



∞3L

**Teaching and Learning in the age
of AI: What are the opportunities?**

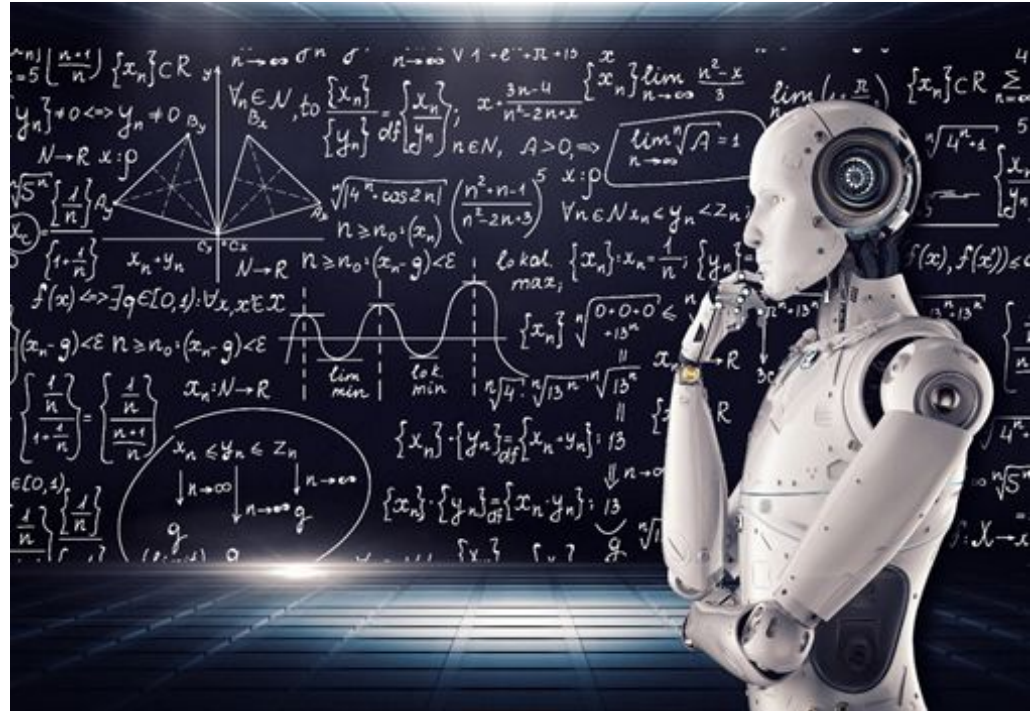
Vitomir Kovanovic & Srecko Joksimovic

What is artificial intelligence?

Making intelligent machines, especially intelligent computer programs.

It is just a name for technology.

Whether AI is “truly intelligent” or not is irrelevant



What is intelligence?

- Ability to learn
- Ability to adapt
- Ability recognize patterns
- Ability to solve problems

- Self-awareness?



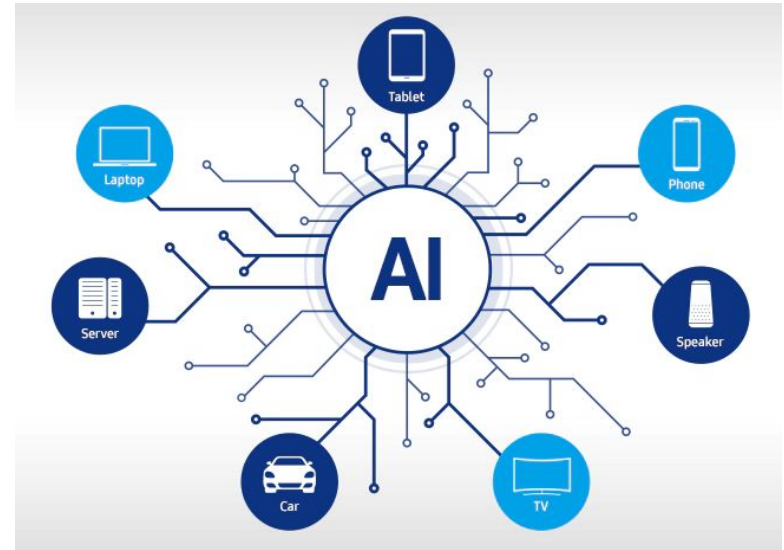
Two flavours of AI

Symbolic AI

- Based on logic
- Inductive and deductive reasoning
- Involves clever “searching” for solution

Machine Learning

- Figuring rules from data
- Less formal
- Messy and inconsistent



What is 'Learning' in Machine Learning

We build a model of things that affect house price

Price = size (sqm) * ? + rooms * ? + pool (y/n) * ?

