

Part I. Introduction

1. Introduction to Artificial intelligence

Part II. Search and optimisation.

2. Search - basic approaches
3. Search - optimisation
4. Two-player deterministic games
5. Evolutionary and genetic algorithms

Part III. Machine learning and data analysis.

6. Regression, classification and clustering (Part I & II)
8. Artificial neural networks
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11. Propositional logic and predicate logic
12. Knowledge Representation

Part V. AI in Action: Language, Vision

13. AI in Natural language processing
14. AI in Vision and Graphics

Part VI. Summary

15. AI engineering, Explainable AI, Ethics,

Agenda

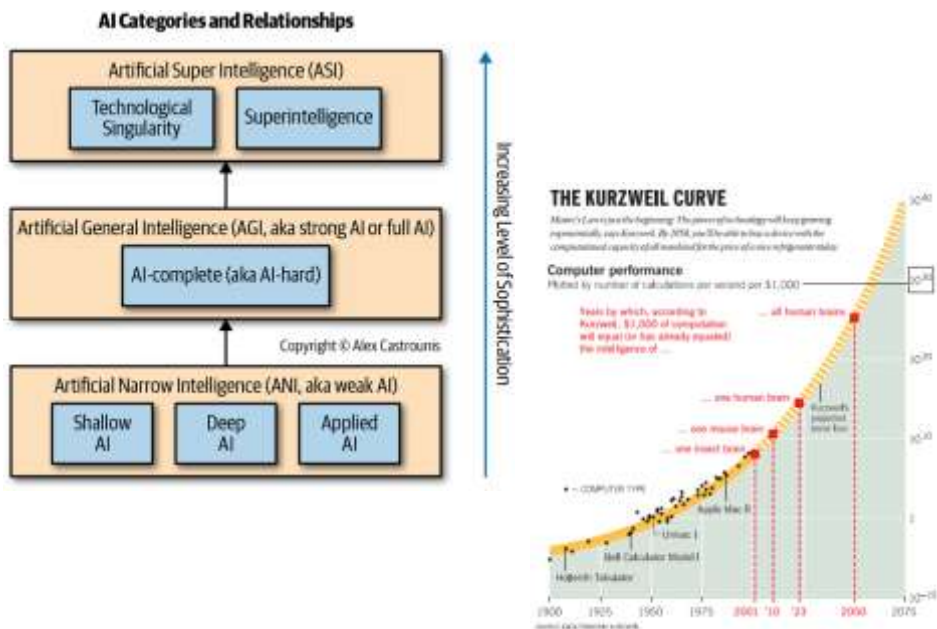
- Definition of Artificial Intelligence (AI)
- Topics of AI
- History of AI
- AI now
- Future of AI

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https://www.youtube.com/watch?v=s7_NikBwdj8



<https://www.whyoai.com/blog/narrow-ai-vs-general-ai-vs-super-ai>

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Just one week; few weeks ago

