

# Generative AI in Action: Use Cases, Risks, and Future Prospects

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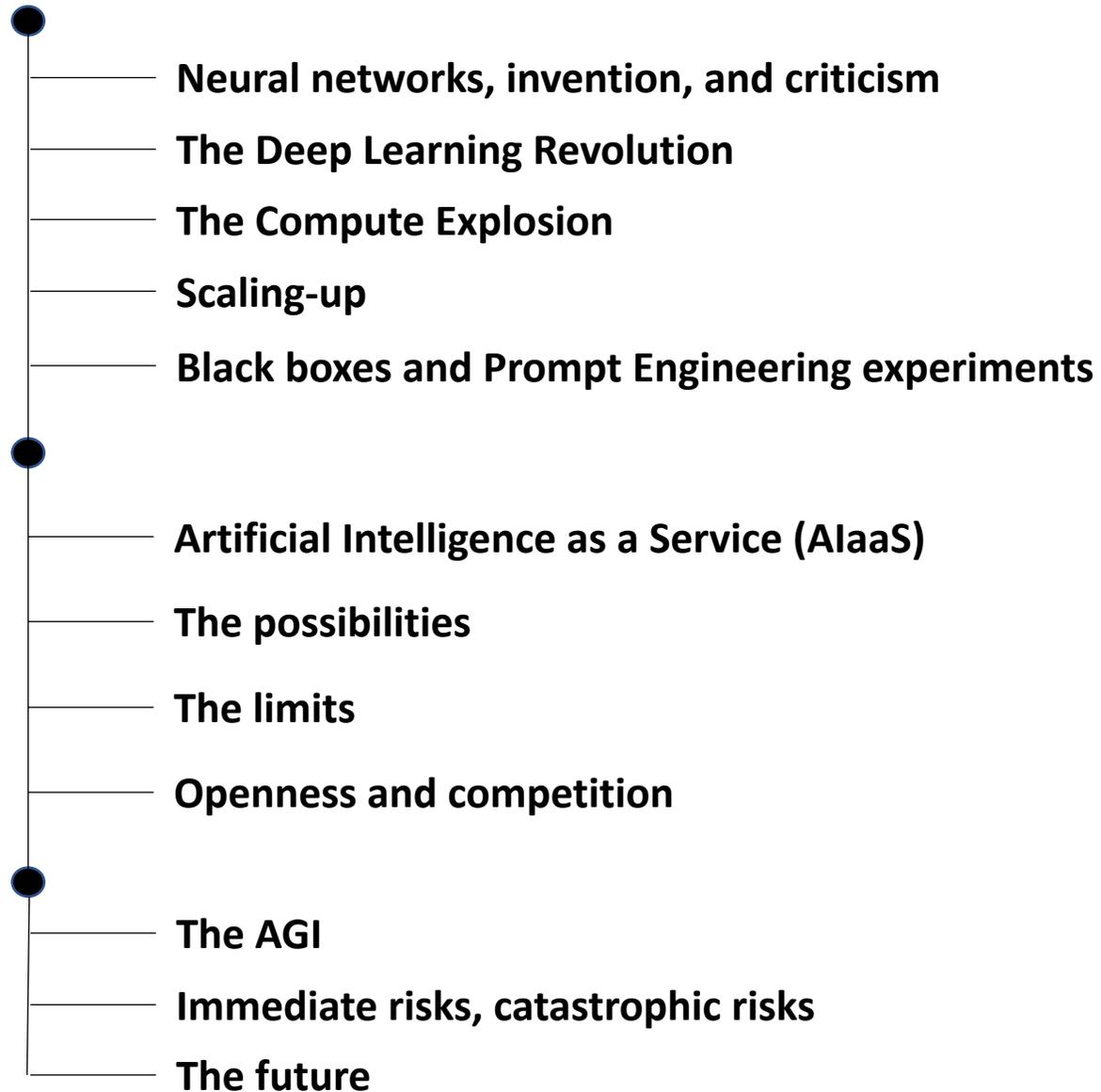
ИЛАШИНЕРИЧА