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Expert: each sqm increases the price by ~ \$3,000

What is 'Learning' in Machine Learning

We build a model of things that affect house price

$$\text{Price} = \text{size (sqm)} * ? + \text{rooms} * ? + \text{pool (y/n)} * ?$$

Expert: each sqm increases the price by ~ \$3,000

$$\text{Price} = \text{size (sqm)} * 3,000 + \text{rooms} * ? + \text{pool (y/n)} * ?$$

What is 'Learning' in Machine Learning

Get past sales data

Price	Floor space	Rooms	Lot size	Appartment	Row house	Corner house	Detached
250000	71	4	92	0	1	0	0
209500	98	5	123	0	1	0	0
349500	128	6	114	0	1	0	0
250000	86	4	98	0	1	0	0
419000	173	6	99	0	1	0	0
225000	83	4	67	0	1	0	0
549500	165	6	110	0	1	0	0
240000	71	4	78	0	1	0	0
340000	116	6	115	0	1	0	0

What is 'Learning' in Machine Learning

Three question marks are three model parameters that we learn (estimate) from the data

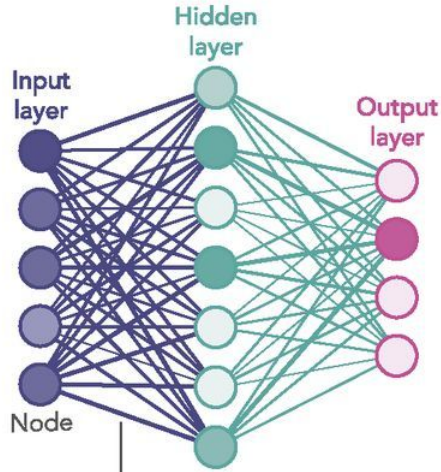
$$\text{Price} = \text{size} * ? + \text{rooms} * ? + \text{pool} * ?$$

We learn three parameters from training data

Neural networks

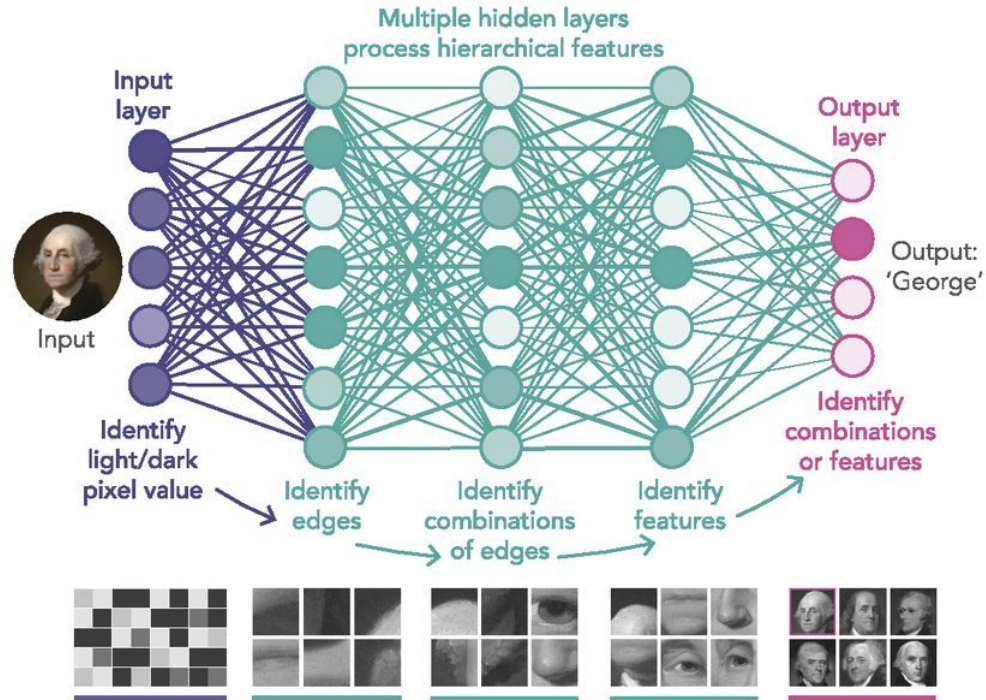


1980S-ERA NEURAL NETWORK



Links carry signals from one node to another, boosting or damping them according to each link's 'weight'.

DEEP LEARNING NEURAL NETWORK



Transformer networks

Simpler than recurrent networks used for processing text

Transforms input sequence into output sequence

Most of the time question -> response

- Initially small (few million parameters)
- Pre-trained on “small” data (all wikipedia articles)
- Typically further trained with specialised datasets (BERT)

