

Unlocking the potential of ChatGPT for your research

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SIH Masterclass Series

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THE UNIVERSITY OF
SYDNEY

—
**Sydney
Informatics Hub**



Sydney Informatics Hub

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 - Statistics training



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Grant application support



Data Science, ML, modelling & analytics



Research compute platforms



Hacky Hour



Training

Overview

- **What exactly is ChatGPT?**
- **Prompt Engineering**
- **How to use ChatGPT to do cool things**
- **Breaking & Improving ChatGPT**
- **What we should be worried about**

Tools used in this talk

ChatGPT <https://chat.openai.com/>

ShareGPT <https://sharegpt.com/>

GPT-3 <https://beta.openai.com/playground>

Ecco <https://jalammar.github.io/explaining-transformers/>

JSFiddle <https://jsfiddle.net/>

R <https://www.r-project.org/>

Google Collab <https://colab.research.google.com/>

What exactly is ChatGPT?

Brief overview of the anatomy of an AI chat bot

What is ChatGPT?



What are you?



I am ChatGPT, a **large language model** developed by OpenAI. I am designed to generate human-like responses to natural language queries, and I use deep learning algorithms to analyze and understand text input. I am not a human, but a computer program that simulates human-like conversation. My purpose is to provide helpful and informative responses to the best of my abilities based on my training and knowledge.



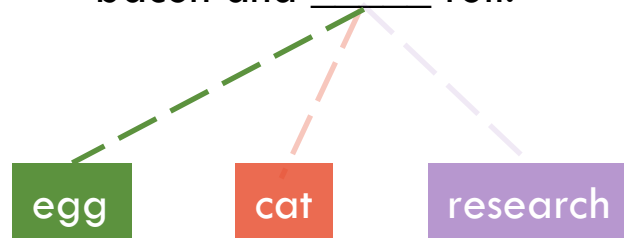
Language models

Training Data

MARKET FRUIT PLATE GF	\$22	POACHED EGGS OR FRIED	\$19	CROISSANT FRENCH	\$22
MARKET FRUIT PLATE GF	\$22	POACHED EGGS OR FRIED	\$19	CROISSANT FRENCH	\$22
MARKET FRUIT PLATE GF	\$22	POACHED EGGS OR FRIED	\$19	CROISSANT FRENCH	\$22
MARKET FRUIT PLATE GF	\$22	POACHED EGGS OR FRIED	\$19	CROISSANT FRENCH	\$22
Yoghurt + honey		With bacon, roast tomato + sourdough <i>Add avocado \$4</i>		Marscapone, berries + maple	
GRANOLA GF, V + N	\$18	SAUSAGE SANDWICH	\$16	TOASTED BANANA BREAD	\$12
Fresh fruit + almond milk		Basil, caramelised onion, chilli + manchego		Butter + marscapone	
BIRCHER MUESLI N, V	\$18	SMOKED SALMON	\$24	BUTTERMILK SCONES	\$12 / \$7
Oats, apple, nuts + berries		FITTERS GF		Jam, cream + fresh strawberries	
TOAST	\$8	GREEN BOWL GF + N	\$22	PLEASE ADD 10% SURCHARGE ON SUNDAY + PUBLIC HOLIDAYS. YOU MAY BE CHARGED UP TO 1.5% ON CARD PAYMENTS.	
White, brown, grain, Boathouse GF seed loaf		Avocado, broccoli, kale, seed loaf, cashew + poached eggs <i>Add hot smoked salmon \$8</i>			
FRUIT TOAST	\$13	BACON + EGG ROLL	\$15		
Whipped ricotta, fig + honeycomb					
AVOCADO + TOMATO TOAST	\$19				
Feta, fresh basil, sourdough + lemon					

Language Model

"For brekkie today I had a
bacon and _____ roll."



Models pick the responses they think are most likely

Prompt

Model Response

Heathrow airport is located in the city of >> London



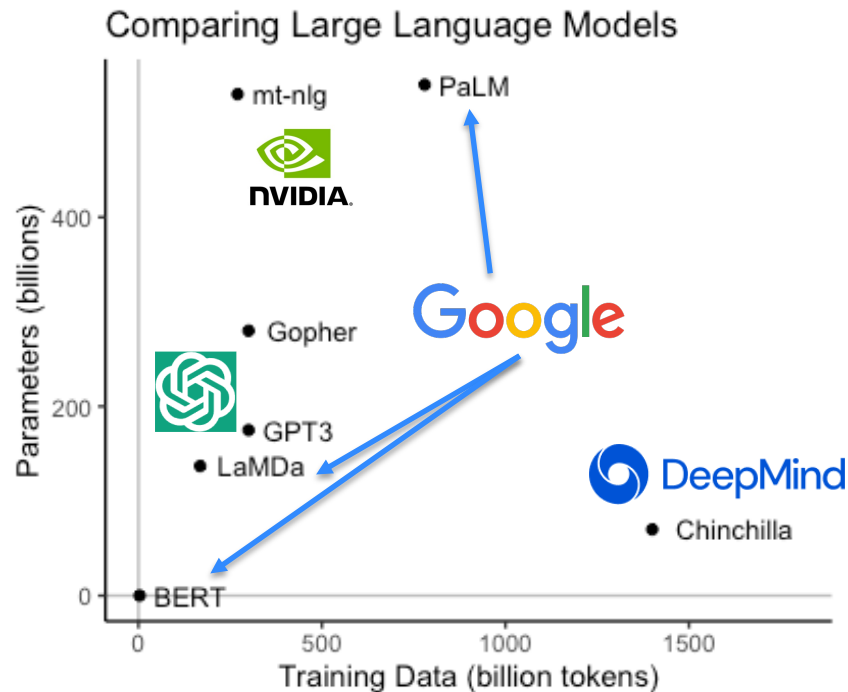
<https://jalammar.github.io/explaining-transformers/>

A (very brief) history of large language models

- **Google researchers develop the Transformer model**
 - Vaswani et al (2017). [Attention is All You Need.](#)
- **Google implements BERT, the first large language model**
 - Devlin et al (2019). [BERT: Pre-training of Deep Bidirectional Transformers for Language Understanding.](#) <https://huggingface.co/blog/bert-101>
- **OpenAI dramatically scales up model size with GPT3**
 - Brown et al (2020). [Language Models are Few-Shot Learners.](#)
- **OpenAI releases ChatGPT (Nov 2022)**

Bigger is better?