# 1. How did we get here?

# 2. Where are we now?

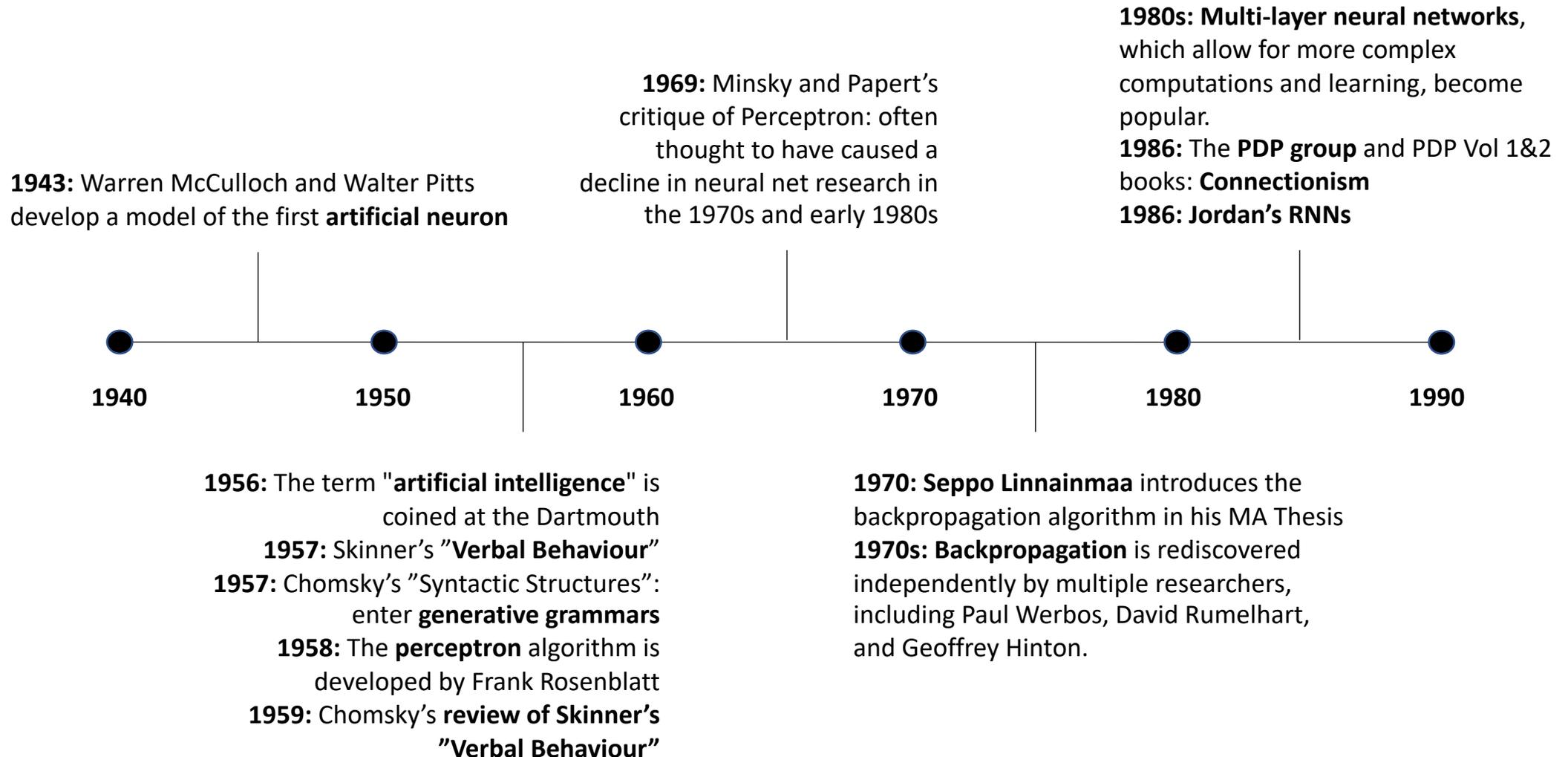
# 3. Risks and Future Prospects



**1. How did we  
get here?**



# Neural networks, invention, and criticism



# Neural networks, invention, and criticism

**1990s:** Connectionism is a part of the mainstream, but Bayesian and Rational approaches steal the show

**1990:** Elman's RNNs for language processing

**1997:** Long short-term memory (LSTM) networks

**2010:** The ImageNet dataset is introduced

**2012:** A **deep convolutional neural network** achieves SOTA performance on the ImageNet

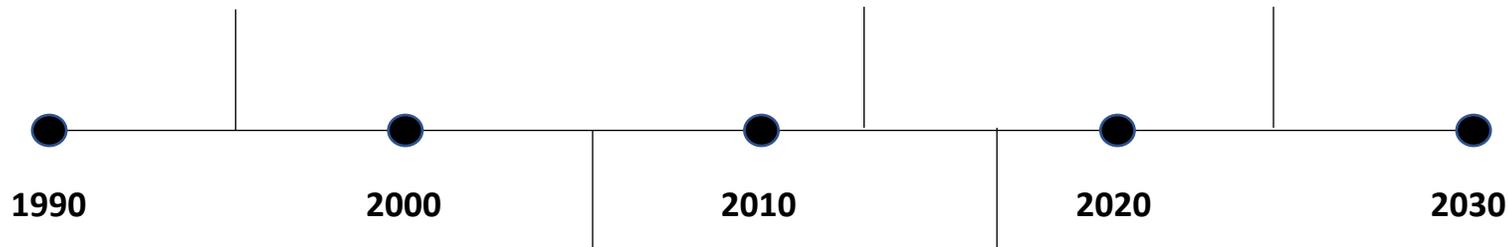
**2014:** **Generative adversarial networks** (GANs)

**2014:** **Attention mechanisms**

**2021:** OpenAI's GPT-3, Google's LaMDA

**2022:** Google's PaLM, Open AI's ChatGPT

**2023:** GPT-4, Google's Bard



**2006:** **Geoffrey Hinton** and colleagues introduce the idea of **Deep Learning**, which involves training neural networks with many layers

**2015:** Google DeepMind's **AlphaGo**

**2017:** "Attention is all you need": the **Transformer** architecture

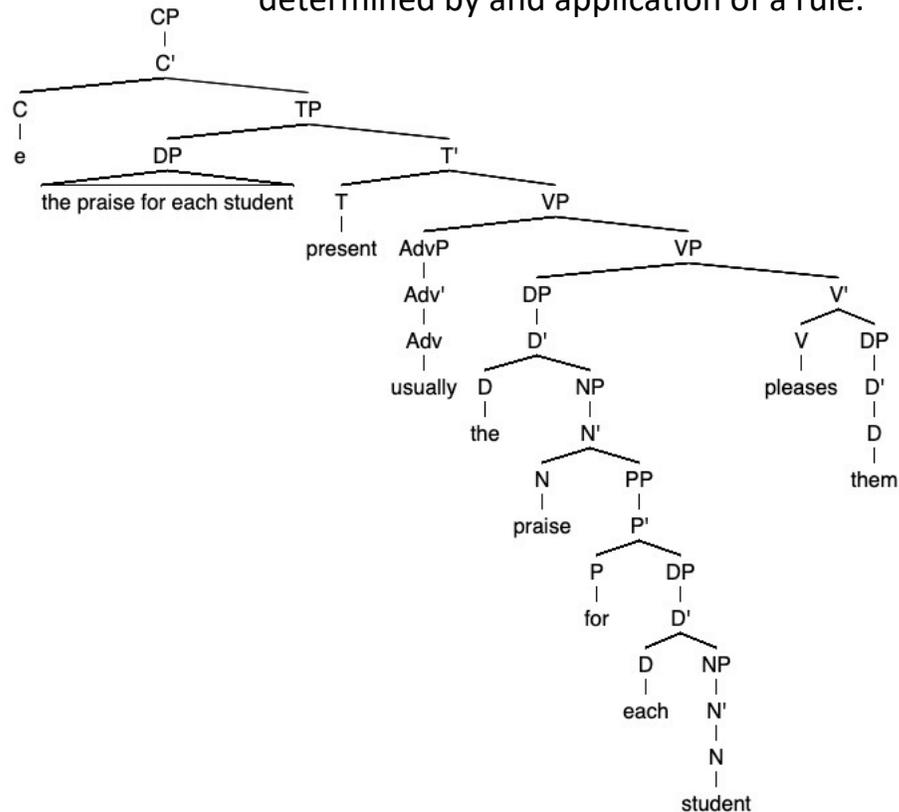
**2018:** OpenAI's GPT-2

**2018:** Hinton, Bengio, LeCun Turing Award

# Neural networks, invention, and criticism

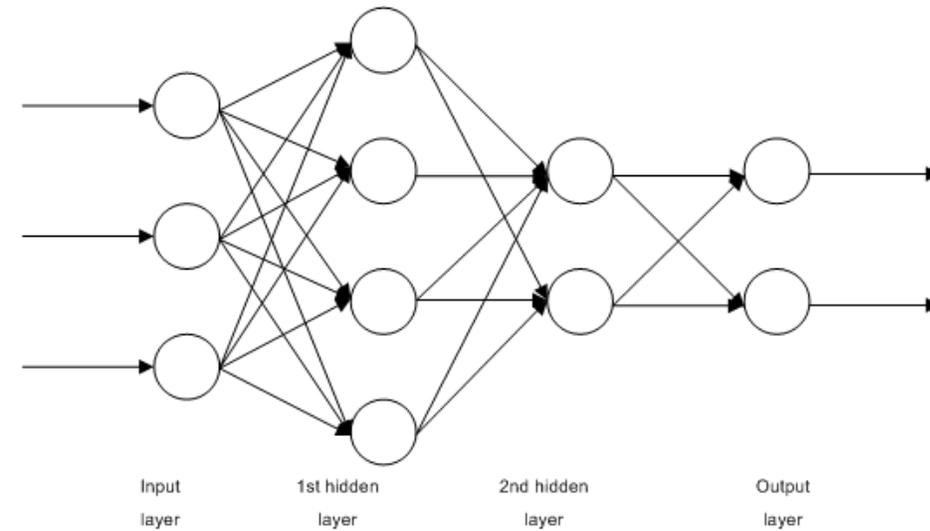
## Symbolic Cognition

- (1) There are variables that represent things and can take certain values,
- (2) there are rules of a formal system of reasoning that constrain the possible combinations of variables,
- (3) the meaning of more complex things is a function of the meaning of its constituents and can be determined by and application of a rule.