Transformer networks

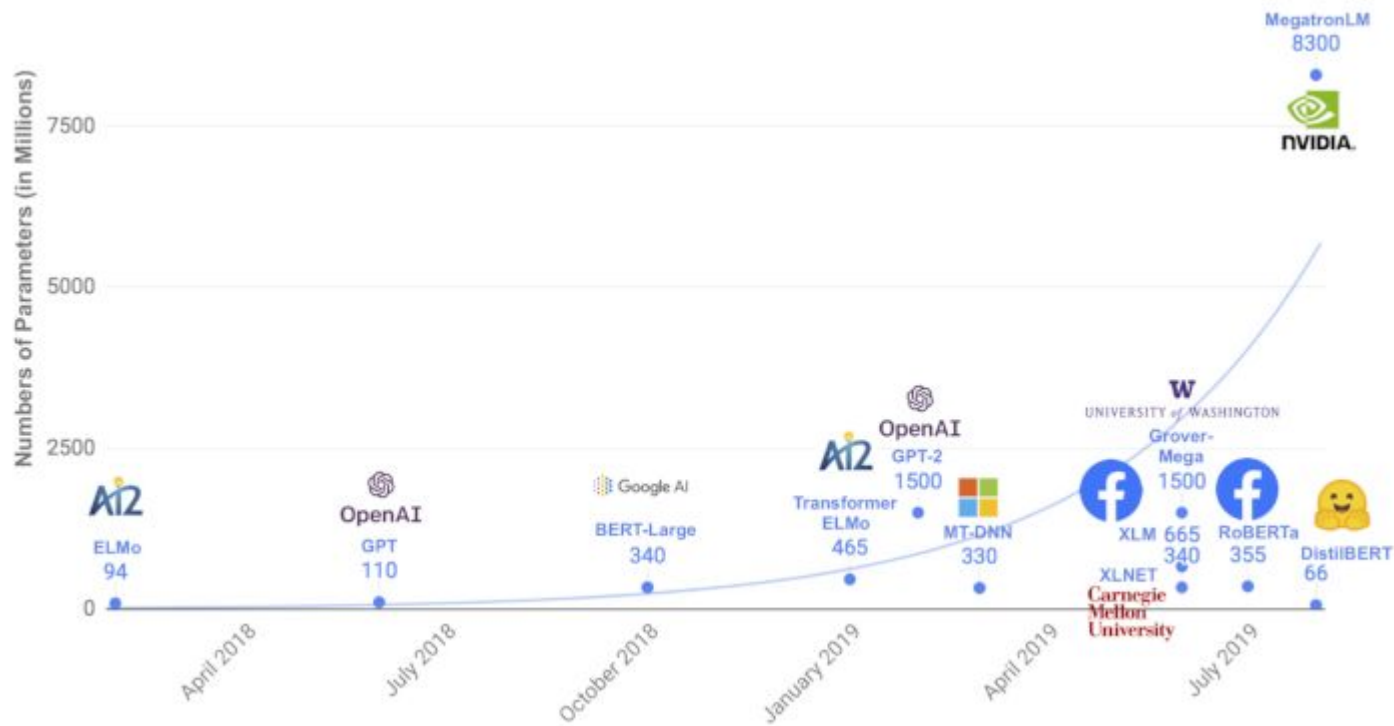
Significant technical advancements

- Can be run in parallel on multiple computers
- Can be trained with whole inputs rather than word by word

