

**What could you do with
machines that understand
language?**

NAME(S)

- A robot wrote this entire article. Are you scared yet, human?

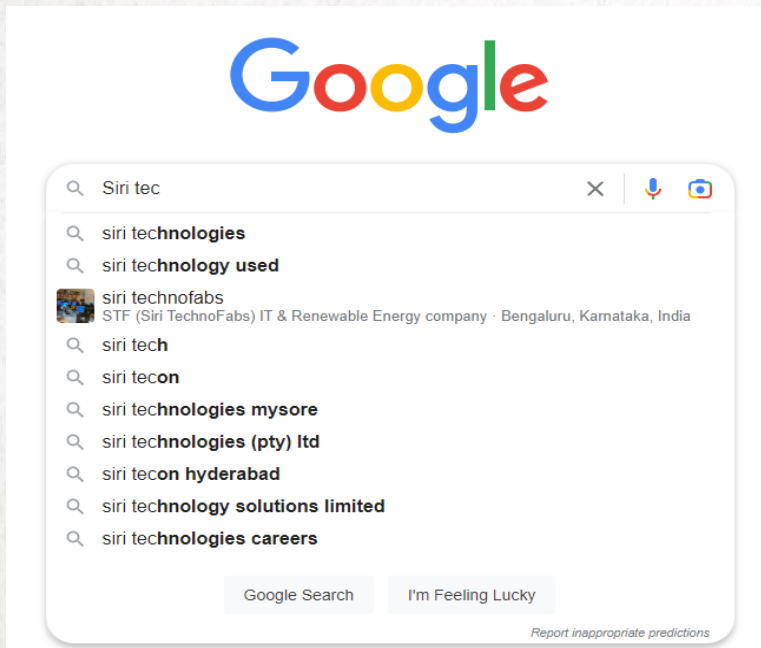
<https://www.theguardian.com/commentisfree/2020/sep/08/robot-wrote-this-article-gpt-3>

- What It's Like To be a Computer: An Interview with GPT-3

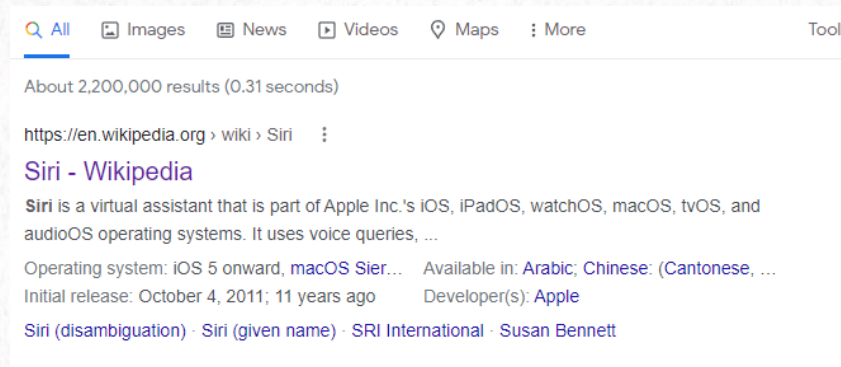
https://www.youtube.com/watch?v=PqbB07n_uQ4

WHICH STEP USED LANGUAGE PROCESSING?

1



2



3

Passage Sentence

In meteorology, precipitation is any product of the condensation of atmospheric water vapor that falls under gravity.