## Associative Learning

- (1) A distributed system powerful enough will learn from correlations in the spatiotemporal arrangement of things in the world and what seems to be
- (2) rules will in the end show up as emergent properties of huge, associative, neural network; principles at work are
- (3a) supervised, (3b) reinforced (RL), and (3c) unsupervised learning.



# The Compute Explosion: Scaling-Up

## Example dataset

*Common Crawl:*  
petabytes of data,  
basically everything that  
can be accessed online,  
380Tb in October 22  
(3.15 billion web-pages).

## OpenAI GPT-3 Training Set

Dataset	Tokens	% in training
Common Crawl	410 billion	60%
WebText2	19 billion	22%
Books1	12 billion	8%
Books2	55 billion	8%
Wikipedia	3 billion	3%

## OpenAI DALL-E 2 Training Set

An image generative model,  
DALL-E 2 was trained on  
approximately 650 million image-  
text pairs scraped from the  
Internet

# The Compute Explosion: Scaling-Up

## How to train your dragon?

- **Data preparation.** Collecting a huge amount of various text (usually from the internet, but also from other sources) which is transformed into smaller processing units - tokens (words or parts of words).
- **Model training (unsupervised/self-supervised pretraining).** Developing an algorithm that goes through sequences of raw text, analyzing relationships between words (tokens) and calculating the probability of the next word (token) appearing. Through this process, the model gains implicit knowledge about different aspects of language, such as word forms, their meanings, sentence formation, etc.
- **Supervised fine-tuning / instruction tuning.** To adapt the model to specific tasks (e.g. answering questions, summarizing, sentiment analysis, translation), it is further trained on a smaller set of annotated data.
- **Reinforced learning from human feedback.** Additional adjustment of the model to generate more desirable responses. People evaluate/rank the responses generated by the model, which is then used for further adjustment.

These are just the most typical steps in the training of a contemporary Large Language Model (LLM). Model training can take various forms and be organized in different ways as well.

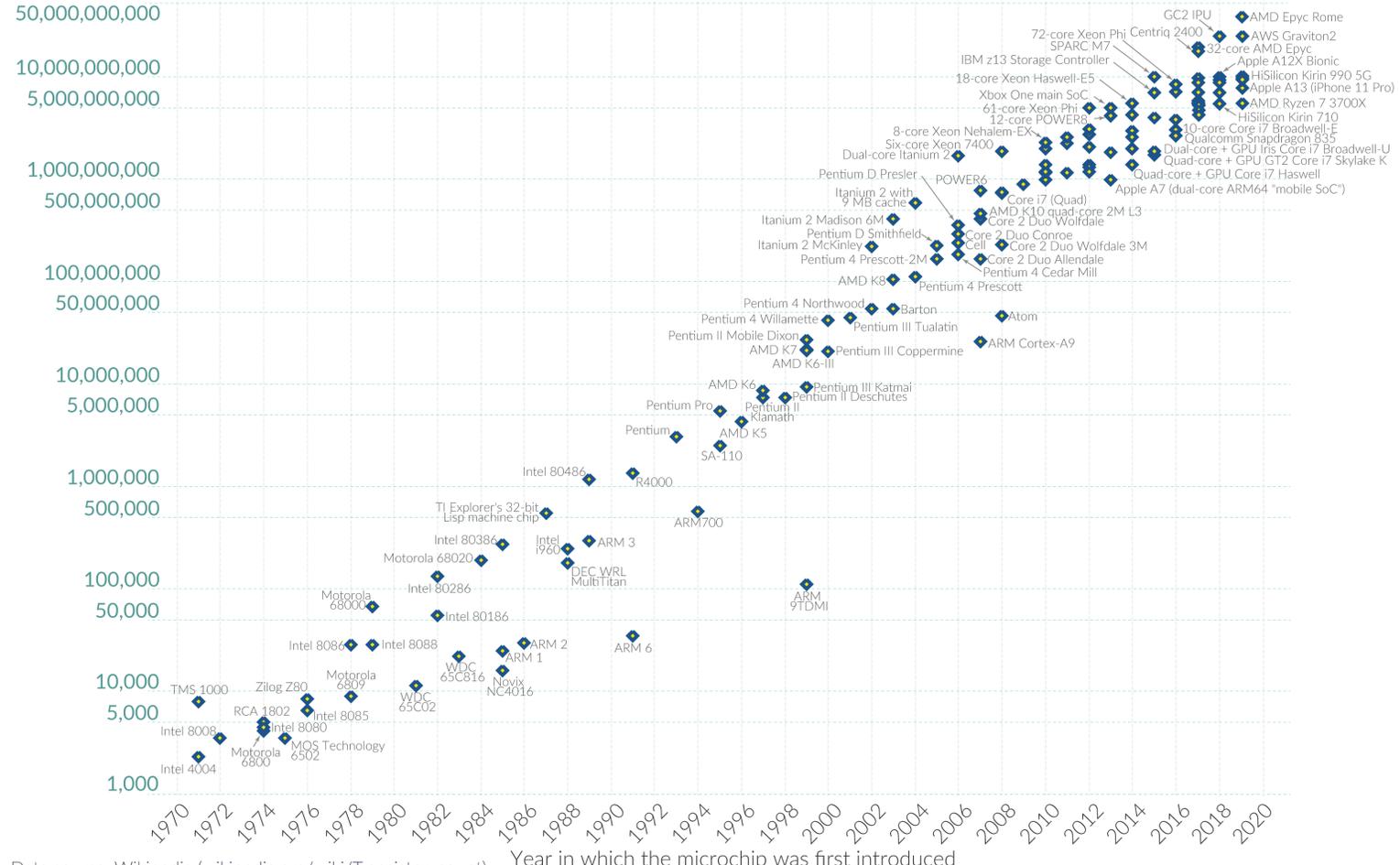
# The Compute Explosion: Scaling-Up

## Moore's Law: The number of transistors on microchips doubles every two years

Moore's law describes the empirical regularity that the number of transistors on integrated circuits doubles approximately every two years. This advancement is important for other aspects of technological progress in computing – such as processing speed or the price of computers.



### Transistor count



Model	Year	Parameters
Google BERT	2018	340 million
OpenAI GPT-2	2019	1.5 billion
OpenAI GPT-3	2021	175 billion
Microsoft/Nvidia Megatron-Turing NLG	2021	530 billion
Google LaMDA	2022	137 billion
Google PaLM	2022	540 billion
OpenAI GPT-4	2023	unknown

Data source: Wikipedia ([wikipedia.org/wiki/Transistor\\_count](https://wikipedia.org/wiki/Transistor_count))  
 OurWorldinData.org – Research and data to make progress against the world's largest problems. Licensed under CC-BY by the authors Hannah Ritchie and Max Roser.

# Black boxes and Prompt Engineering experiments



There seems to be more to it

“Recent investigations like the one Dyer worked on **have revealed that LLMs can produce hundreds of “emergent” abilities** — tasks that big models can complete that smaller models can’t, many of which seem to have little to do with analyzing text.”