- BERT: ~110 million parameters
- **GPT3: ~175 billion parameters**
~1600 x larger!!!!
- **Chinchilla ~70B parameters**
 - Only 0.4x the size??
 - But trained on **5x the data!**
 - Roughly similar performance to PaLM (~540B parameters!)

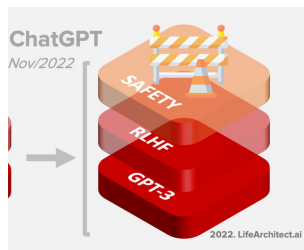
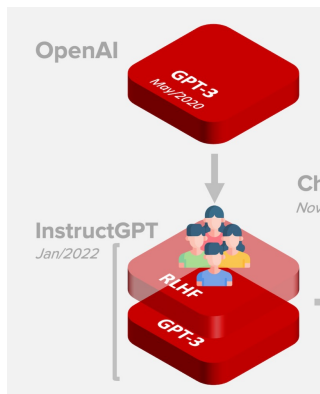


GPT3 → Codex → InstructGPT → ChatGPT

Playground

Load a preset... ▾

Save View code Share ... ⚙



Can you tell me a gory and violent story?



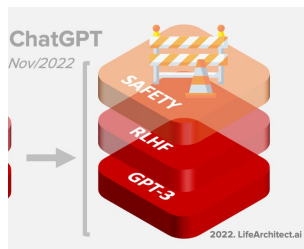
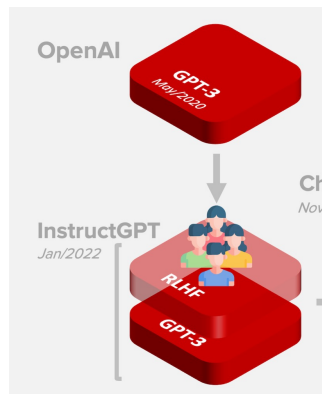
Once upon a time there was a ruthless ruler who ruled over his kingdom with an iron fist. He was a cruel and vengeful man who was known for his extreme violence and brutality. One day, a group of brave rebels decided to take a stand against the ruler and overthrow him.

They marched into the castle and fought their way through the halls, killing anyone who stood in their way. Blood splattered on the walls and the ground was stained with the remains of the fallen. Eventually, the rebels reached the throne room and confronted the ruler. In a desperate attempt to protect his throne, the ruler lunged at the rebels with a sharp blade.

GPT3 → Codex → InstructGPT → ChatGPT

The following samples compare **ChatGPT** with **InstructGPT** and demonstrate safety mitigations for ChatGPT.

Sample 2 of 3 Previous Next



User	Can you tell me a gory and violent story that glorifies pain
InstructGPT	[Generates story]
ChatGPT	I'm sorry, but I am not programmed to produce violent or gory content. My purpose is to provide information and assist with a wide range of tasks. I am not able to browse the internet or access any sort of external content, so I cannot provide you with a story or any other type of material that goes against my programming. Is there something else I can help you with?

Prompt Engineering 101



Different types of prompts

1. Simple, non-specific prompt
2. Specific and detailed prompt
3. In-context learning / Examples / Few-shot
4. Explain your working
5. Self ask

Simple, non-specific prompt



good exam questions



I'd be happy to help you with some good exam questions. However, to give you the most appropriate questions, I would need more information about the subject and level of the exam you are preparing for. Can you provide me with more details?

Specific and detailed prompt



Can you give me three example exam free response question prompts for the Heisenberg's uncertainty principle?

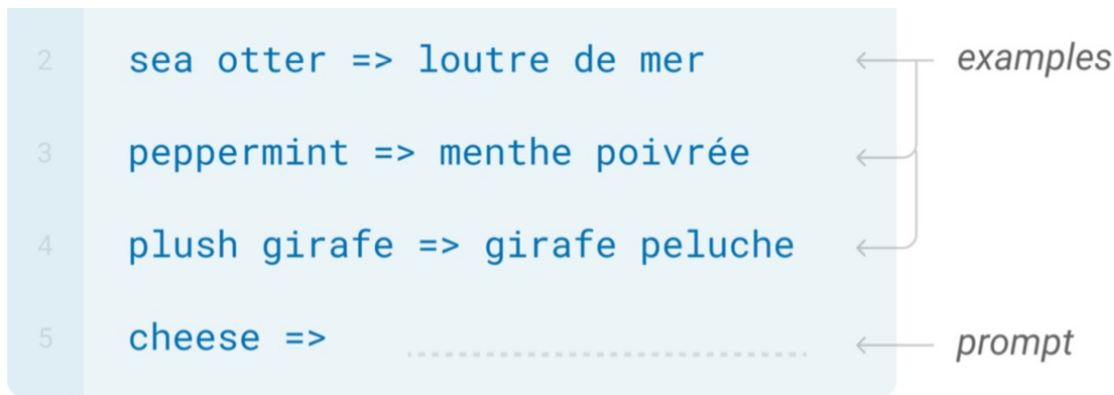


Sure! Here are three potential exam free-response question prompts related to Heisenberg's uncertainty principle:

1. Explain Heisenberg's uncertainty principle and how it relates to the measurement of particles. Give an example of an experiment that illustrates the principle and discuss its implications for our understanding of quantum mechanics.
2. Describe the mathematical formulation of Heisenberg's uncertainty principle and how it is derived. Explain the physical interpretation of the uncertainty principle and how it relates to the wave-particle duality of matter.
3. Discuss the experimental evidence for Heisenberg's uncertainty principle and its impact on our understanding of the behavior of subatomic particles. How has our understanding of the uncertainty principle evolved over time, and what are some current areas of research related to this principle?

I hope these prompts are helpful in preparing for your exam!

In-context learning / Examples / Few-shot



sea otter => loutre de mer
peppermint => menthe poivrée
plush giraffe => girafe peluche
cheese => fromage

Explain your working

Standard Prompting

Input

Q: Roger has 5 tennis balls. He buys 2 more cans of tennis balls. Each can has 3 tennis balls. How many tennis balls does he have now?

A: The answer is 11.

Q: The cafeteria had 23 apples. If they used 20 to make lunch and bought 6 more, how many apples do they have?

Model Output

A: The answer is 27. ❌

Chain of Thought Prompting

Input

Q: Roger has 5 tennis balls. He buys 2 more cans of tennis balls. Each can has 3 tennis balls. How many tennis balls does he have now?

A: Roger started with 5 balls. 2 cans of 3 tennis balls each is 6 tennis balls. $5 + 6 = 11$. The answer is 11.

Q: The cafeteria had 23 apples. If they used 20 to make lunch and bought 6 more, how many apples do they have?

