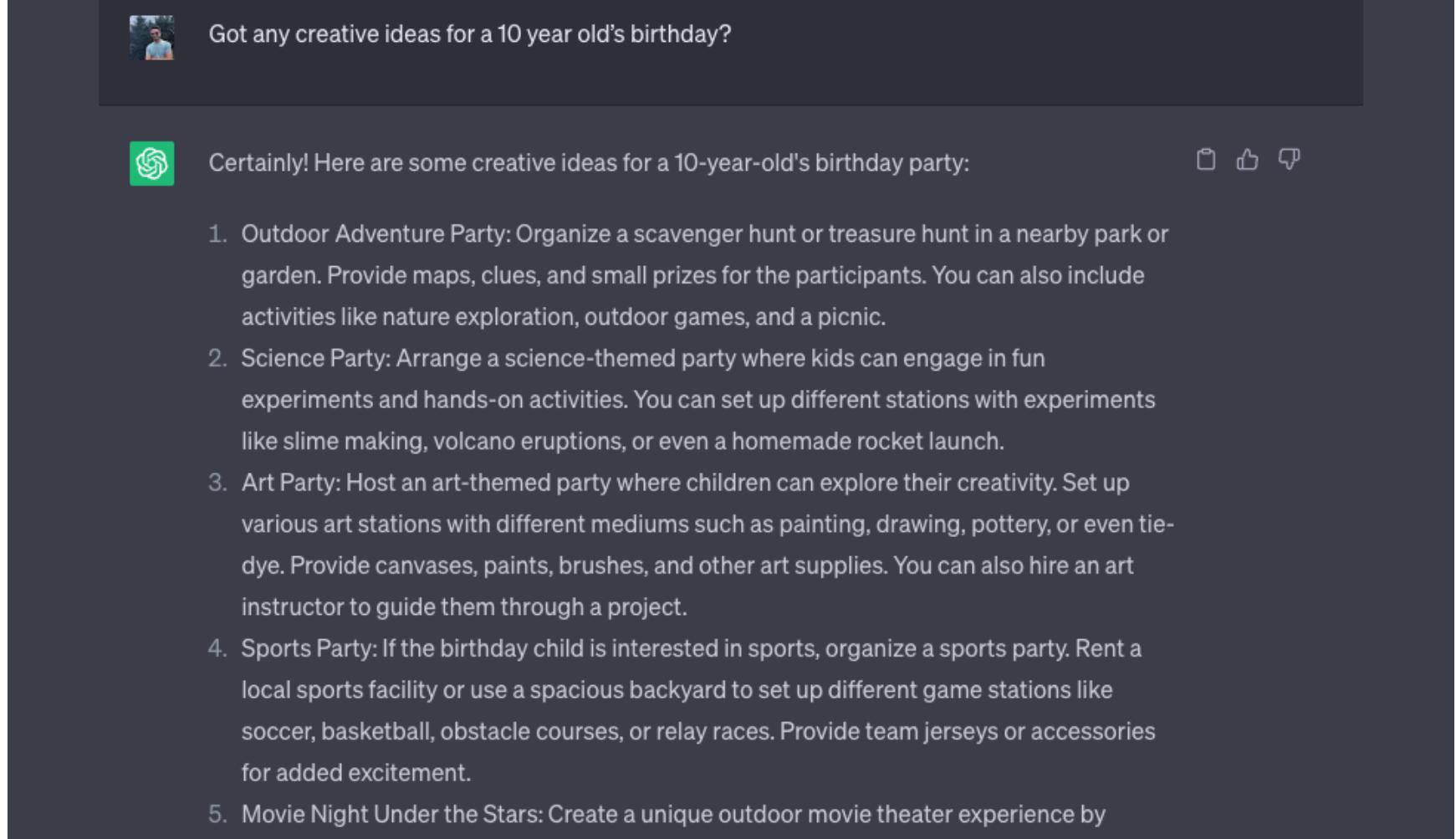
Section 1

Prompt Engineering Basics

Interfaces: ChatGPT or GPT Playground

ChatGPT UI

- Free version available
- \$20/mo premium
- GPT4 model default



Got any creative ideas for a 10 year old's birthday?