“**That language models can do these sort of things was never discussed in any literature that I’m aware of,**” said Rishi Bommasani, a computer scientist at Stanford University. Last year, he helped **compile a list of dozens of emergent behaviors**, including several identified in Dyer’s project. **That list continues to grow.**”

Yi Tay, a scientist at Google Brain who worked on the systematic investigation of breakthroughs, points to recent work suggesting that **chain-of-thought prompting** changes the scaling curves and therefore the point where emergence occurs. [...] Such prompts, which ask the model to explain its reasoning, may help researchers begin to investigate why emergence occurs at all.



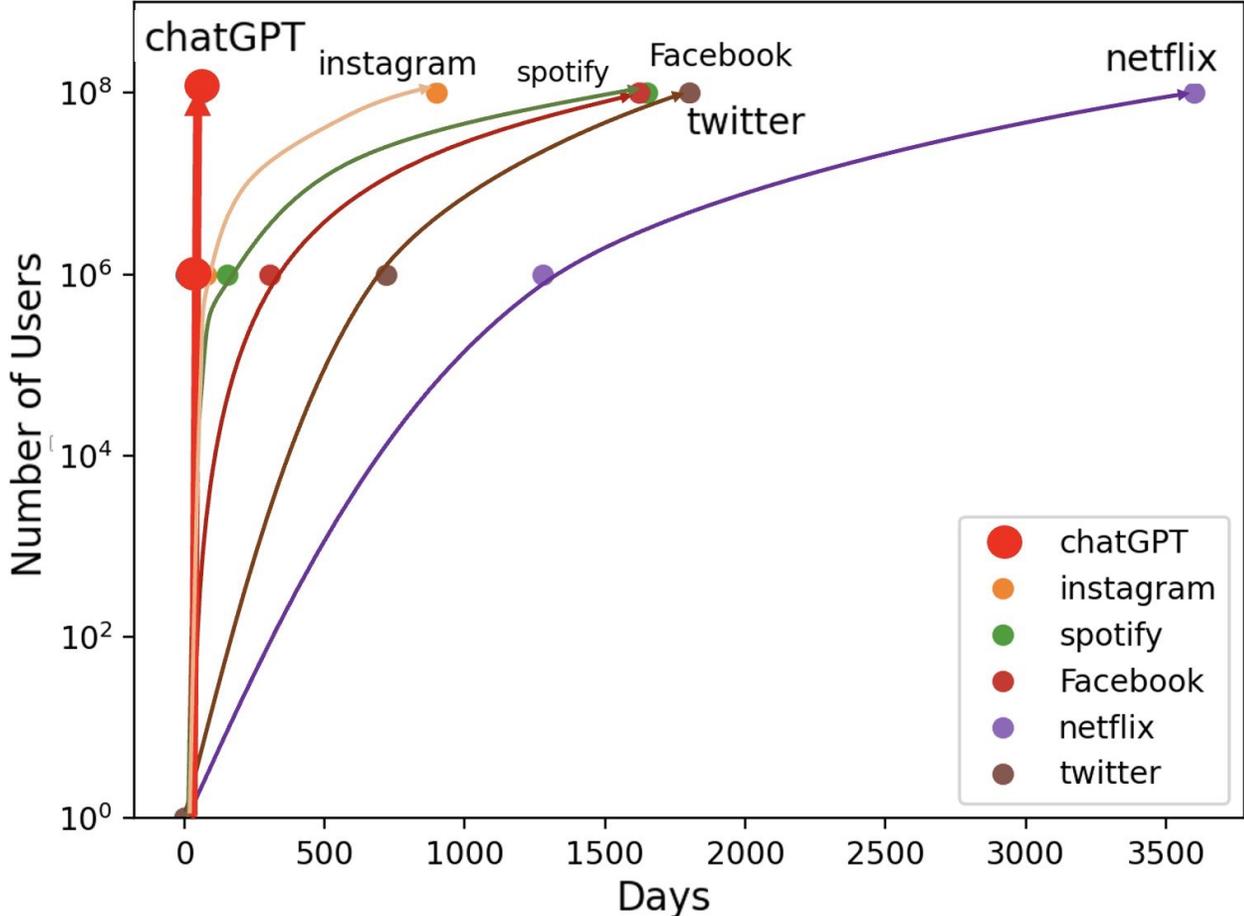
-- [The Unpredictable Abilities Emerging From Large AI Models, Stephen Ornes, March 16, 2023, Quanta Magazine](#)

## 2. Where are we now?



# The current situation and the near future

The first half of 2022 was marked by image generation models (**DALL-E 2, Midjourney, Stable Diffusion**), but the end of the year was certainly marked by **ChatGPT**, which exploded to **1 million users in just one week and 100 million in two months**.



# Artificial Intelligence as a Service (AlaaS)

**gpt-4** More capable than any GPT-3.5 model, able to do more complex tasks, and optimized for chat (8,192 tokens) **gpt-4-0314** Snapshot of gpt-4 from March 14th 2023. Unlike gpt-4, this model will not receive updates, and will only be supported for a three month period ending on June 14th 2023. (8,192 tokens) **gpt-4-32k** - Same capabilities as the base gpt-4 mode but with 4x the context length (32,768 tokens) **gpt-4-32k-0314** - Snapshot of gpt-4-32 from March 14th 2023. Unlike gpt-4-32k, this model will not receive updates, and will only be supported for a three month period ending on June 14th 2023. (32,768 tokens) **code-davinci-002**: good for pure code-completion tasks **text-davinci-002**: is an InstructGPT model based on code-davinci-002 **text-davinci-003**: is an improvement on text-davinci-002 **gpt-3.5-turbo-0301**: is an improvement on text-davinci-003, optimized for chat (...only be supported for a three month period ending on June 1st 2023) **gpt-3.5-turbo**: most capable GPT-3.5 model and optimized for chat at 1/10th the cost of text-davinci-003. Will be updated with our latest model iteration. **davinci**: Most capable GPT-3 model. Can do any task the other models can do, often with higher quality (2,049 tokens, Up to Oct 2019) **curie**: Very capable, but faster and lower cost than Davinci (2,049 tokens, Up to Oct 2019) **babbage**: Capable of straightforward tasks, very fast, and lower cost (2,049 tokens, Up to Oct 2019) **ada**: Capable of very simple tasks, usually the fastest model in the GPT-3 series, and lowest cost (2,049 tokens, Up to Oct 2019) **text-moderation-stable** **text-moderation-latest**

**OpenAI**

**Amazon Bedrock**

**Generative AI on Google Cloud**

**MS Azure**

**OpenAI Service**

# The possibilities

Over 300 applications are delivering GPT-3–powered search, conversation, text completion, and other advanced AI features through our API.

[-- OpenAI, GPT-3 powers the next generation of apps](#)  
[March 25, 2023](#)

**Algolia:** semantic search

**Duolingo:** language courses

**Khan Academy:** education

**GitHub Copilot:** software engineering

**Microsoft Bing:** search

**Microsoft 365 Copilot:** office

...