Actually quite simple

Led to large, General Pre-trained Transformers (GPT) -> General AI

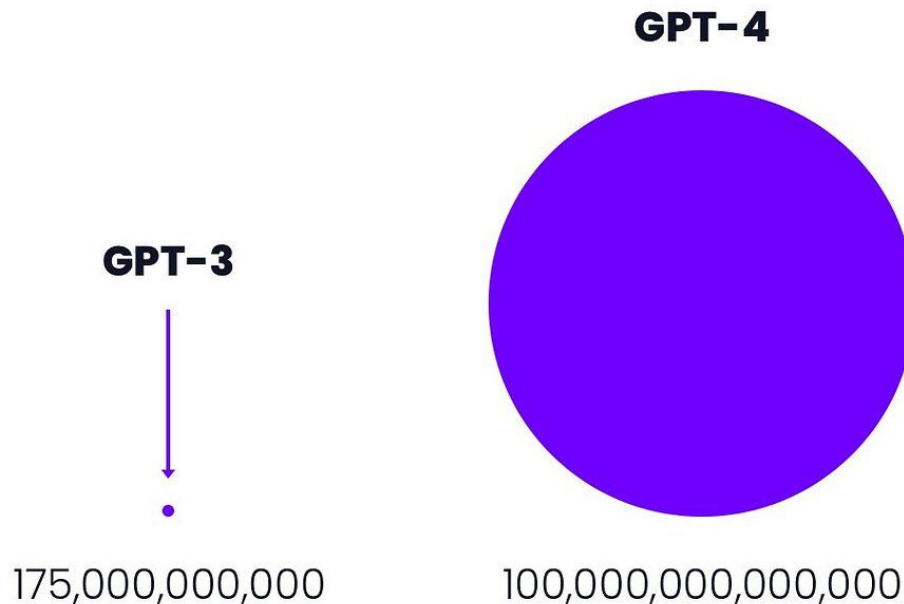
Rapid growth in size



GPT-3 vs GPT-4

45TB textual data
as input

800GB to store the
model



ChatGPT

Chat interface to GPT3 model

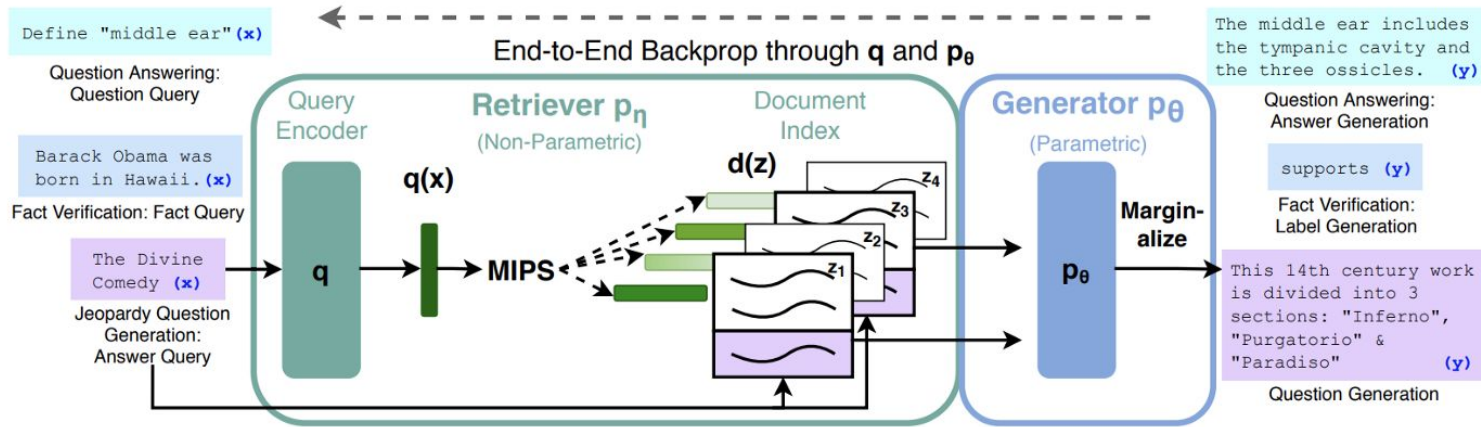
Extremely impressive results

Full extent of capabilities not clear

New field: prompt (input) engineering

Capabilities will only grow

- What the model currently can or can't do is not important so much
- Combining with search engine data: Retrieval augmented generation



Recap

- Machine learning -> learning model parameters
- Need “training” data to figure out (learn) model parameters
 - Map input to outcome
- Transformers: Simpler neural network models with billions of parameters
 - Can utilise cloud computers
 - Faster to train than previously popular RNN
 - New field prompt engineering

Impact on education

- Short term
 - Assessment
- Long term
 - What should we learn?

- Assessment
- Teaching support
- Learning support

Assessment

Make it harder for AI to help

Ask things that AI doesn't know about

- Ask students to summarise class discussions

Ask students to self-reflect on a particular topic

- Ask students to embed their own experience into their responses

Assessment

Embed AI into assessment

Assess the *process of using AI*

- Assess how AI is being used to generate response
- Assess the quality of prompts and critical thinking embedded in the prompts



Can you write me a short story about three little piggies set in the star wars universe



Once upon a time, in a galaxy far, far away, there were three little piggies living on the planet of Tatooine. They had always dreamed of escaping their mundane life and exploring the vastness of space. They spent their days tinkering with gadgets and dreaming of adventures beyond their wildest imaginations.



The first little piggy, whose name was Porkins, was an excellent mechanic. He spent most of his time in his workshop, building and repairing droids. He dreamed of one day building his own spaceship and traveling across the stars.

The second little piggy, whose name was Chewbacca, was a fearless warrior. He spent his days training and honing his combat skills. He dreamed of fighting for a just cause and defending the galaxy against evil forces.

The third little piggy, whose name was Luke, was a gifted pilot. He spent most of his time practicing his flying skills, hoping to one day join the legendary Rebel Alliance and fight against the tyranny of the Galactic Empire.



can you change it so that the third piggy is evil sith lord?



Once upon a time, in a galaxy far, far away, there were three little piggies living on the planet of Coruscant. They had always dreamed of power and domination, and they spent their days scheming and plotting to achieve their goals.

The first little piggy, whose name was Darth Porkins, was a cunning strategist. He spent most of his time planning his next move, hoping to gain more power and influence within the Sith Order.

The second little piggy, whose name was Chewbacca, was a fierce warrior. He spent his days training and honing his combat skills, dreaming of one day leading the Sith armies to victory.

The third little piggy, whose name was Darth Vader, was a gifted pilot and a powerful Sith Lord. He was feared throughout the galaxy for his cruelty and his thirst for power.

Together, the three little piggies plotted to overthrow the Galactic Republic and establish a new Sith Empire. They formed an alliance and began to execute their plan, using their unique skills and abilities to outmaneuver their enemies.



I don't want all three piggies to conspire against the republic, I want only the third one to be against the republic

Unlike his fellow piggies, Darth Vader had a different goal in mind. He saw the corruption and decadence of the Galactic Republic, and he believed that the only way to save the galaxy was to overthrow the Republic and establish a new order under the Sith.

Teaching support

- Design: Automate creation of learning materials
 - Study guides
 - Examples
 - Assignments, rubrics
 - Course outlines
 - Lesson and week plans
- Support:
 - Help create personalised feedback
 - Automated formative feedback
 - Personalise learning experience
 - Identify gaps, misconceptions, areas for improvement
 - Automate grading

Generating course outline



can you generate course outline for the university course titled "Research Methods and Issues in Education"?



Sure, here is a sample course outline for a university course titled "Research Methods and Issues in Education":



Course Title: Research Methods and Issues in Education

Course Description: This course will introduce students to the fundamental concepts and techniques used in educational research. Students will learn how to design and conduct research studies, analyze data, and communicate research findings. The course will also examine key issues in educational research, including ethical considerations, the use of technology, and the challenges of conducting research in diverse contexts.