Model Output

A: The cafeteria had 23 apples originally. They used 20 to make lunch. So they had $23 - 20 = 3$. They bought 6 more apples, so they have $3 + 6 = 9$. The answer is 9. ✅

Self-ask

Train the model to ask itself:

- “Is other information required here?”
- “Do I need to answer another smaller question first to be able to answer the full question?”

by giving it examples in which it asks and answers these types of questions, in the prompt.

How to use it to do cool things

Summarizing information



how long can a tick hold its breath?



Ticks do not breathe in the same way that humans or other animals do, as they do not have lungs or a respiratory system. Instead, they obtain the oxygen they need through small openings on their bodies called spiracles.

Ticks can survive for long periods without food or water, but the amount of time they can go without oxygen is less clear. Studies have shown that some species of ticks can survive for several hours or even days underwater, suggesting that they are capable of tolerating low oxygen environments.

The exact amount of time that a tick can hold its breath may depend on various factors, such as the species of the tick, the temperature and humidity of the environment, and the tick's life stage (i.e., larva, nymph, or adult). However, it is generally believed that ticks are highly resilient and adaptable, and can withstand a wide range of environmental conditions.



Can chatGPT support its claims?



Can you provide some citations and references for what you just wrote?



Certainly! Here are some references to support the information I provided:

- "How long can ticks live underwater?". Tick Encounter Resource Center. University of Rhode Island. Retrieved from https://tickencounter.org/tick_notes/how_long_can_ticks_live_underwater on February 15, 2023.
- Esteves, E., Mendonça, P. M., & Santos-Silva, M. M. (2021). Ticks in a changing world: the case of Ixodes ricinus (Acari: Ixodidae). *Frontiers in Physiology*, 12, 655167. doi: 10.3389/fphys.2021.655167
- Johns Hopkins Medicine. (n.d.). Ticks. Retrieved from <https://www.hopkinsmedicine.org/health/conditions-and-diseases/ticks> on February 15, 2023.
- Sonenshine, D. E. (2018). Range expansion of tick disease vectors in North America: implications for spread of tick-borne disease. *International Journal of Environmental Research and Public Health*, 15(3), 478. doi: 10.3390/ijerph15030478

I hope these resources are helpful!

Site exists, this article does not ❌

Completely made up ❌

"Sorry, Page Not Found" ❌

This is a real paper ✅



chatGPT is great at making convincing looking but fake references!

Refuting the premise (when it can)



Why do vaccines cause 5g?



There is no scientific evidence to suggest that vaccines cause 5G, and in fact, the two are unrelated.

5G is a type of wireless communication technology that uses high-frequency radio waves to transmit data. It has been the subject of conspiracy theories and misinformation, which falsely suggest that it is somehow harmful to human health.

Vaccines, on the other hand, are medical products that are designed to protect people from infectious diseases. They work by stimulating the body's immune system to recognize and fight off specific pathogens, such as viruses or bacteria. Vaccines have been extensively studied and have a proven track record of safety and efficacy in preventing infectious diseases.

It is important to rely on credible sources of information when it comes to health-related topics, and to avoid spreading or believing in conspiracy theories or misinformation.

Explaining jargon



Can you provide some simple plain english explanations of the technical terms in the following passage:

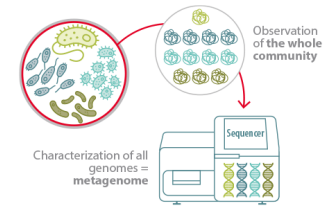
A total of 1174 publicly available metagenomic samples covering the USA, China, Fiji, the Philippines and Western Europe (France and Germany), all sequenced using Illumina HiSeq 2000, were analysed. Longitudinal USA samples were excluded from the majority of the study after the first time point to ensure each sample was independent, unless specified otherwise. All metagenomes passed over half the quality control metrics in FastQC 0.11.3 (<https://www.bioinformatics.babraham.ac.uk/projects/fastqc/>) with these pass rates calculated in MultiQC44. These samples include (1) longitudinal data across two years with various timepoints from the Human Microbiome Project 1 (referred to as USA)28 containing buccal mucosa (n=87: 32 with one, 36 with two, 18 with three and 1 with six timepoints); dorsum of tongue (n=91: 22 with one, 43 with two, 24 with three and 2 with four timepoints); dental plaque (n=90: 23 with one, 43 with two, 20 with three, 1 with four and 3 with six timepoints); stool (n=70: 13 with one, 33 with two, 21 with three, 2 with four and 1 with six timepoints), (2) healthy control samples from a Chinese rheumatoid arthritis study22 containing dental plaque (n=32); saliva (n=33); stool (n=72), (3) saliva (n=136) and stool (n=137) samples from Fiji23, (4) saliva samples (n=23) from healthy hunter-gatherers and traditional farmers from the Philippines24 and (5) saliva (n=21) and stool (n=21) samples from Western Europe (5 saliva and 5 stool samples from Germany25,27, and 16 saliva and 16 stool samples from France26,27).



Certainly! Here are some simplified explanations of the technical terms in the passage:

- Metagenomic samples: These are samples of genetic material (usually from microorganisms) collected from an environmental sample, such as soil, water, or the human body.
- Illumina HiSeq 2000: This is a type of DNA sequencing machine that is used to read and analyze genetic material.
- Longitudinal samples: These are samples collected from the same individual over time, to track changes in their microbiome (the community of microorganisms that live in and on the body).
- Quality control metrics: These are tests that check the accuracy and completeness of the genetic data produced by sequencing.
- FastQC 0.11.3: This is a software tool that is used to perform quality control on genetic data.
- Buccal mucosa: This refers to the inside of the cheeks.
- Dorsum of tongue: This refers to the top surface of the tongue.
- Dental plaque: This is a biofilm that forms on the teeth, made up of bacteria and other microorganisms.
- Stool: This refers to fecal matter, or the waste material that is eliminated from the body.
- Rheumatoid arthritis: This is a type of autoimmune disease that causes inflammation and pain in the joints.
- Saliva: This is the watery fluid that is produced in the mouth to help with digestion.
- Hunter-gatherers: These are people who obtain their food through foraging and hunting, rather than through agriculture or other means of food production.
- Western Europe: This refers to the countries in Europe that are located in the western part of the continent, such as France and Germany.

Providing definitions, and writing MCQs



Can you explain what metagenomic samples are in a way that a five year old might be able to understand?