Certainly! Here are some creative ideas for a 10-year-old's birthday party:

1. Outdoor Adventure Party: Organize a scavenger hunt or treasure hunt in a nearby park or garden. Provide maps, clues, and small prizes for the participants. You can also include activities like nature exploration, outdoor games, and a picnic.
2. Science Party: Arrange a science-themed party where kids can engage in fun experiments and hands-on activities. You can set up different stations with experiments like slime making, volcano eruptions, or even a homemade rocket launch.
3. Art Party: Host an art-themed party where children can explore their creativity. Set up various art stations with different mediums such as painting, drawing, pottery, or even tie-dye. Provide canvases, paints, brushes, and other art supplies. You can also hire an art instructor to guide them through a project.
4. Sports Party: If the birthday child is interested in sports, organize a sports party. Rent a local sports facility or use a spacious backyard to set up different game stations like soccer, basketball, obstacle courses, or relay races. Provide team jerseys or accessories for added excitement.
5. Movie Night Under the Stars: Create a unique outdoor movie theater experience by

Interfaces: ChatGPT or GPT Playground

GPT Playground

- pay per use
- select 3.5/4 model
- API access
- tune parameters

The screenshot shows the GPT Playground interface. On the left, a sidebar displays the text "You are a helpful assistant." under the heading "SYSTEM". In the main area, a user message "Got any creative ideas for a 10 year old's birthday?" is followed by an assistant response: "Here are some creative ideas for a 10-year-old's birthday:" and a numbered list of 7 ideas. To the right, a vertical bar contains various configuration settings: Mode (Chat Beta), Model (gpt-3.5-turbo), Temperature (1), Maximum length (256), Top P (1), Frequency penalty (0), and Presence penalty (0).

SYSTEM

You are a helpful assistant.

USER

Got any creative ideas for a 10 year old's birthday?

ASSISTANT

Here are some creative ideas for a 10-year-old's birthday:

1. Themed Party: Choose a theme based on your kid's interests such as Harry Potter, superheroes, Disney characters or a favorite TV show.
2. Scavenger Hunt: Plan a scavenger hunt around the house or in the park and have the kids hunt for clues to find a special treasure or prize.
3. Movie Night: Host a movie night with a fun popcorn bar and decorate with a movie theme.
4. DIY Craft Party: Set up a craft table and let the kids make their own party favors or decorate their own cupcakes or cookies.
5. Outdoor Adventure: Plan an outdoor adventure such as a camping trip, hiking, or a nature scavenger hunt.
6. Karaoke Party: Set up a karaoke machine and let the kids sing their favorite songs.
7. Virtual Party: Host a virtual party with online games, a

Mode Chat Beta

Model gpt-3.5-turbo

Temperature 1

Maximum length 256

Top P 1

Frequency penalty 0

Presence penalty 0

Clarity + Specification: keys to good prompts!

simple
prompt gives
generic
results

Share 5 creative ideas for a 10 year old's birthday.

-
- TANT
1. DIY Pizza Party: Set up a station with pre-made dough, sauces, and toppings, and let the kids create their own pizzas. This is a fun way to let them experiment with different flavors and get creative with their food.
 2. Treasure Hunt: Create a scavenger hunt that takes the kids through the house or backyard, with clues and riddles to solve along the way. The final prize can be something like a personalized trophy or a piñata filled with candy.
 3. Movie Night: Set up a projector in the backyard or in a room with a large screen, and have a movie night with snacks and drinks. This is a great way to host a party that's low-key and laid back, but still tons of fun.
 4. Art Party: Set up a paint station, drawing station, and craft station, and let kids get creative with materials. They can draw on t-shirts, paint canvases, or make their own jewelry. This is a great way to let them express themselves and take home a personalized piece of art.
 5. Science Experiments: Set up a science lab with experiments like making slime, lava lamps, and volcanoes. Kids will learn about chemistry and physics while having fun and getting their hands dirty. This is a great way to engage their curious minds and keep them entertained for hours.