Course Goals and Learning Outcomes:

1. Understand the basic concepts and techniques used in educational research
2. Develop skills in designing and conducting research studies
3. Analyze data using appropriate statistical methods
4. Communicate research findings through written and oral presentations
5. Identify ethical considerations in educational research
6. Understand the challenges of conducting research in diverse contexts

Course Topics:

Week 1: Introduction to Educational Research

- Overview of educational research
- Types of research studies
- Basic concepts in research design

Week 2: Research Questions and Hypotheses

- Formulating research questions
- Developing hypotheses
- Operationalizing variables

Week 3: Research Design

- Experimental and non-experimental designs
- Validity and reliability
- Sampling methods

Week 4: Data Collection Methods

- Surveys and questionnaires
- Interviews
- Observations

Generating course outline

Week 5: Data Analysis

- Descriptive statistics
- Inferential statistics
- Statistical software

Week 6: Writing and Presenting Research

- Writing a research report
- Communicating research findings
- Oral presentations

Week 7: Ethical Considerations in Educational Research

- Informed consent
- Confidentiality
- Institutional review boards

Week 8: Challenges in Conducting Educational Research

- Research in diverse contexts
- Using technology in research
- Challenges of conducting longitudinal studies

Assessment and Grading:

- Participation and Attendance: 10%
- Written Assignments: 40%
- Research Project: 40%
- Presentation: 10%

Note: The course outline may be adjusted to meet the needs of specific universities or instructors.

Learning support

- Language skills
 - Help write better
 - Provide feedback on writing
- Idea generation
 - Avoid writer's block and generate starting point
 - Explore different alternatives
- Understanding
 - Self-testing for understanding
 - Summarize complex topics and documents
 - Explain solutions to problems
 - Generate alternative solutions
 - Simplify solutions



I want you to test me on my knowledge of python programming. You will ask me 20 multiple choice questions about python programming constructs.



Sure, I can do that! Here's your first question:



1. What is the output of the following code snippet?

scss

Copy code

```
list = [1, 2, 3, 4, 5]
print(list[2:4])
```

- a) [2, 3]
- b) [3, 4]
- c) [3, 4, 5]
- d) [2, 3, 4]

Please select your answer from the options above.



d



Correct! The output of the code snippet will be `[3, 4]`. The slice `list[2:4]` includes elements at index 2 and 3, but not 4.



Challenges

- Training data can be compromised
 - Incorrect
 - Socially unacceptable
- Embed biases and prejudices that are not apparent
- Further dominance of “major” cultures
- A lot of computing power needed (CO2 footprint)
- Hard to trust
- Tricky to use
- Can be used to fool people
- Ethics of using data to train models

Big Questions and Implications for broader society

- What it means to create something?
 - Copyright
 - Creativity
 - Co-creation with AI

Big Questions and Implications for broader society

- What is the value of knowing something?
 - Two purpose of learning
 - Know something because it is useful to know
 - Act in the world
 - Employment
 - Know something because it is transformative
 - Changes in understanding self
 - Changes in belief systems
 - Changes in behaviour

Applications & Alternatives

Microsoft Teams + ChatGPT

<https://bit.ly/teams-gpt>

In other news:

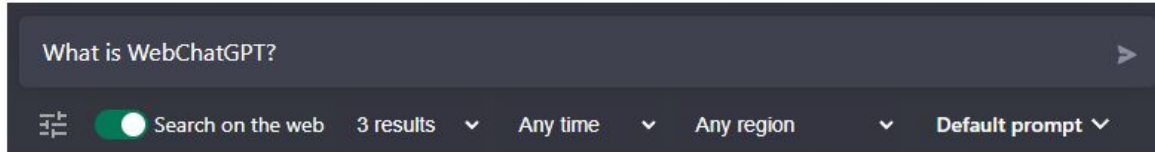
<https://techmonitor.ai/technology/ai-and-automation/microsoft-to-integrate-chatgpt-into-teams>

WebChatGPT

WebChatGPT

 Join server  144 online  Follow me

This browser extension `adds web access` capability to `ChatGPT`. Get much more relevant and up-to-date answers from the chatbot!



Link: <https://github.com/qunash/chatgpt-advanced>



ChatGPT for Google

ChatGPT for Google is a browser extension that enhances search engines with the power of ChatGPT. It works by showing ChatGPT responses alongside normal search engine results.

Link: <https://chatgpt4google.com/>

The screenshot displays a Google search for "what is the meaning of life?". The search results include a dictionary entry for "life" and a ChatGPT response. The dictionary entry defines "life" as the state of being alive, distinguishing animals and plants from inorganic matter. The ChatGPT response provides a philosophical and religious perspective on the meaning of life.

Google

what is the meaning of life?

All Images Videos Shopping Books More Tools

About 10,630,000,000 results (0.49 seconds)

Dictionary

Definitions from Oxford Languages · Learn more

Search for a word

life

ɪf/

is in:

Religion Games Penal - Informal Art

It distinguishes animals and plants from inorganic matter, including the capacity for motion, functional activity, and continual change preceding death.

living animation aliveness animateness

creature

Feedback

ChatGPT

The meaning of life is a question that has puzzled humanity for centuries, and there is no one definitive answer. Different people, cultures, and belief systems have proposed various theories and explanations about the purpose of existence.

From a philosophical standpoint, some argue that the meaning of life is subjective and that it depends on each individual's perception and interpretation of the world. Others believe that life has an objective meaning, which may be tied to a specific goal or purpose, such as achieving enlightenment or contributing to the greater good of humanity.

From a religious or spiritual perspective, the meaning of life may be linked to a higher power or spiritual purpose, such as serving God, attaining salvation, or fulfilling one's destiny.