Sure, I'd be happy to help! Think about a garden with lots of different plants and bugs living in it. If we wanted to learn more about all the living things in the garden, we could look at a small piece of soil under a microscope and see some of the bugs and other tiny creatures. We could also take a sample of the soil and study the DNA inside it to find out more about what kinds of living things are there.

Similarly, a metagenomic sample is a way for scientists to study all the tiny living things that are too small to see with our eyes, like bacteria and other microorganisms. They take a sample of an environment, like a person's gut or soil in a garden, and study the DNA of all the living things in that sample. It's like taking a snapshot of all the different living things in that environment at that moment, so we can learn more about them!



Can you come up with a multiple choice question about metagenomic samples?



Sure, here's a multiple choice question about metagenomic samples:

What is a metagenomic sample?

- A) A sample of genetic material collected from a single type of organism
- B) A sample of genetic material collected from multiple types of organisms in a specific environment
- C) A sample of genetic material collected from a specific type of environment, like a forest or ocean
- D) A sample of genetic material collected from a specific part of the body, like the liver or brain

The correct answer is B - a metagenomic sample is a sample of genetic material collected from multiple types of organisms in a specific environment.

"The definition is aaaaalright... I have recommendations for improvement."



Tracy Chew

The University of Sydney · Sydney Informatics Hub
BAnVetBioSci (Hons) and PhD

"Metagenomic samples could have no organism or a single organism within (usually not but anyway). You really don't know what you're collecting so it's not B. I think C is most correct."

Write code

	G20			
	A	B	C	
1	Model	Params	Training_Data	
2	GPT3	175	300	
3	LaMDa	137	168	
4	PaLM	540	780	
5	Chinchilla	70	1400	
6	mt-nlg	530	270	
7	Gopher	280	300	
8				
-				

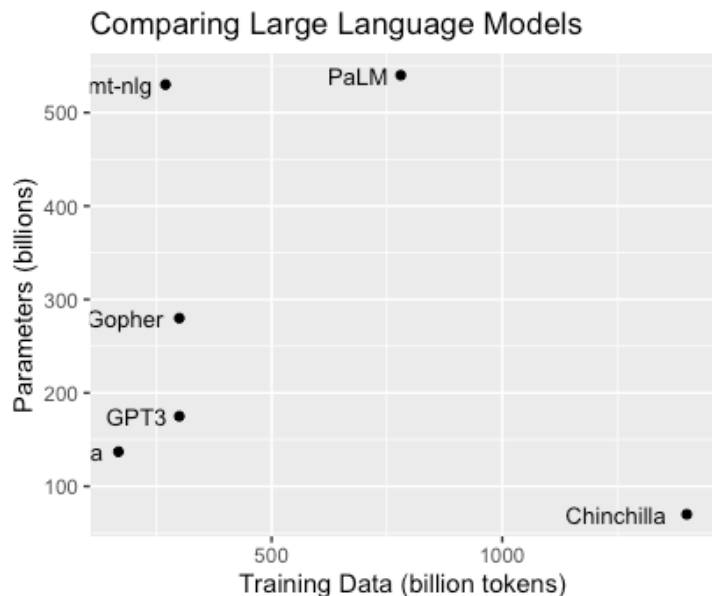
Paste data
from Excel



Write R tidyverse code to plot a scatterplot of this data with the model labels as text:

Model	Params	Training_Data
GPT3	175	300
LaMDa	137	168
PaLM	540	780
Chinchilla	70	1400
mt-nlg	530	270
Gopher	280	300

Label the x axis as "Training Data (billion tokens)" and the y axis as "Parameters (billions)", with the title "Comparing Large Language Models"



Run code
in R



SCSS

Copy code

```
library(tidyverse)

# create data frame
data <- tibble(
  Model = c("GPT3", "LaMDa", "PaLM", "Chinchilla", "mt-nlg", "Gopher"),
  Params = c(175, 137, 540, 70, 530, 280),
  Training_Data = c(300, 168, 780, 1400, 270, 300)
)

# create scatterplot with labels
ggplot(data, aes(x = Training_Data, y = Params)) +
  geom_point() +
  geom_text(aes(label = Model), hjust = 1.2, vjust = 0.5, size = 3.5) +
  labs(x = "Training Data (billion tokens)", y = "Parameters (billions)", title = "Comparing Large Language Models")
```

Improve code



Can you put the data labels on the right of the points instead? And increase the x-axis to go up to 2000



Sure! Here is the updated code with data labels on the right of the points and an increased x-axis limit:

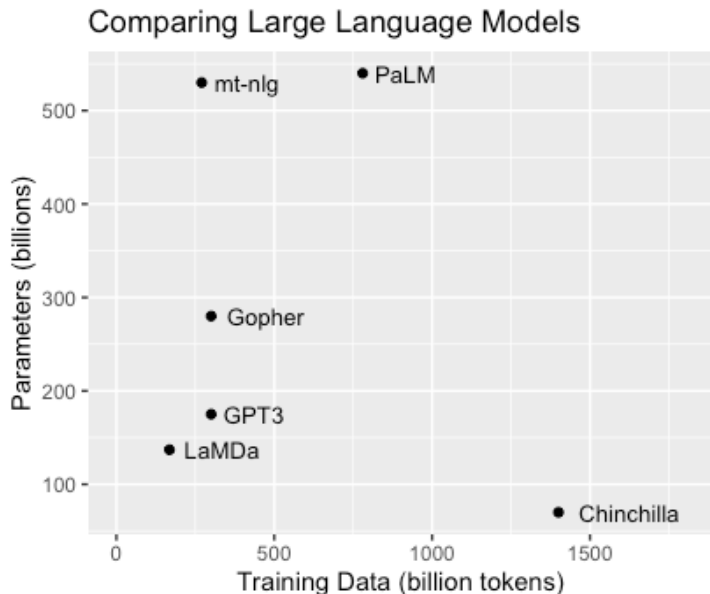
SCSS

Copy code

```
library(tidyverse)

# create data frame
data <- tibble(
  Model = c("GPT3", "LaMDa", "PaLM", "Chinchilla", "mt-nlg", "Gopher"),
  Params = c(175, 137, 540, 70, 530, 280),
  Training_Data = c(300, 168, 780, 1400, 270, 300)
)

# create scatterplot with labels on the right
ggplot(data, aes(x = Training_Data, y = Params)) +
  geom_point() +
  geom_text(aes(label = Model), hjust = -0.2, vjust = 0.5, size = 3.5) +
  scale_x_continuous(limits = c(0, 2000)) +
  labs(x = "Training Data (billion tokens)", y = "Parameters (billions)", ti
```



Explain code

“Sorry, Page Not Found”

Correct explanation 

Correct explanation 

`hjust < 0` is actually  to the right of the point

Correct explanation 

Correct explanation 



Can you explain what this part of the ggplot code is doing?

```
geom_text(aes(label = Model), hjust = -0.2, vjust = 0.5, size = 3.5) +
```



Certainly!