**Natural Language Processing (NLP)**

**Chatbots and virtual assistants**

**Content generation**

**Search and recommendation systems**

**Customer service**

**Medical diagnosis and research**

**Language learning**

**Content moderation**

**Data analysis**

**Marketing and advertising**

**Creative writing and storytelling**

**Education**

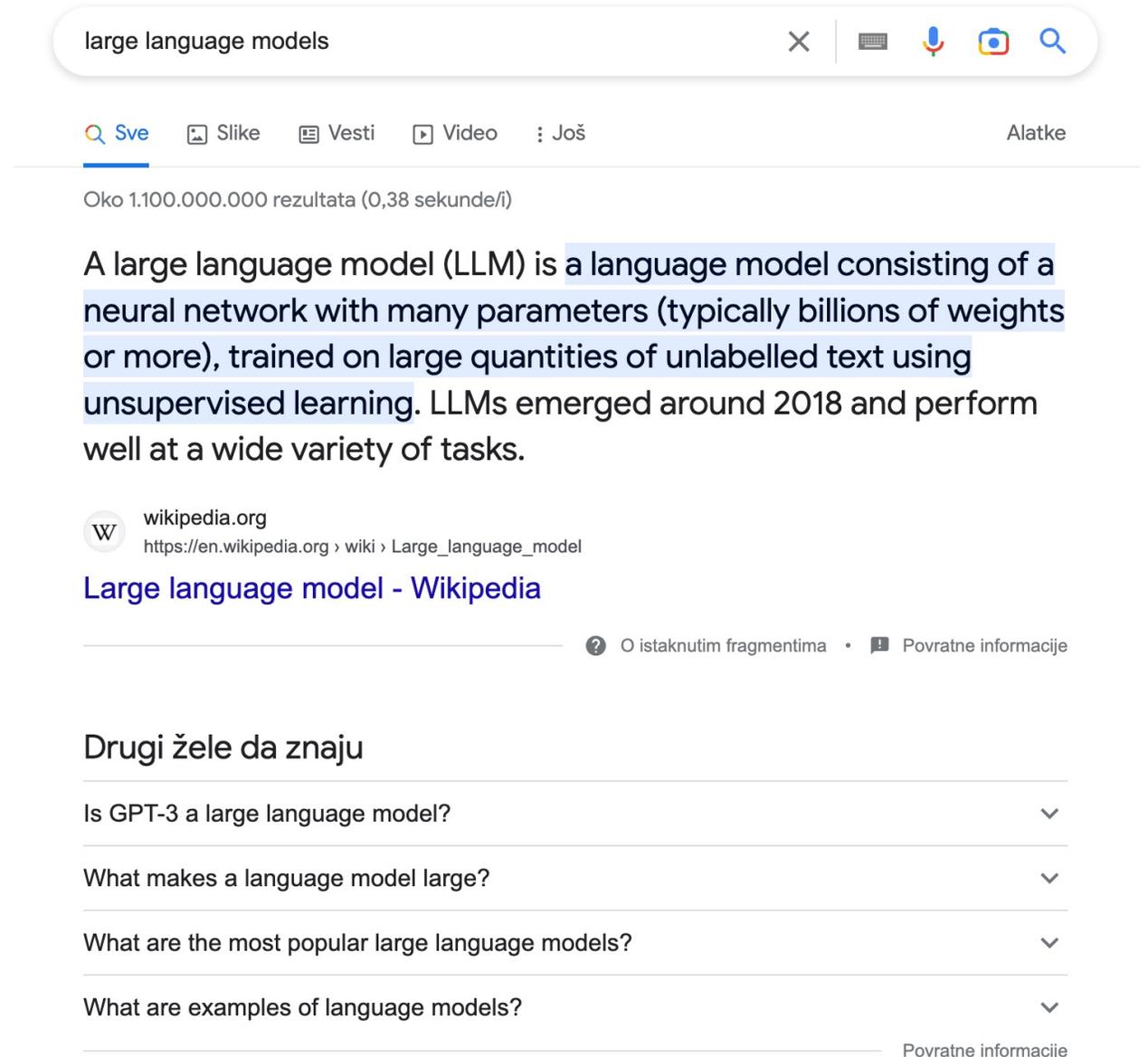
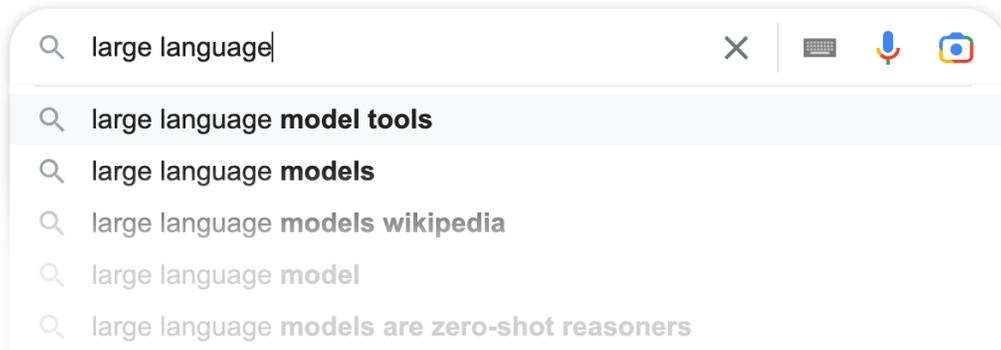
**Knowledge management**

**Legal research and analysis**

**Financial analysis and forecasting**

**Code completion, Code generation, Code review, Bug detection**

**Autocomplete, text summarization,  
recommendation of similar content,  
semantic search.**



# Automatic Translation



Text

Documents

Websites

SERBIAN - DETECTED

ENGLISH

SPANISH

FRENCH



ENGLISH

SPANISH

ARABIC



У основи NLP/NLU налазе се рачунарски алати који служе да текст писан природним језиком учине погодним за даљу обраду помоћу рачунара.



U osnovi NLP/NLU nalaze se računarski alati koji služe da tekst pisan prirodnim jezikom učine pogodnim za dalju obradu pomoću računara.



134 / 5,000



At the core of NLP/NLU are computer tools that serve to make text written in natural language suitable for further processing by computers.



# Paraphrasing, shortening and lengthening of text, determining similarities

The screenshot displays the QuillBot Premium Paraphraser interface. At the top left is the QuillBot Premium logo. The main title is "Paraphraser". On the right side, there are icons for the US flag, a moon (dark mode), and a user profile 'S'. A left sidebar lists various tools: Paraphraser (selected), Grammar Checker, Plagiarism Checker, Co-Writer, Summarizer, Citation Generator, Chrome Extension, and Word Extension. The main workspace is divided into two panels. The left panel contains the original text: "At the core of NLP/NLU are computer tools that serve to make text written in natural language suitable for further processing by computers." Below this text is a word count of "23 Words". The right panel shows the paraphrased text: "At the heart of NLP/NLU are computer tools that convert natural language text into text that computers can process." Below this text is a word count of "19 Words". A green "Rephrase" button is positioned between the two panels. Above the paraphrased text, there are controls for "Modes" (Standard, Fluency, Formal, Simple, Creative, Expand, Shorten) and a "Synonyms" slider. A vertical toolbar on the far right includes icons for settings, a tree view, chat, and keyboard shortcuts.

QuillBot PREMIUM

Paraphraser

Modes: Standard **Fluency** Formal Simple Creative Expand Shorten Synonyms:

At the core of NLP/NLU are computer tools that serve to make text written in natural language suitable for further processing by computers.