Ultimately, the meaning of life is a deeply personal and subjective question that each individual must grapple with on their own terms, based on their own experiences, beliefs,

ChatGPT Writer

Free Chrome extension to generate entire emails and messages using ChatGPT AI.

All sites are supported and enhanced support for Gmail.

Link: <https://chatgptwriter.ai/>

The image displays two screenshots of the ChatGPT Writer Chrome extension integrated with Gmail. The top screenshot shows the extension's interface with the following elements:

- ChatGPT Writer** window title.
- Email context:** A text area containing the email body: "Hi I had a glance at your profile and I'm really impressed with your background and would like to connect with you to talk about a Software Development Engineer II (Backend developer) opportunity at Amazon Ads Amazon Ads helps brands of all sizes design ad experiences that delight customers around the world and deliver meaningful business results. With our 300+ million worldwide active customer accounts, as well as first-party insights based on shopping streaming, and browsing signals, brands can confidently craft relevant campaigns that enhance, rather than disrupt, the customer experience. Our breadth of solutions on Amazon combined with crowd-favorite services like Twitch, IMDb TV, Alexa, Amazon".
- Prompt:** A text input field with the text: "Generate reply to this email that I'm interested, ask about salary range, remote work optio".
- Annotations:** A red arrow points from the text "(email context is auto-loaded for you)" to the email context area. Another red arrow points from the text "1 Briefly enter what do you want to reply" to the prompt field.

The bottom screenshot shows the extension after generating a reply:


- Generated Reply:** A text area containing: "Hello Megha, Thank you for reaching out to me about the Software Development Engineer II opportunity at Amazon Ads. I am very interested in this opportunity and would love to learn more about it. Could you provide me with more information about the salary range for this position, as well as whether there is the option for remote work? These details would help me determine if this opportunity is a good fit for me. Thank you in advance for your help. I look forward to hearing back from you. Best regards,".
- Buttons:** Two buttons at the bottom: "Insert generated reply" (highlighted in pink) and "Generate reply".
- Annotations:** A red arrow points from the text "(personalised reply generated for you)" to the generated reply area. Another red arrow points from the text "Insert reply into gmail textbox" to the "Insert generated reply" button.

YouTube Summary

Free Chrome extension to generate entire emails and messages using ChatGPT AI.

All sites are supported and enhanced support for Gmail.

YouTube Summary with ChatGPT

Get summary of the YouTube videos.
Learn better with ChatGPT 



Install on Chrome



Install on Safari

No sign up required

Link: <https://glasp.co/youtube-summary>

Summarize

With the Summarize extension, you can get the main ideas of any page in just one click, without leaving the page.

Wordtune Read - an alternative

 chrome web store

[Home](#) > [Extensions](#) > Summarize



Summarize

★★★★★ 31 ⓘ

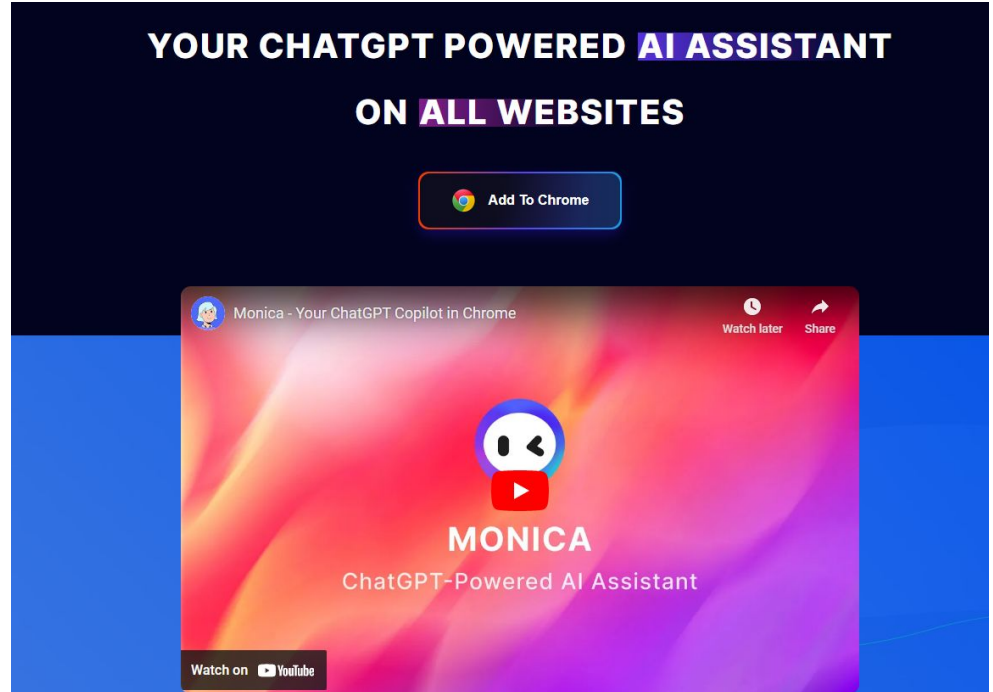
[Productivity](#) | 20,000+ users

[Overview](#)