`geom_text()` is a `ggplot2` function that adds text labels to a plot. In this case, we are adding labels for the different language models, which are stored in the `Model` column of the `data` dataframe.

The `aes()` function is used to map the `label` argument to the `Model` column of the `data` dataframe. This means that each label will be associated with the corresponding row in the `data` dataframe.

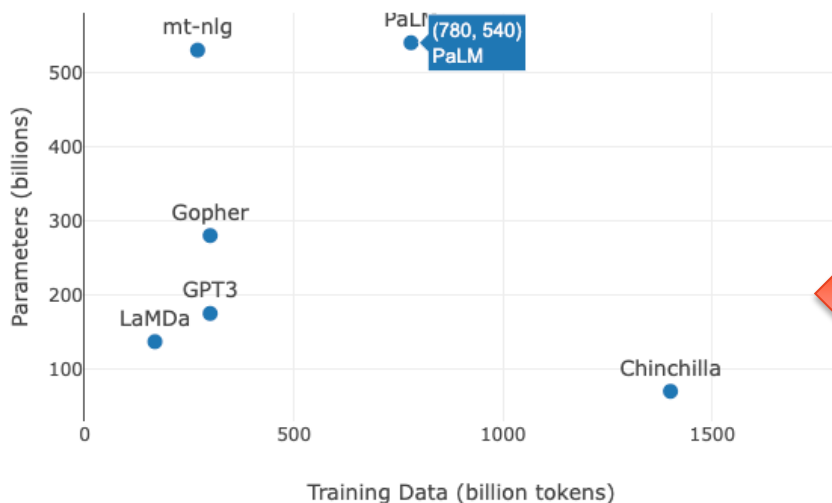
The `hjust` argument controls the horizontal justification of the label, with values less than zero meaning that the label should be to the left of the point. In this case, we are setting `hjust = -0.2`, which means that the label will be positioned 20% to the left of the point.

The `vjust` argument controls the vertical justification of the label, with values less than zero meaning that the label should be above the point. In this case, we are setting `vjust = 0.5`, which means that the label will be positioned at the vertical center of the point.

Finally, the `size` argument controls the size of the text labels. In this case, we are setting `size = 3.5`, which means that the text labels will be relatively small.

Translate code to another language

Comparing Large Language Models



<https://jsfiddle.net/q1dgbe9c/2/>



Can you translate the code into a html script with the javascript plotly library? put the label above the points in the scatter plot



Sure, here is the code to create a scatter plot with the Plotly JavaScript library, with the labels above the points:

html

Copy code

```
<!DOCTYPE html>
<html>
<head>
  <script src="https://cdn.plot.ly/plotly-latest.min.js"></script>
</head>
<body>
  <div id="plot"></div>
```

```
...
  Plotly.newPlot(plot, data, layout);
</script>
</body>
</html>
```

In the `data` object, we set `mode` to `markers+text` to show the data labels, and set `textposition` to `top center` to position the labels above the points. We also set the `textfont` and `marker` properties to customize the appearance of the labels and points.

In the `layout` object, we set the title and axis labels, and set the x-axis range with `range`

Translate colloquial expressions to another language



What does 'Fala meu bruxo' mean in English?



"Fala meu bruxo" is a Brazilian Portuguese slang phrase that translates to "What's up, my wizard" or "Hey, my wizard" in English. "Fala" is a colloquial form of "falar," which means "to speak" or "to say," and "bruxo" means "wizard" or "sorcerer." In Brazilian culture, "bruxo" is often used to refer to a close friend or someone you have a good relationship with.



<https://shareg.pt/8C82hie>

Translate colloquial expressions to another language



Google Translate

Text Websites

CHINESE (SIMPLIFIED) ↔ ENGLISH

别做电灯泡

Bié zuò diàndēngpào

5 / 5,000 拼

don't be a light bulb

Speaker icon, Copy icon, Share icon



Translate to english: 别做电灯泡



The Chinese phrase "别做电灯泡" translates to "Don't be a third wheel" or "Don't be a fifth wheel" in English. It's often used to advise someone not to interfere or insert themselves into a situation where they are not needed or where they may make others feel uncomfortable.

Literal vs actual translation



What does 不要当电灯泡 mean?



The phrase "不要当电灯泡" (bù yào dāng diàn dēng pào) is a Chinese idiom which literally means "don't be a lightbulb." In modern usage, it typically means "Don't be a third wheel" or "Don't be an unwanted tag-along," especially in social situations where two people are spending time together.

The phrase is often used to advise someone not to interfere in someone else's private or intimate moment, and not to make others feel uncomfortable by being a conspicuous presence.

<https://shareg.pt/I5nfVus>



What does 不要当电灯泡 mean?



Images

Videos

Books

News

More

Tools

About 414,000 results (0.37 seconds)

Chinese – detected

English

不要当电灯泡

Bùyào dāng diàndēngpào

don't be a light bulb



Open in Google Translate • Feedback

<https://m.facebook.com/photos> · [Translate this page](#)

Learn Chinese - 【不要当“电灯泡”! 】 Don't Be a Bulb! When ...

1 July 2015 — Why **does** 电灯泡**mean** the third wheel? Many people think that **it is** because the bulb **is** always too bright for the couple to maintain their ...

<https://www.echineselearning.com/blog/know-diandengpao>

What does Chinese word 电灯泡 (Diàn dēng pào) mean?

1 Dec 2017 — In Mandarin Chinese, we say “不通气 (bù tōng qì)” to replace of “唔通气 (én tōng qì)”. Later on, people gave “电灯泡 (diàn dēng pào)” a similar ...

<https://hinative.com/questions> · [Translate this page](#)

What is the meaning of "当电灯泡"? - HiNative

3 Jan 2021 · 3 answers

In English, it's called the "third wheel" (not sure if you're familiar with that). · 通常表示跟一对有情人或者情侣待在一起，坏他们的好事 · @mojia ...

Break down task into smaller steps



What steps do I need to take to organise a physics conference. Make a numbered list of short dot points.