23 Words

Rephrase

At the heart of NLP/NLU are computer tools that convert natural language text into text that computers can process.

19 Words

# Knowledge Management: Automatic organization of documents by type, language, names/titles, locations...

The screenshot displays a document management system interface. On the left, a sidebar contains navigation icons. The main area shows search results for 'H4201030M.pdf'. The right panel provides a detailed view of the document, including a search bar, navigation options, and a list of extracted named entities categorized by type: People (36), Organizations (52), and Locations (61). A tooltip highlights the extraction process: 'Extracted using CORENLP in ENGLISH'.

Back to search results Previous Next Mark as recommended Download

## H4201030M.pdf

EXTRACTED TEXT PREVIEW TAGS & DETAILS NAMED ENTITIES

### People (36)

KOHL HUTCHISON LUXCO HUTCHISON KOHL PEETERS LUXCO LUXCO LUXCO LUXCO LUXCO WIM PIOT WIM PIOT  
MARIUS KOHLLUXEMBOURG HUTCHISON CONFIDENTIAL HUTCHISON ROBERT ECBRT ECKERT LUXELLBOURG ILCJB DINE AUMIAN SCHILLING  
ROBIO SNG DIRECTOR HUTCHISON HUTCHISON ROBERT ECKERT ECKERT HUTCHISON ROBINDIRECTORHUTCHISON HUTCHISON ROBERT  
HUTCHISON HUTOHLSA DILLION ROBIN ROBERT ECKERT ECKERT HUTCHISON

### Organizations (52)

MR PEETERS ADMINISTRATION DES CONTR...ria, the fiscal value of LuxCo's  
LUXEMBOURG TELEPHONE HUTCHISON  
HUTCHISON WHAMPOA LIMITED AUSTRIA  
R.C. LUXEMBOURG BUREAU D'IMPOSITIO...participation in H3G Holdings should consist of its acquisition price, increased by the  
RMS/VLN/H4201030M-WPIHUTCHISON WH...amounts granted by LuxCo to H3G Austria. The total amount of these contributions will  
HUTCHISON WHAMPOA LIMITED HUTCHISON 3G AUSTRIA GMBH  
H3G HOLDINGS R.C. LUXEMBOURG B LUXCO LUXCO H3G HOLDINGS H3G HOLDINGS LUXCO H3G HOLDINGS LUX CO LUXCO LUXCO  
H3G HOLDINGS H3G HOLDINGS LUXCO H3G HOLDINGS HUTCHISON 3G AUSTRIA INVESTMENTS S.A.R.L. HUTCHISON 3G AUSTRIAGMBH  
AUSTRIA INVESTMENTS S.A.R.L. HDTCHISON 3G AUSTRIA GMBH HUTCHISON AUSTRIA INVESTMENTS YHUTCHISON 3G AUSTRIA INVESTMENTS  
HUTCHISON 3G AUSTRIA GMBH HUTCHISON 3G AUSTRIA HOLDINGS HUTCHISON 3G AUSTRIA GMBH. HUTCHISON 3G AUSTRIA GMBH FCBRUAR  
AUSTRIA GMBH AUSLRIA INVESTMENTS S.A.R.L. HUTCHISON 3G AUSTRLA HOLDINGSGMBH HUTCHISON 3G AUSTRIA GMBH

### Locations (61)

EUROPE AUSTRIA AUSTRIA AUSTRIA LUXEMBOURG EUROPE AUSTRIA AUSTRIA AUSTRIA AUSTRIA AUSTRIA AUSTRIA AUSTRIA  
AUSTRIA AUSTRIA AUSTRIA AUSTRIA AUSTRIA ILL AUSTRIA LUXEMBOURG AUSTRIA AUSTRIA AUSTRIA AUSTRIA AUSTRIA  
LUXEMBOURG AUSTRIA AUSTRIA LUXEMBOURG AUSTRIA AUSTRIA AUSTRIA AUSTRIA AUSTRIA LUXEMBOURG LUXEMBOURG  
AUSTRIA AUSTRIA EUROPE AUSTRIA VIENNA AUSTRIA HATCBISOO AUSTRIA AUSTRIA EUROPE JC LUXEMBOURG VIENNA

Show more locations

6.5.2

# Sentiment Analysis



Filter by Review Date Input field filters Topic Sentiment Intent Clear All

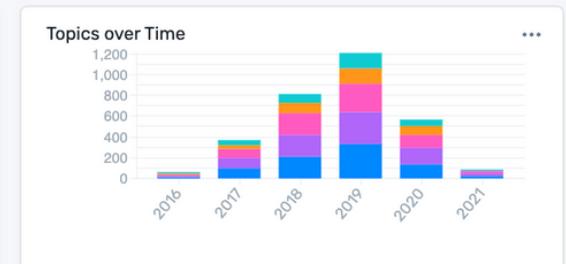
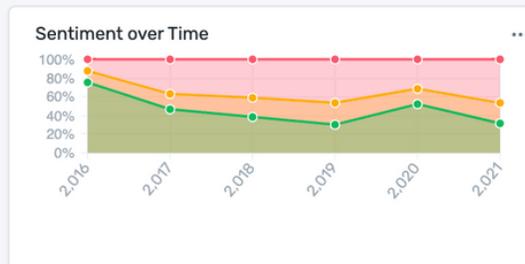
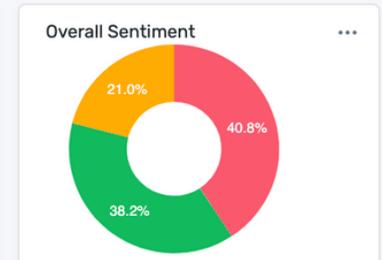
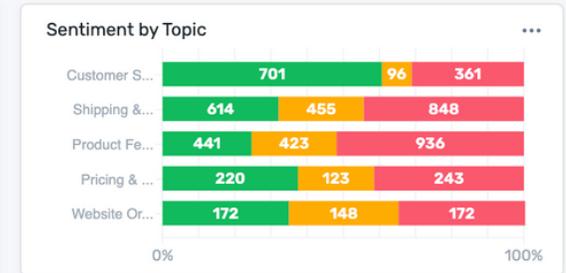
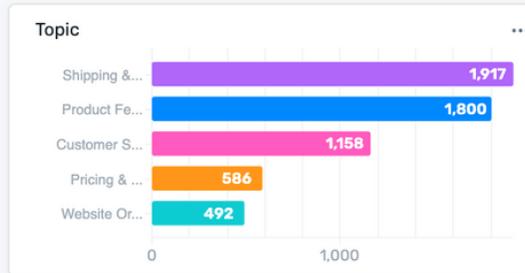


Total Comments  
**5,639**

Search... 5000 samples

rating	Text	Sentiment	Topic
1 5	and half empty. They replaced my litter for free. Last November my beagle got really sick. My vet said it was arthritis but it was kidney fa	Negative	Product Feedback
2 1	I tried to see if I could do better buying my dog food through Chewy and the pricing did not even come close. My wet dog food is .70 cheaper at the pet store n	Negative	Pricing & Fees Product Feedback
3 5	I have been using Chewy for about a year now. I have my dog food shipped to me and have cat food shipped to my daughter. She recently moved and gave me the wrong spelling	Neutral	Product Feedback
4 1	I was extremely happy with Chewy's prior to the business being sold to PetSmart. Customer Service was efficient and the delivery	Positive	Product Feedback

1-10/5000 < >



# Answering questions and automated interaction with users (chatbots, virtual assistants)

 Pretend that you are a hiring manager for an AI position and that you are conducting an interview with a prospective employee. Ask me a question at an expert level.