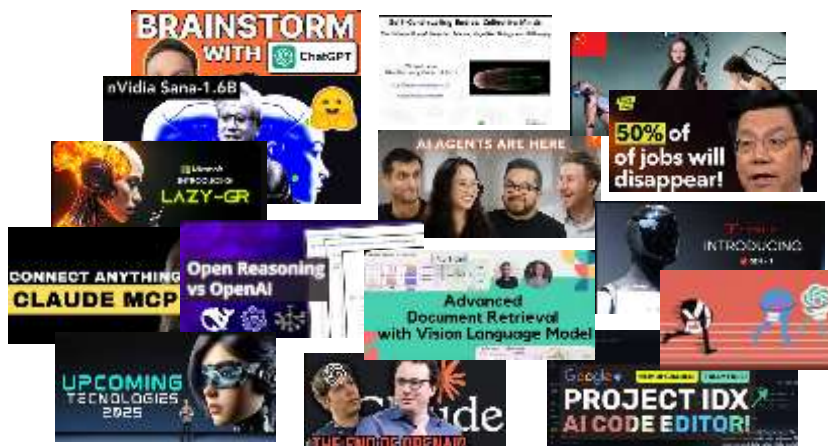
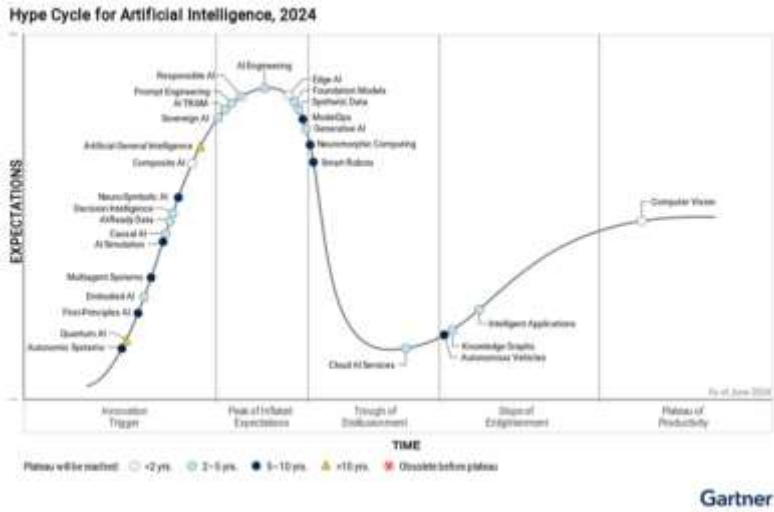




Figure 1: Hype Cycle for Artificial Intelligence, 2024

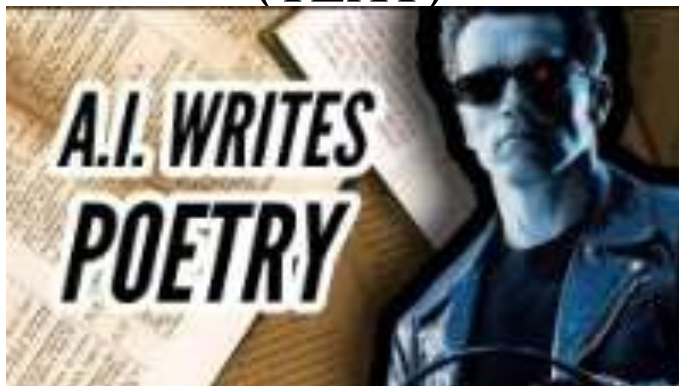


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DIGITAL / ai CREATIVITY (TEXT)



CreatiVe photo (Sony World Photography Award 2023)



<https://cyfrowa.rp.pl/technologie/art38343551-bezczelna-malpa-sztuczna-inteligencji-pokonala-zawodowych-fotografow>

Example 1



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Example 2



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<https://www.youtube.com/shorts/UJMXFLu6Krk>

Example 3



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Dialogue with an AI Chatbot chatGpT



Write a short blog post on the prevalence of artificial intelligence and how it connects with basic economic concepts about automation and the demand for labor.

Artificial Intelligence (AI) is becoming increasingly prevalent in our daily lives, from virtual assistants on our smartphones to self-driving cars on the roads. As AI technology continues to advance, it is transforming a wide range of industries and has the potential to revolutionize many aspects of society.

One way that AI connects with basic economic concerns is through automation. As AI systems become more sophisticated, they are able to perform a growing number of tasks that were previously done by humans. This has led to concerns about the potential for AI to displace many jobs and displace human workers.