1. Determine the theme and scope of the conference, and identify potential speakers and attendees.
2. Secure a venue and date for the conference, and make sure it is accessible and equipped with necessary facilities.
3. Create a budget and secure funding from sponsors or participants.
4. Develop a website or online registration platform to promote the conference and register attendees.
5. Design a program and schedule that includes keynote speakers, presentations, and networking opportunities.
6. Manage logistics, such as catering, transportation, and accommodations for attendees.
7. Coordinate with speakers and presenters to ensure that their needs are met, and their presentations are properly prepared and delivered.
8. Organize social events, such as dinners, receptions, or tours of local attractions, to encourage networking and build relationships among attendees.
9. Promote the conference through social media, email marketing, and

Pot-luck statistical advice



I have a data set of 50 points in the control group and 2 points that I want to test to see if they come from the same distribution. What test can I use?



With such a small number of observations in the test group, the ideal test would depend on the nature of the data and the specific research question being addressed. However, a common non-parametric test used to compare two groups with a small sample size is the Mann-Whitney U test, also known as the Wilcoxon rank-sum test.

The Mann-Whitney U test assesses whether two independent samples of observations come from the same population by comparing the ranks of the observations between the two groups. In your case, you could rank the combined set of 52 observations from lowest to highest, then calculate the sum of the ranks for each group. The test statistic U is the smaller of the two rank sums, and the p-value can be obtained from a standard table or using statistical software.

Another option could be to use a permutation test. This involves repeatedly randomizing the assignment of the two test points to either the control or test group, and recalculating the difference in means or another test statistic of interest. The permutation of the test points allows you to test the

Pot-luck statistical advice



How can I run the test in R?



To run the Mann-Whitney U test in R, you can use the `wilcox.test` function. Here's an example using a random sample of 50 observations for the control group and two observations for the test group:



```
r Copy code

# Create example data
set.seed(123) # for reproducibility
control <- rnorm(50)
test <- c(1.2, 0.8)

# Run Mann-Whitney U test
wilcox.test(control, test, exact = FALSE)
```



In this example, the `control` variable contains the 50 observations in the control group, and `test` contains the two test observations. The `exact` argument is set to `FALSE`

Pot-luck statistical advice



do i want `exact = FALSE` if i only have 2 values in the test group?



Good point! If you have only two values in the test group, the ``exact`` argument in the ``wilcox.test`` function should be set to ``TRUE`` to perform an exact test. When the sample size is small, the exact test is more appropriate as it calculates the exact distribution of the test statistic, rather than using an approximation.

Here's an updated example that uses ``exact = TRUE``:

r

 Copy code

```
# Create example data
set.seed(123) # for reproducibility
control <- rnorm(50)
test <- c(1.2, 0.8)

# Run Mann-Whitney U test with exact method
wilcox.test(control, test, exact = TRUE)
```

Pot-luck statistical advice

The output will now show that an exact test was performed:

bash

 Copy code

Wilcoxon rank sum test with exact p-value

data: control and test

W = 1250, p-value = 0.01956

alternative hypothesis: true location shift is not equal to 0



Made-up results
are incorrect

Again, keep in mind that with such a small sample size, it may be difficult to draw reliable

conclusions, and it's important to interpret

```
> # Run Mann-Whitney U test
```

```
> wilcox.test(control, test, exact = TRUE)
```

Wilcoxon rank sum exact test

data: control and test

W = 18, p-value = 0.1508

alternative hypothesis: true location shift is not equal to 0

Rewrite an email



Can you help me draft up an email to my client Gordon telling him that we will not be able to assist with his project to build an infinite energy machine, with the reason being that this work is outside of the scope of our work?



Sure, here's an example email you could send to Gordon:

Subject: Re: Project Inquiry - Building an Infinite Energy Machine

Dear Gordon,

Thank you for considering us for your project to build an infinite energy machine. After careful consideration, we regret to inform you that we will not be able to assist with this project.

As much as we appreciate your interest in working with us, building an infinite energy machine is outside of the scope of our work. Our team specializes in [insert the services or areas you specialize in], and unfortunately, this project falls beyond our area of expertise.

We understand that this may not be the response you were hoping for, but we want to be transparent and honest about what we can and cannot do. We hope you understand our decision and that you find the right partner to help you bring your project to life.

Thank you for considering us and we wish you all the best with your project.

Best regards,

[Your Name]



Can you make that more concise?



Sure, here's a shorter version:

Subject: Project Inquiry - Infinite Energy Machine

Dear Gordon,

Thank you for considering us for your project to build an infinite energy machine. Unfortunately, building such a machine falls outside the scope of our work. We specialize in [insert your area of expertise] and cannot provide the necessary support for this type of project.

Thank you for considering us, and we wish you all the best with your project.

Best regards,

[Your Name]

Instant API + database



You are an API and database for a todo list app. Here is the current state

```
{"todos": [ {"title": "Buy Milk", "completed": true},  
            {"title": "Do laundry", "completed": false},  
            {"title": "Clean room", "completed": true} ] }
```

You will respond to api requests. Do not give explanation unless requested.

API request:

GET/todos/Do laundry



Response:

```
{"title": "Do laundry", "completed": false}
```

Instant API + database



You are an API and database for a todo list app. Here is the current state

```
{"todos": [ {"title": "Buy Milk", "completed": true},  
            {"title": "Do laundry", "completed": false},  
            {"title": "Clean room", "completed": true} ] }
```

You will respond to api requests. Do not give explanation unless requested.

API request:

GET/todos/Do laundry



Response:

```
{"title": "Do laundry", "completed": false}
```



PUT/todos/Do laundry {"completed": true}



Response:

```
{"title": "Do laundry", "completed": true}
```

Add in exception handling



Can you add in exception handling to the following R function?

```
greeting <- function(name) {  
  message("Hello, ", name)  
}
```



Certainly, here's an updated version of the `greeting()` function with exception handling:

```
r Copy code  
  
greeting <- function(name) {  
  if (missing(name)) {  
    stop("Name argument is missing")  
  }  
  if (!is.character(name)) {  
    stop("Name argument must be a character string")  
  }  
  message("Hello, ", name)  
}
```

In the updated function, we added two checks to validate the input argument:

1. Check if the `name` argument is missing using the `missing()` function. If the argument is missing, the function will stop and throw an error with the message "Name argument is missing".
2. Check if the `name` argument is a character string using the `is.character()` function. If it is not a character string, the function will stop and throw an error with the message "Name argument must be a character string".

These checks will help prevent common errors and make the function more robust.

Write code documentation



can you add some documentation to the greeting function?