 As a hiring manager for an AI position, I would like to assess your understanding of state-of-the-art techniques in deep learning. Can you please explain the concept of attention mechanisms in transformer models, and discuss how self-attention is used to capture the dependencies between different positions in the input sequence? Additionally, can you highlight any key advantages and limitations of using transformers for natural language processing tasks?

 List top 3 highest grossing movies in a tabular form "movie", "year", "amount"

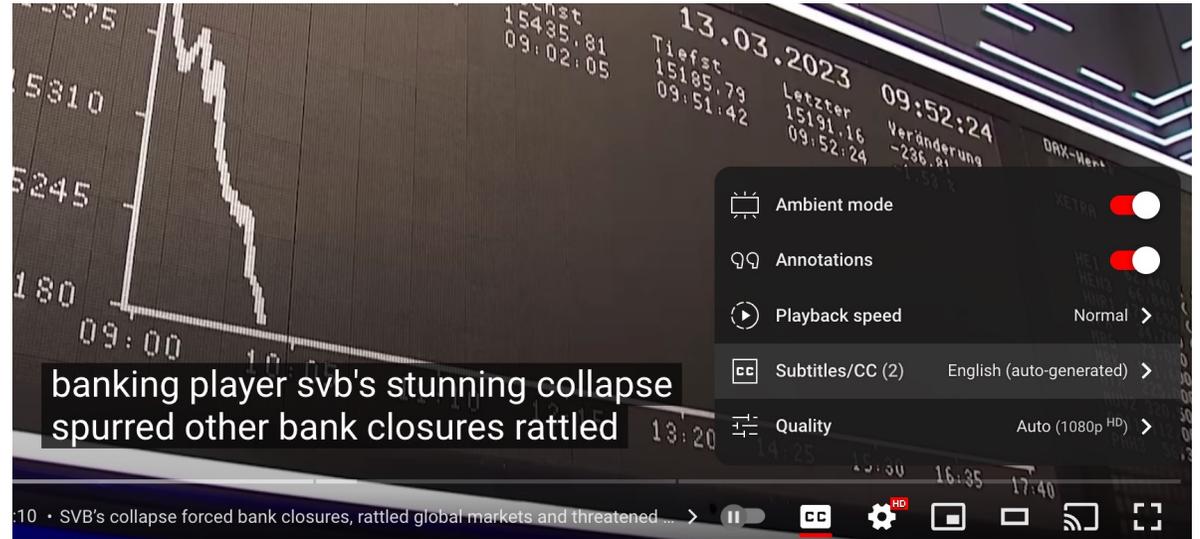
 As my knowledge was last updated in September 2021, here are the top 3 highest-grossing movies up to that point. Please note that these figures might have changed in the meantime.

Movie	Year	Amount (worldwide gross)
Avatar	2009	\$2,847,246,203
Avengers: Endgame	2019	\$2,798,589,794
Titanic	1997	\$2,202,201,882

## Automatic Speech Recognition (ASR)



Voice device control (digital assistants)



Automatic captioning of audio-video content

# Speech Synthesis (text-to-speech, TTS)



УТОРАК, 31.01.2023, 11:05 -> 16:07

ИЗВОР:  
DW (ДОЈЧЕ ВЕЛЕ)

## Вештачка интелигенција у школи: ChatGPT ради домаће задатке

Софтвер који користи вештачку интелигенцију ChatGPT пише писмене задатке у школама и решава домаће задатке. Да ли би то требало користити или забранити? Да ли је то помоћ или ризик? И шта раде у немачким школама?

# Voice cloning

Click on a voice to hear it

 <b>Elon</b>           	 <b>The Rock</b>           	 <b>JFK</b>           
 <b>Tom</b>           	 <b>Offerman</b>           	 <b>Joe</b>           
 <b>Neil D. Tyson</b>           	 <b>Obama</b>           	 <b>Kevin Hart</b>           

# Generating music (based on textual description)

## Caption

## Generated audio

The main soundtrack of an arcade game. It is fast-paced and upbeat, with a catchy electric guitar riff. The music is repetitive and easy to remember, but with unexpected sounds, like cymbal crashes or drum rolls.

▶ 0:00 / 0:30 — 🔊

A fusion of reggaeton and electronic dance music, with a spacey, otherworldly sound. Induces the experience of being lost in space, and the music would be designed to evoke a sense of wonder and awe, while being danceable.

▶ 0:00 / 0:30 — 🔊

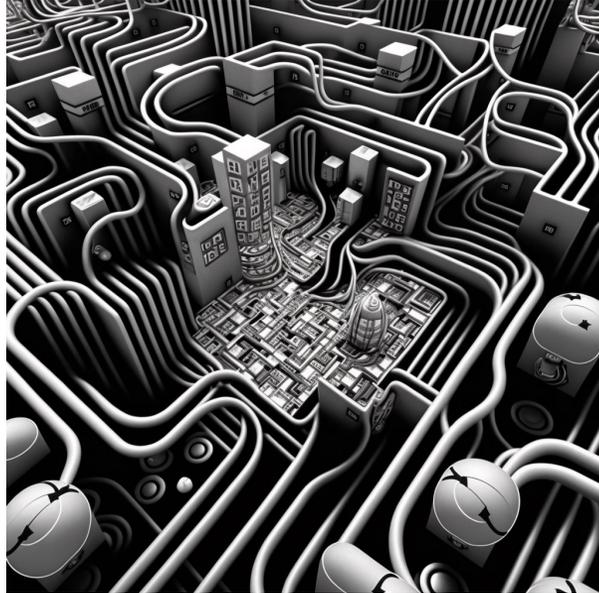
A rising synth is playing an arpeggio with a lot of reverb. It is backed by pads, sub bass line and soft drums. This song is full of synth sounds creating a soothing and adventurous atmosphere. It may be playing at a festival during two songs for a buildup.

▶ 0:00 / 0:30 — 🔊

Slow tempo, bass-and-drums-led reggae song. Sustained electric guitar. High-pitched bongos with ringing tones. Vocals are relaxed with a laid-back feel, very expressive.

▶ 0:00 / 0:30 — 🔊

# Image Generation (Midjourney)



## Their combination is particularly interesting!

- **Virtual customer support agent.** Speech-to-text translation, understanding of questions and generating responses, speech synthesis.
- **Virtual actors, TV/podcast hosts, historical figures.** Generating text in a specific style, speech synthesis with a cloned voice, generating 3D avatars based on images.
- **AI tribute band.** Generating text and music in a specific style, speech synthesis (singing) with a cloned voice.
- **Automatic sign language generation for any audio or video content.** Speech-to-text translation, sign language generation by a 3D avatar.
- **Automatic video generation based on text.** Generating a sequence of images (storyboard) from textual descriptions, generating a video based on the storyboard.