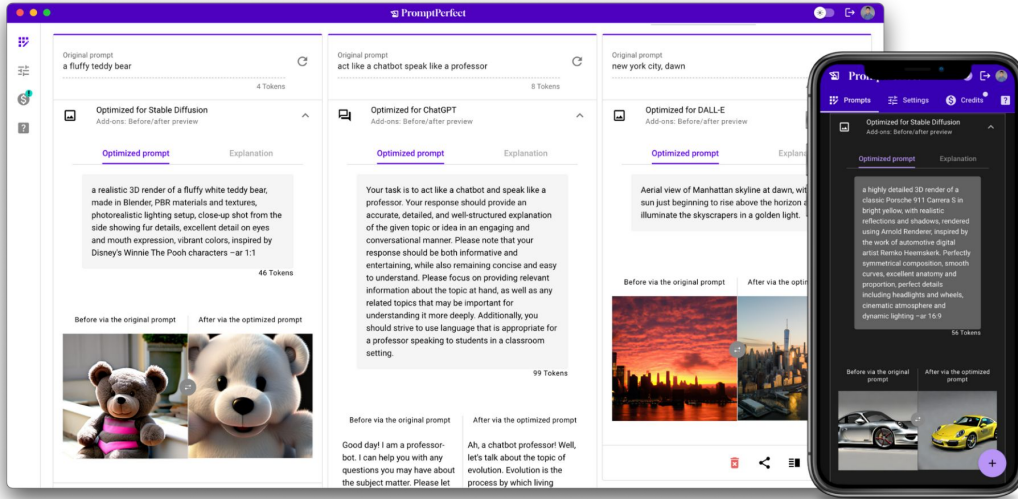
[Privacy practices](#)

Monica

- Chat about anything, anywhere
- Monica can answer any question you have, engages you in a contextual conversation, and provides writing inspiration.



PromptPerfect



- Optimizing prompts for ChatGPT, GPT-3.5, DALL-E, and StableDiffusion models
- Intuitive interface
- Amazing features

Link: <https://promptperfect.jina.ai/>

Why do we need alternatives?

1. ChatGPT can not generate real-time data
2. Can't generate visuals or AI art
3. Can't take voice commands or generate voice responses
4. Heavy traffic
5. ChatGPT Plus costs \$20/month

Some of the alternatives

ChatSonic

- large-scale pre-trained dialogue response generation models, specifically built for multi-turn conversations
- **Link:** <https://writesonic.com/chat>

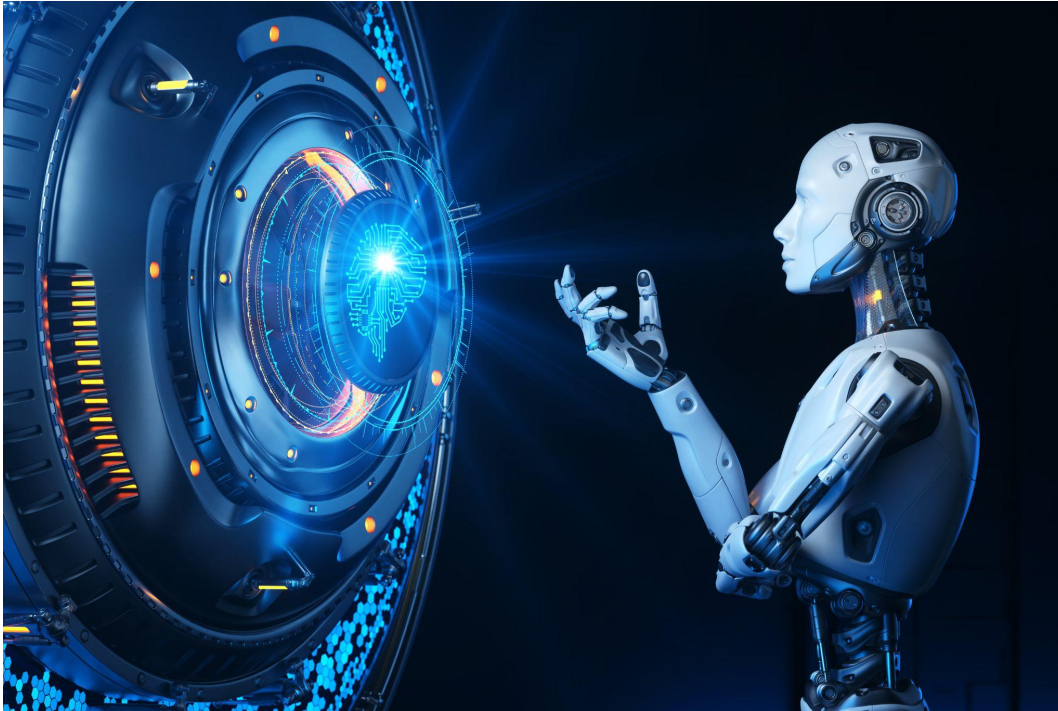
Bard AI

- Google's newest, revolutionary AI-powered chatbot
- **Link:** <https://bardai.io/>

Perplexity

- Collecting information from various popular platforms like Wikipedia, LinkedIn, and Amazon
- **Link:** <https://www.perplexity.ai/>