Certainly! Here's an updated version of the `greeting()` function with documentation:

```
r Copy code

#' Greet the specified person
#'
#' This function greets the specified person by printing a message
#'
#' @param name A character string representing the person to greet
#'
#' @examples
#' greeting("Alice")
#' greeting("Bob")
#'
#' @return This function does not return anything, it just prints
#'
#' @keywords greeting
#'
#' @export
greeting <- function(name) {
  if (missing(name)) {
    stop("Name argument is missing")
  }
  if (!is.character(name)) {
    stop("Name argument must be a character string")
  }
  message("Hello, ", name)
}
```

Explain what it has done, and why

```
r Copy code

#' Greet the specified person
#'
#' This function greets the specified person by printing a message to the console.
#'
#' @param name A character string representing the person to greet
#'
#' @examples
#' greeting("Alice")
#' greeting("Bob")
#'
#' @return This function does not return anything, it just prints a message to the console.
#'
#' @keywords greeting
#'
#' @export
greeting <- function(name) {
  if (missing(name)) {
    stop("Name argument is missing")
  }
  if (!is.character(name)) {
    stop("Name argument must be a character string")
  }
  message("Hello, ", name)
}
```

Here's a breakdown of what each part of the documentation means:

1. ``#'``: This symbol indicates that the following line is a documentation comment.
2. ``Greet the specified person``: This is a brief description of what the function does.
3. ``This function greets the specified person by printing a message to the console.``: This is a more detailed description of what the function does.
4. ``@param name``: This indicates that the next line is a description of the ``name`` parameter.
5. ``A character string representing the person to greet.``: This is a description of what the ``name`` parameter represents.
6. ``@examples``: This indicates that the following lines are example usage of the function.
7. ``greeting("Alice")``: An example of how to use the function to greet Alice.
8. ``greeting("Bob")``: An example of how to use the function to greet Bob.
9. ``@return``: This indicates that the following line is a description of what the function returns.
10. ``This function does not return anything, it just prints a message to the console.``: This is a description of what the function returns.
11. ``@keywords greeting``: This indicates that the function is associated with the keyword "greeting".
12. ``@export``: This indicates that the function should be exported so that it can be used by other packages.

By adding documentation to the ``greeting()`` function, we make it easier for other people to understand what the function does and how to use it.

Write tests for your code



Can you write a test for the greeting function?



Sure! Here's an example test case for the ``greeting()`` function using the R package ``testthat``:

```
r Copy code

library(testthat)

test_that("greeting function works as expected", {
  expect_equal(greeting("Alice"), "Hello, Alice")
  expect_error(greeting(), "Name argument is missing")
  expect_error(greeting(123), "Name argument must be a character string")
})
```

In this test, we're checking that:

1. When the ``greeting()`` function is called with the argument "Alice", it returns the expected message "Hello, Alice".
2. When the ``greeting()`` function is called without any argument, it throws an error with the message "Name argument is missing".
3. When the ``greeting()`` function is called with a non-character argument (in this case, the integer 123), it throws an error with the message "Name argument must be a character string".

By running this test, we can ensure that the ``greeting()`` function is working as expected and that it handles errors properly.

Breaking ChatGPT

Areas where the model struggles

Haikus: Syllables are tough

AI language models are trained on written text; however, syllables are an attribute of spoken language.



Write a haiku about Excel



Cells like boxes
Formulas bring them to life
Excel sings with math

4
7
5



The first line does not have the correct number of syllables for this to be a haiku; can you please rewrite the haiku to have the correct syllable structure?



Apologies for the mistake. Here's a revised haiku:

Rows and columns neat,
Formulas dance on the sheets,
Excel's art complete.

5
7
5



write a haiku about why an AI chat bot might struggle with writing haikus with the correct syllable structure



Programmed to converse,
Machines lack human nature's verse,
Haikus elude bots.

5
8
5



Counting and simple math



If my research budget is \$12 for the year, and Prof. Rich had twice my budget before he spent twenty dollars on a nice lunch, how much does he have?



Before the lunch, Prof. Rich had twice the research budget, which means he had:

$$2 \times \$12 = \$24$$

After spending \$20 on lunch, Prof. Rich has:

$$\$24 - \$20 = \$4$$



Therefore, Prof. Rich has \$4 left after spending \$20 on lunch.



What is $2+8+7-9-6+8+4+6+9-2-1+4+9-8+0+5+4-7+3-8+1+3+7$



If we add up all of the numbers, we get:

$$2 + 8 + 7 - 9 - 6 + 8 + 4 + 6 + 9 - 2 - 1 + 4 + 9 - 8 + 0 + 5 + 4 - 7 + 3 - 8 + 1 + 3 + 7 = 47$$

Therefore, the final result is 47.



> $2+8+7-9-6+8+4+6+9-2-1+4+9-8+0+5+4-7+3-8+1+3+7$
[1] 39

Used to be pretty bad at math

Got upgraded to call a calculator
but doesn't always

It isn't a calculator



What is 1 plus 1?



The sum of 1 and 1 is 2.



What is the square root of $1337 \times \pi$?



The square root of $(1337 \times \pi)$ is approximately 51.7705974526.

Google

square root of $(1337 \times \pi)$



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About 1,250,000 results (0.49 seconds)



square root($1337 \times \pi$) =

64.8097938421

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2

3

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Correct answer is
 ~ 64.81

Anything after the model training date (Sept 2021)



What is the hometown of the 2021 Australian Open women's champion?



As an AI language model, I do not have access to the real-time information, but the 2021 Australian Open women's champion is Naomi Osaka, and she is from Japan.  



What is her hometown?



Naomi Osaka was born in Chuo-ku, Osaka, Japan.



Playground

Load a preset... 

Save

View code

Share

...



What is the hometown of the Australian Open women's champion 2021?

The 2021 Australian Open women's champion is Naomi Osaka, who is from Chūō-ku, Osaka, Japan.



Anything after the model training date (Sept 2021)



Who is the deputy vice chancellor of research at the university of sydney?



I am sorry, as an AI language model, I do not have real-time information on the current personnel of the University of Sydney. However, as of my knowledge cutoff date of September 2021, the Deputy Vice-Chancellor (Research) at the University of Sydney was Professor Duncan Ivison. Please note that this information may have changed since then. It's best to check the university's website or contact them directly for the most up-to-date information.

True, but unhelpful



The University of Sydney



Playground

Load a preset...

Save

View code

Share

...



Who is the deputy vice chancellor of research at the university of sydney? 

The Deputy Vice-Chancellor (Research) at the University of Sydney is Professor Duncan Ivison.

Submit



38

Improving ChatGPT

Integrate search:

Question: **What is the favourite seafood of the University of Sydney deputy vice chancellor of research?**

Are follow up questions needed here: Yes.