Question

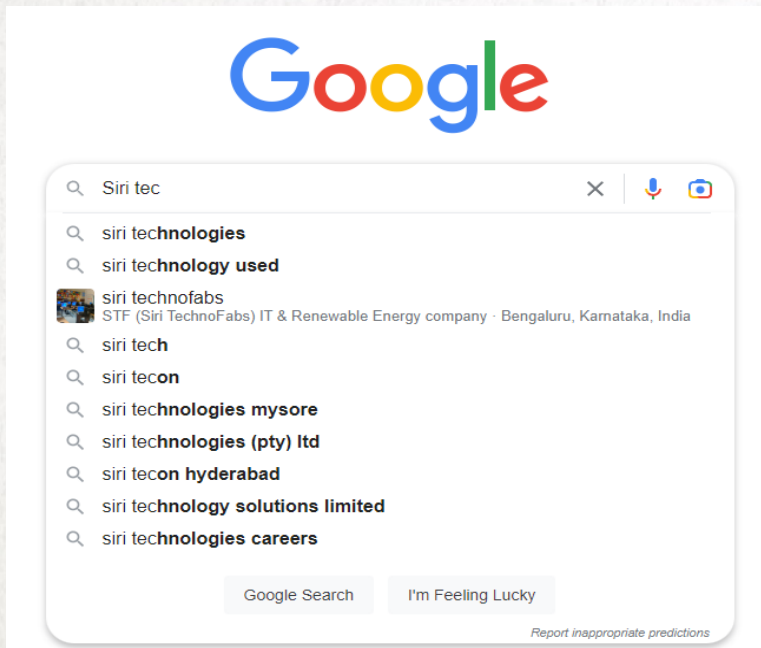
What causes precipitation to fall?

Answer Candidate

gravity

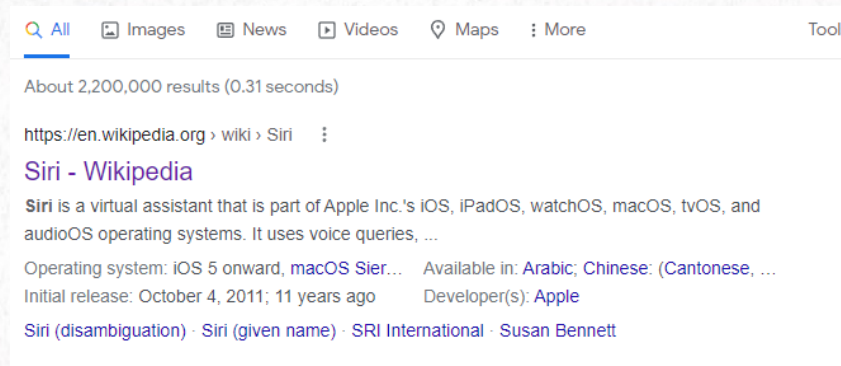
WHICH STEP USED LANGUAGE PROCESSING?

1



Auto Complete
Predict the next word
(Language modelling)

2



Information Retrieval

3

Passage Sentence

In meteorology, precipitation is any product of the condensation of atmospheric water vapor that falls under gravity.

Question

What causes precipitation to fall?

Answer Candidate

gravity

Question Answering

Question-Answering App

MODULES

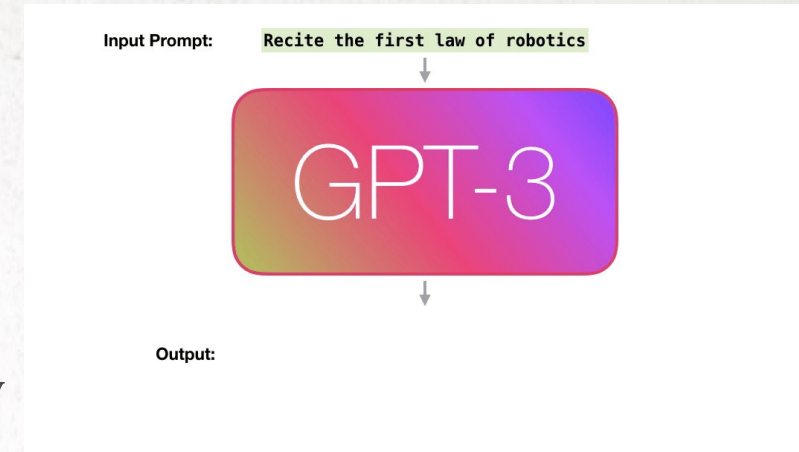
- Speech to Text (Using OpenAI Whisper)
 - Text processing (Using GPT-3)
 - Text to Speech (Using TTS API)
-