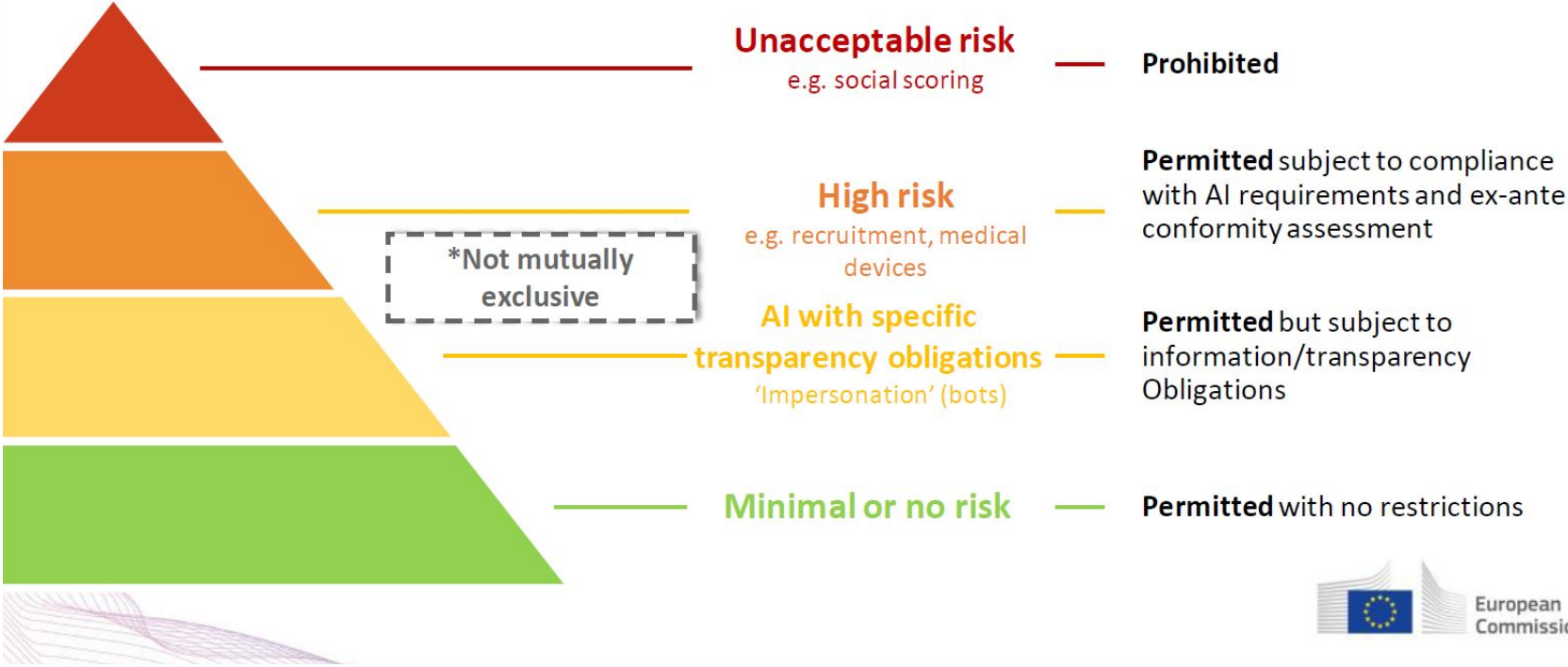
AI Agents



- AI-driven contact centers
- The Sims
https://reverie.herokuapp.com/arXiv_Demo/#
- <https://www.youtube.com/watch?v=nWBEMjAoA14>
- Healthcare
- Khanmigo, Khan Academy's AI-powered guide
- Metaverse

Regulation

AI is good, but...



High-risk Artificial Intelligence Systems (Title III, Annexes II and III)



Certain applications in the following fields:

1 SAFETY COMPONENTS OF REGULATED PRODUCTS

(e.g. medical devices, machinery) which are subject to third-party assessment under the relevant sectorial legislation

2 CERTAIN (STAND-ALONE) AI SYSTEMS IN THE FOLLOWING FIELDS

- ✓ Biometric identification and categorisation of natural persons
- ✓ Management and operation of critical infrastructure
- ✓ Education and vocational training
- ✓ Employment and workers management, access to self-employment
- ✓ Access to and enjoyment of essential private services and public services and benefits
- ✓ Law enforcement
- ✓ Migration, asylum and border control management
- ✓ Administration of justice and democratic processes

AI that contradicts EU values is prohibited (Title II, Article 5)

X

Subliminal manipulation
resulting in physical/
psychological harm

Example: An **inaudible sound** is played in truck drivers' cabins to push them to **drive longer than healthy and safe**. AI is used to find the frequency maximising this effect on drivers.

X

**Exploitation of children
or mentally disabled persons**
resulting in physical/psychological harm

Example: A doll with an integrated **voice assistant** encourages a minor to **engage in progressively dangerous behavior** or challenges in the guise of a fun or cool game.

X

**General purpose
social scoring**

Example: An AI system **identifies at-risk children** in need of social care **based on insignificant or irrelevant social 'misbehavior'** of parents, e.g. missing a doctor's appointment or divorce.

X

**Remote biometric identification for law
enforcement purposes in publicly accessible
spaces (with exceptions)**

Example: All faces captured live by video cameras checked, in real time, against a database to identify a terrorist.

Activity

Discovering the Needs and Preferences

Activity - MURAL

What applications of ChatGPT (or alternatives) would you like to see?

<https://bit.ly/uta-gpt>

Thank you

QA