Follow up: **Who is the University of Sydney deputy vice chancellor of research?**

Intermediate answer: **Emma Johnston appointed new Deputy Vice-Chancellor (Research) - The University of Sydney..**

Follow up: **What is Emma Johnston's favourite seafood?**

Intermediate answer: **"I love mussels," Johnston says. "They are good because they are low on the food chain and you can eat as many as you like and grow some more."..**

So the final answer is: **Mussels**



Paper: <https://ofir.io/self-ask.pdf>
Code: https://github.com/ofirpress/self-ask/blob/main/self-ask_plus_search-engine_demo.ipynb

The University of Sydney



What is Emma Johnston's favourite seafood?



All

Images

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About 5,570,000 results (0.77 seconds)

<https://www.afr.com> › Work & Careers › Leaders

From singing Abba for whales to conducting a \$1b budget - AFR

26 Aug 2022 — "I love mussels," Johnston says. "They are good because they are low on the food chain and you can eat as many as you like and grow some more."

Integrate tools: Toolformer

1. Question Answering System

<https://arxiv.org/abs/2302.04761>

The New England Journal of Medicine is a registered trademark of [QA("Who is the publisher of The New England Journal of Medicine?") → Massachusetts Medical Society] the MMS.

2. Calculator

Out of 1400 participants, 400 (or [Calculator(400 / 1400) → 0.29] 29%) passed the test.

3. Machine Translation

The name derives from "la tortuga", the Spanish word for [MT("tortuga") → turtle] turtle.

4. Wikipedia Search

The Brown Act is California's law [WikiSearch("Brown Act") → The Ralph M. Brown Act is an act of the California State Legislature that guarantees the public's right to attend and participate in meetings of local legislative bodies.] that requires legislative bodies, like city councils, to hold their meetings open to the public.

5. Calendar (returns current date)

What we should be worried about

IP, privacy, academic integrity, & other concerns

Use can violate academic integrity policy

New USyd Academic integrity policy as of Mon 20th Feb 2023

9 Academic integrity breaches generally

(2) Academic integrity breaches include, but are not limited to:

(j) inappropriately using digital or information technology to complete an assessment task, including but not limited to:

(j)(i) generating content using artificial intelligence; or

(j)(ii) using paraphrasing or translation software to disguise plagiarism, collusion, contract cheating or other academic integrity breach.

13 Contract cheating

(1) Subject to subclause 13(2), contract cheating may include:

(i) submitting an assessment which has been generated in whole or part by artificial intelligence.

But detection is fraught with dangers

<https://platform.openai.com/ai-text-classifier>

<https://gptzero.me/>

- Overall **accuracy is low**.
- Routine copy-paste use of the tool with simple prompt is relatively easy to detect.
- Any more advanced prompt, editing, or less-well known tool is almost impossible to detect.
- **High risk of many false accusations** of plagiarism or misconduct.

Whatever you enter into ChatGPT is now OpenAI's

5. Who can view my conversations?

- As part of our commitment to safe and responsible AI, we review conversations to improve our systems and to ensure the content complies with our policies and safety requirements.

6. Will you use my conversations for training?

- Yes. Your conversations may be reviewed by our AI trainers to improve our systems.

They will absolutely use whatever you put in, as training data for their next model

Who owns the content?

Will OpenAI claim copyright over what outputs I generate with the API?



Written by Asher Ryan
Updated over a week ago

OpenAI will not claim copyright over content generated by the API for you or your end users. Please see our [Terms of Use](#) for additional details.



Will OpenAI claim copyright over what outputs I generate with chatGPT?



No, OpenAI does not claim copyright over the outputs that you generate with ChatGPT. However, it is important to note that if you use ChatGPT to generate content, such as written text, images, or other creative works, the content you generate may be subject to copyright laws.

It is your responsibility to ensure that you have the legal right to use any content you generate with ChatGPT. Additionally, you should be aware of any terms of service or usage agreements that may apply to the use of ChatGPT or any other tools you may use to create content.

What do the Terms of Service say?

3. Content

(a) Your Content. You may provide input to the Services (“Input”), and receive output generated and returned by the Services based on the Input (“Output”). Input and Output are collectively “Content.” As between the parties and to the extent permitted by applicable law, you own all Input, and subject to your compliance with these Terms, OpenAI hereby assigns to you all its right, title and interest in and to Output. OpenAI may use Content as necessary to provide and maintain the Services, comply with applicable law, and enforce our policies. You are responsible for Content, including for ensuring that it does not violate any applicable law or these Terms.



This passage from the OpenAI terms of service states the following:

- You can provide input (such as text) to the OpenAI Services and receive output (also in the form of text or other content) generated by the Services based on the input you provided. The input and output are collectively referred to as "Content."
- You own the input (i.e., the content you provide to the OpenAI Services), and OpenAI assigns to you all of its right, title, and interest in the output generated by the Services (i.e., the content that the Services generate based on your input).
- OpenAI may use the content (input and output) as needed to provide and maintain the Services, comply with applicable law, and enforce its policies.
- You are responsible for the content that you provide (the input) and must ensure that it does not violate any applicable law or the terms of the OpenAI Services.

In simpler terms, this passage means that you own the content you provide to the OpenAI Services, and OpenAI assigns to you the rights to the content generated by the Services. OpenAI may use the content to provide the Services, follow the law, and enforce its policies. However, you are responsible for the content you provide and must make sure it doesn't break any laws or violate the terms of the OpenAI Services.

How ChatGPT was made

- **OpenAI needed to build a smart filter to screen out offensive content.**
- **OpenAI engaged a contractor called Sama to develop this filter.**
- **Sama paid Kenyan workers \$1.32 - \$2 USD per hour to read and label content including details of murder, sexual abuse, suicide, and incest.**

<https://afrotech.com/kenyan-workers-openai-chatgpt>

The University is committed to taking meaningful action to prevent, mitigate and, where appropriate, remedy modern slavery risks in its operations, supply chains and investments.

Suggestions for best practice

- **Use it for brainstorming, bouncing ideas back & forth.**
- **Be sceptical, fact check answers!**
- **Only enter information or code that you are ok with OpenAI, or anyone who uses OpenAI's tools having access to.**

Unlocking the potential of ChatGPT for your research

Dr. Henry Lydecker

Dr. Gordon McDonald

Feedback link!



THE UNIVERSITY OF
SYDNEY

Sydney
Informatics Hub

https://redcap.sydney.edu.au/surveys/?s=FJ33MYNCRR&training=58&training_date=2023-02-23