# The limits

- 1. Data bias.** LLMs are trained on large datasets of text, which can be biased towards certain perspectives or demographics; can sometimes produce biased or discriminatory outputs.
- 2. Hallucinations in LLMs.** Refer to instances where the model generates output that is not based on the input or the task it was trained to perform. In other words, the model generates output that is not grounded in reality, but rather reflects patterns or information it has learned from the training data.
- 3. Lack of common sense:** LLMs lack the common sense knowledge that humans possess, which can lead to misunderstandings or nonsensical responses in certain situations.
- 4. Difficulty with complex reasoning.** While LLMs are adept at language processing tasks, they can struggle with more complex reasoning tasks that require deeper understanding and analysis.
- 5. Inability to generate original content.** While LLMs can generate high-quality text, they are not capable of generating truly original or creative content.
- 6. Lack of interpretability.** LLMs are often described as "black boxes" because it can be difficult to understand how they arrive at their outputs. This lack of interpretability can make it challenging to diagnose and correct errors or biases.

# Openness and competition

[dealroom.com](https://dealroom.com) mapped **250+** generative AI startups, updated 11 April 2023.

Trends to watch in **2023**, according to [Forbes](https://www.forbes.com):

- **Generative AI Infrastructure** (where models live: OpenAI, Google, Anthropic, Hugging Face, Stability)
- **Predictive Infrastructure** (Data Management and Data Engineering support for Generative AI training)
- **Generative AI Applications** (mainly content creation, co-writing, marketing)
- **Predictive AI Applications** (i.e. anomaly detection; [Abnormal Security](https://abnormalsecurity.com), [Viz.ai](https://viz.ai))



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## GPT-4 Technical Report

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OpenAI\*

Abstract

we used python



## Bard can explain why large language models might make mistakes

Meet Bard: your creative and helpful collaborator, here to supercharge your imagination, boost your productivity, and bring your ideas to life.

**Bard isn't currently supported in your country. Stay tuned!**

# Openness and competition

- **A lot is being invested in AI** (just this year, Microsoft **invested \$10B in OpenAI**, while Google **invested \$300M in Anthropic**), and there will be even more investment in the future.
- In the coming years, **there is expected to be an explosion of user AI applications** and the creation of ecosystems around large (foundational) models and their APIs.
- Some functionalities will be incrementally **built into software that we already use massively** (office applications, ticketing software, image and sound processing applications), **but there will also be more AI-first software.**

# Openness and competition

- Despite the hype, **most (generative) AI systems are currently in early stages of development.** Generative AI models have flaws/limitations and for further progress in the field of AI, solutions are needed that will enable more efficient self-learning (from smaller amounts of data), better reasoning, generalization ability, etc.
- Generative AI models are **currently mostly large and demanding** - the training data and models are measured in gigabytes and terabytes, and the process of **training and generating content requires a lot of memory, processing power, and energy.**
- That is why they are **usually stored on dedicated computer clusters of large cloud providers** (such as Microsoft Azure, Google Cloud, Amazon AWS) and are typically available via APIs for integration into user applications.
- There is **intense work being done to optimize the models so that they can be executed on weaker hardware**, such as personal computers and phones (for example, open-source models such as **Stable Diffusion** or **LLaMA**).
- At the same time, a new generation of **consumer hardware optimized for AI applications** is being developed (such as **Apple's M-series processors**).

### **3. Risks and Future Prospects**



# The Artificial General Intelligence (AGI)

# **The Artificial General Intelligence (AGI)**

**IS NOT COMING ANYTIME SOON.**

# The Artificial General Intelligence (AGI)

**(ONCE AND FOR ALL)**

# **The Artificial General Intelligence (AGI)**

**SYSTEMS OF ASSOCIATIVE LEARNING  
(SUPERVISED, SELF-SUPERVISED,  
REINFORCED, WHATEVER) LIKE OUR  
GENERATIVE AIs HAVE KNOWN, INTRINSIC  
LIMITATIONS.**

# The Artificial General Intelligence (AGI)

**CHILDREN DO NOT NEED TO READ THE  
WHOLE INTERNET WHILE THEY PERFECTLY  
MASTER HUMAN LANGUAGE.**

## **The Artificial General Intelligence (AGI)**

**THAT ANYTHING THAT PLAYS A ROLE OF A  
SUBJECT IN A SENTENCE IN SERBIAN  
LANGUAGE NEEDS TO BE PUT IN THE  
NOMINATIVE CASE IS NOT  
A STATISTICAL FACT. SIMILAR FOR PYTHON.**

# The Artificial General Intelligence (AGI)

**MORE IMPORTANT, "DO NOT KILL" AND  
"DO NOT STEAL" ARE NOT STATISTICAL  
FACTS.**

# Immediate risks, catastrophic risks

**MISUSE OF THE TECHNOLOGY**  
**WEAPONIZATION OF AI**  
**JOB DISPLACEMENT**  
**BIASES AND DISCRIMINATION**  
**PRIVACY VIOLATIONS**  
**EROSION OF HUMAN VALUES**  
**DECREASE IN HUMAN CREATIVITY**  
**PLAGIARISM**  
**AUTOMATED PROPAGANDA**

**LOSS OF CONTROL**  
**INSTRUMENTAL CONVERGENCE**  
**EXTINCTION LEVEL EVENT**  
**UNEXPECTED CONSEQUENCES**  
**UNINTENDED VALUES ALIGNMENT**  
**SYSTEM FAILURE**

## **Immediate risks, ~~catastrophic risks~~**

**WHEN WE INVENTED FAST INTERNET AND SOCIAL MEDIA, MANY STOPPED READING. NOW THAT WE HAVE COME UP WITH GENERATIVE ARTIFICIAL INTELLIGENCE, IS THERE A RISK THAT MANY WILL STOP THINKING?**

# The future

**“Prediction is very difficult, especially about the future.”**

# The future of the Internet

Vector database servers caching  
LLM embeddings for semantic search?  
Embeddings Exchange Points (EEP)?  
Emergent Web Ontologies?

# **The future of the Security and Privacy**

**Game Theory, business as usual.**

**It will just be more difficult and more complicated than it already is - if that is possible at all.**

**Automated propaganda: well, we were almost there already, it is only going to become cheaper.**

# **The future of the Education**

**Creative problem solving and research should be considered a primary criterion for human development, while recognizing that knowledge of facts and their reproduction and recapitulation are of secondary importance only?**

# **The future of work and creativity**

**The price of true creativity and genuine human intelligence will skyrocket.**

**People might become motivated to discover “the new” again and again and compete against generative AIs in what can be discovered and produced beyond recombination strategies.**

## Regulations and ethical guidelines

Although it has great potential for improving everyday life and work, the social consequences of widespread use of artificial intelligence are not easy to predict...

The EU is working on the **AI Regulation ([EU AI Act](#), expected in 2024)**, which is based on the assessment of the risk of AI application to human rights and society as a whole. For the most risky applications (unacceptable risk), a ban on the use of AI systems is proposed (e.g. systems that manipulate people at a subconscious level, continuous facial recognition and tracking systems in public spaces, social credit scoring). For less risky applications, various restrictions and obligations to provide publicly available information on how models are trained and applied are prescribed.

Serbia received its **["Ethical guidelines for the development, application, and use of reliable and responsible artificial intelligence"](#)** on 23 March 2023.





ИИ МАШИНИРИЈА