Clarity + Specification: keys to good prompts!

adding
gender and
likes =>
tailored
suggestions

Share 5 creative ideas for a 10 year old's birthday.

my son is a fan of star wars and marvel universe.

TANT

1. Superhero/Star Wars Escape Room: Host an escape room party with a superhero/Star Wars theme. Set-up exciting puzzles, challenges and obstacles throughout the house or yard that the kids have to solve to escape from the room. For instance, they could have to figure out a way to avoid laser beams to rescue a lost superhero or recover stolen Infinity Stones from the enemy base.
2. Marvel Movie Marathon: Create a cinema-style experience at home by setting up a cozy area in the living room for kids to watch their favourite Marvel cinematic universe movies. You could make popcorn and other snacks, create themed decorations or even encourage the kids to dress up as their favourite superheroes. Make the viewing experience even more exciting with a trivia game or a bingo card with hidden phrases from the movie.
3. Superhero Training Academy: Take the party outdoors and organise a superhero training academy. Create an obstacle course around your backyard, complete with training equipment like agility cones, balance beams and hurdles. Have the kids wear some superhero-themed gear and run some fun drills like running, jumping, and balancing. You could even get some capes as souvenirs for the kids.
4. Marvel/Star Wars Treasure Hunt: Who doesn't love a treasure hunt? Create a scavenger hunt around

Clarity + Specification: keys to good prompts!

adding
organizer's
preferences
hits it home

USER	Share 5 creative ideas for a 10 year old's birthday.
	my son is a fan of star wars and marvel universe. i live in a two bedroom apartment in new york city and want to have the celebration in my apartmemt. five of his friends are coming. share an estimate of how much each idea will cost.
ASSISTANT	<ol style="list-style-type: none">1. "Galactic Adventure" Party: Transform your apartment into a space station with a Star Wars-inspired scavenger hunt, laser tag game, and DIY light saber activities. You can purchase a Star Wars party supply kit and light saber kits online for around \$50-100. Total estimated cost: \$100-\$200.2. Marvel Superhero Training Camp: Host a superhero-themed party with fun games and activities like building a superhero mask, creating a shield, and participating in an obstacle course. You can purchase a Marvel-themed party supply kit online for around \$50-75. Total estimated cost: \$75-\$150.3. DIY Pizza Party: Let your son and his friends make their own pizzas with a variety of toppings and sauces, followed by a fun dessert-making activity like decorating cupcakes. You can purchase pre-made pizza crusts and toppings at a local grocery store for around \$30-50. Total estimated cost: \$50-\$100.4. Movie Night Marathon: Set up a mini movie theater at home and let your son and his friends watch their favorite superhero or Star Wars movies. Serve popcorn, soda, and other movie snacks. You can rent or stream movies online for around \$5-\$20 each. Total estimated cost: \$30-\$100.

Code Generation using LLMs

Case study: Data Science Salaries

Code



Information Extraction using LLMs

Case study: JioMart Catalog Parsing

Code

The screenshot shows the English Wikipedia homepage. The title 'Wikipedia' is at the top, followed by a sub-headline 'From Wikipedia, the free encyclopedia'. Below this is a paragraph about the article's purpose as an online encyclopedia. A large image of the Wikipedia logo (a globe composed of puzzle pieces) is centered. To the right, there is a sidebar with various statistics and links, including 'Screenshot', 'Type of site: Online encyclopedia', 'Available in: 303 languages', 'Owner: Wikimedia Foundation', 'Created by: Jimmy Wales, Larry Sanger', 'Website: www.wikipedia.org', 'Alexa rank: 5 (Global, June 2019)', 'Commercial: No', 'Registration: Optional', and 'Users: >282,227 active users (notable), and >83,706,533 registered users'.



Text Summarization using LLMs

Case study: Delta Air Lines Twitter Support

Code

A photograph showing a person's arm and hand raised, palm facing forward, silhouetted against a bright, overexposed background. The background is filled with blurred, colorful lights in shades of green, blue, and purple, suggesting a concert or a night event.

Query Generation using LLMs

Case study: Google Analytics

Code



Learning Resources

Notes



GitHub

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