MODULE 1: SPEECH TO TEXT

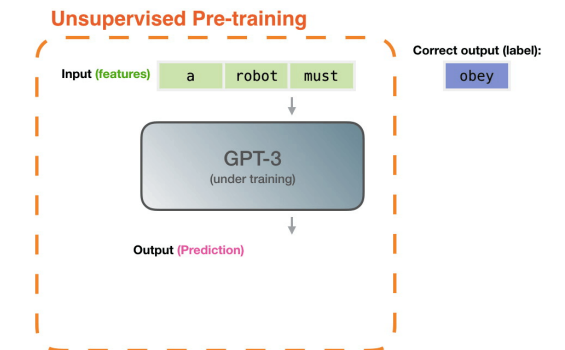
- Used OpenAI speech recognition model called Whisper
 - Whisper is an automatic speech recognition model trained on 680,000 hours of multilingual data collected from the web
 - Model is robust to accents, background noise and technical language
 - Supports 99 different languages' transcription and translation from those languages into English.
-

MODULE 2: TEXT PROCESSING

- Used OpenAI GPT-3
- GPT-3 stands for Generative Pre-trained Transformer
- GPT-3 was trained on a supercomputer developed by Microsoft and OpenAI collectively
- Contains 96 decoder layers and is built on a system with 285k CPU cores, 10k GPUs and 400 Gbps network connectivity for each GPU server.
- Not only it can produce text, but it can also generate code, stories, poems, etc.



Text: Second Law of Robotics: A robot must obey the orders given it by human beings



MODULE 3: TEXT TO SPEECH

- Used Google Cloud Text to Speech API
 - It enables developers to synthesize natural sound speech
 - Offers over 30 plus voices
 - Screen reading service API
 - Turns text into sound files of highest fidelity
 - Developed by Google and DeepMind
 - Google has helped with neural networks whereas Deep Mind is a company which focuses mainly on Artificial Intelligence
-

DEMO

Module 1: speech to text

Voice to text

Record

Transcribe Translate

Module 2: text processing

Gradio

127.0.0.1:7860

query

What is the first rule of robotics?

Clear Submit

output

The first rule of robotics is that a robot may not injure a human being or, through inaction, allow a human being to come to harm.

Flag

Module 3: text to speech

Text to Speech Synthesis

TEXT TO SPEECH

Enter Text

PLAY EXIT RESET

Record

Transcribe Translate

Q&A Text2Speech

APPLICATIONS OF GPT-3


- Building Machine Learning Models

Build Keras Models

Build a model to classify images into 5 groups. The dataset has 25000 images, with an input shape of 500x500.

Generate Model

```
from keras.models import Sequential
from keras.layers import Conv2D, MaxPooling2D,
Dropout, Flatten, Dense, Activation,
BatchNormalization
model = Sequential()
model.add(Conv2D(32, (5,5),
```

 **ML/AI language model tutor**

Answers Generation Conversation

This is a QA-style chatbot that answers questions about language models.

Prompt


ML Tutor: I am a ML/AI language model tutor
You: What is a language model?
ML Tutor: A language model is a statistical model that describes the probability of a word given the previous words.
You: What is a statistical model?

Sample response

ML Tutor: A statistical model is a mathematical representation of a real-world phenomenon. It is used to make predictions or decisions based on data. Statistical models use probability and statistics to make inferences about the data.

APPLICATIONS OF GPT-3

- Write SQL query

 **SQL request**

Transformation Generation Translation

Create simple SQL queries.

Prompt

Create a SQL request to find all users who live in California and have over 1000 credits:

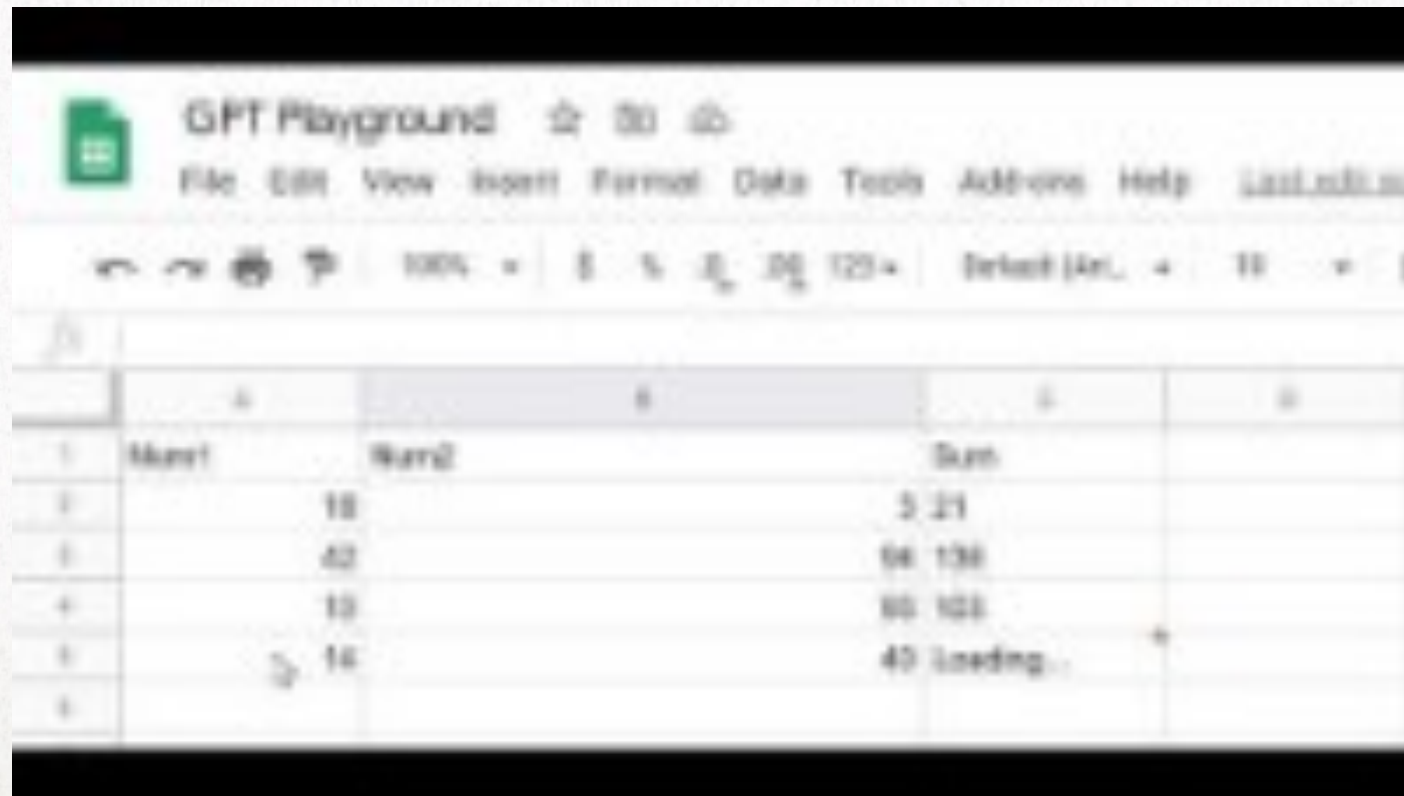
Sample response

```
SELECT *  
FROM users  
WHERE state = 'California' AND credits > 1000;
```



APPLICATIONS OF GPT-3

- Use it as a Spreadsheet function



The screenshot shows the GPT Playground interface with a menu bar (File, Edit, View, Insert, Format, Data, Tools, Add-ons, Help) and a toolbar. Below the toolbar is a spreadsheet-like table with the following data:

	Month	Year2	Sum
1			
2		18	5.21
3		42	64.138
4		10	80.108
5		14	40 loading...
6			

APPLICATIONS OF GPT-3

- Translate programming languages
 - Explain a complicated piece of code
 - Parse unstructured data
 - Micro horror story creator
 - Recipe creator (eat at your own risk)
 - Essay outline
-

Risks and Limitations of GPT-3

- Not constantly learning
 - It doesn't have an ongoing long-term memory that learns from each interaction
 - GPT-3 suffers from the same problems as all neural networks: lack of ability to explain and interpret why certain inputs result in specific outputs
-

Where is the journey heading?

- Are bigger language models better?
 - Bigger models are better at generalizing on various downstream tasks
 - Issues: Environmental cost (carbon footprint), very complex



Yann LeCun

27 October 2020 at 13:01 · 🌐

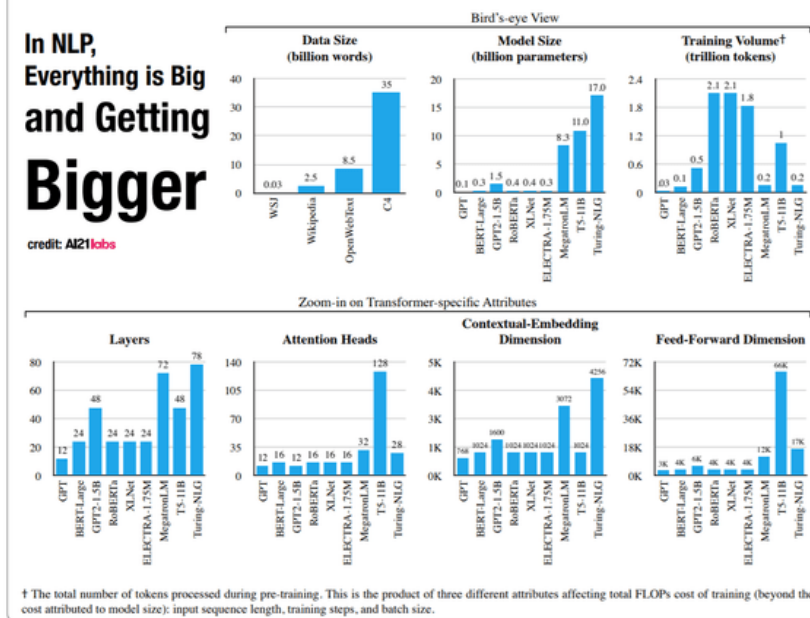
“It’s entertaining, and perhaps mildly useful as a creative help,” LeCun wrote. “But trying to build intelligent machines by scaling up language models is like building high-altitude airplanes to go to the moon. You might beat altitude records, but going to the moon will require a completely different approach.”

Deep Learning, Deep Pockets?

As you would expect, training a 530-billion parameter model on humongous text datasets requires a fair bit of infrastructure. In fact, Microsoft and NVIDIA used hundreds of DGX A100 multi-GPU servers. At \$199,000 a piece, and factoring in networking equipment, hosting costs, etc., anyone looking to replicate this experiment would have to spend close to \$100 million dollars. Want fries with that?

In NLP, Everything is Big and Getting Bigger

credit: AI21 Labs



Large computer language models carry environmental, social risks

It takes an enormous amount of computing power to fuel the model language programs, Bender said. That takes up energy at tremendous scale, and that, the authors argue, causes environmental degradation. And those costs aren't borne by the computer engineers, but rather by marginalized people who cannot afford the environmental costs.

Another risk comes from the training data itself, the authors say. Because the computers read language from the Web and from other sources, they can pick up and perpetuate racist, sexist, ableist, extremist and other harmful ideologies.

Credit: University of Washington.

<https://www.washington.edu/news/2021/03/10/large-computer-language-models-carry-environmental-social-risks/>