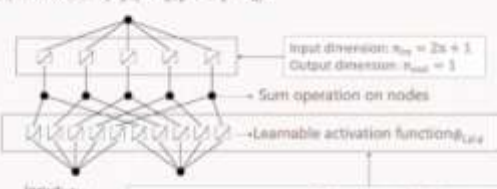
https://youtu.be/_XTq5CSzR0

<https://jadian.substack.com/p/chatgpt>

AI Education and academic world

An Introduction to Kolmogorov-Arnold Networks

Output: $KAN(x) = \phi_{0,1} + \phi_{0,2} + \dots + \phi_{0,p} + \phi_{1,1}x$



Input dimension: $n_{in} = 2n + 1$
Output dimension: $n_{out} = 1$

Sum operation on nodes

Learnable activation function $\phi_{i,j,k}$

input: $x_{i,j}$

A KAN layer: $\phi_i = [\phi_{p,k}] = \begin{bmatrix} \phi_{0,1}(\cdot) & \phi_{0,2}(\cdot) & \dots & \phi_{0,p}(\cdot) \\ \phi_{1,1}(\cdot) & \phi_{1,2}(\cdot) & \dots & \phi_{1,p}(\cdot) \\ \vdots & \vdots & \ddots & \vdots \\ \phi_{n_{in},1}(\cdot) & \phi_{n_{in},2}(\cdot) & \dots & \phi_{n_{in},p}(\cdot) \end{bmatrix}$

Input dimension: $n_{in} = n$
Output dimension: $n_{out} = 2n + 1$

ROBOTS IN ACTION – CONT.



<https://www.youtube.com/watch?v=vCYskCbPTTU>

Robots in action



<https://www.youtube.com/watch?v=AYSfgVv9-U>

Example: Sales process with gen ai



<https://www.youtube.com/watch?v=qCHpu6WA-k8>

Intelligence colloquially

Property of:

- Humans?
- Animals?
- Plants?
- Chemical compounds?
- Washing machines?
- Computers?
- ...

Intelligence colloquially

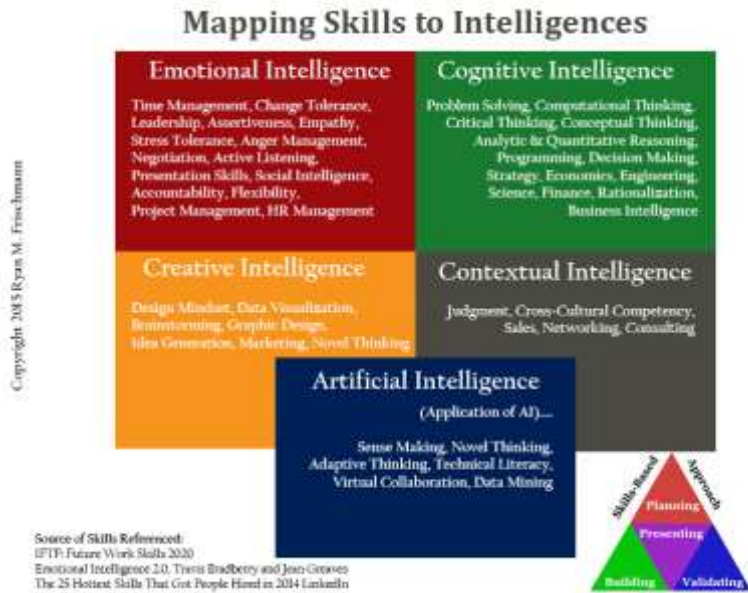
Ability to

- make choices
- make inference
- predict
- plan
- adapt
- classify
- create

Table 1: Four Categories of AI Definitions

| | Human Behaviour | Rational Behaviour |
|------------------------------|---|--|
| Thinking (Mental Process) | 1. Thinking Humanly Machines that think intelligently like humans | 3. Thinking Rationally Machines that think rationally |
| Acting (Action) | 2. Acting Humanly Machines that perform activities that human consider intelligent | 4. Acting Rationally Machines that act rationally |

Source: Adapted from Russell and Norvig (2010), Figure 1.1, p.2.



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Two views of AI

AI agents: how can we create intelligence?

- The inspiration comes from the types of capabilities that humans possess.

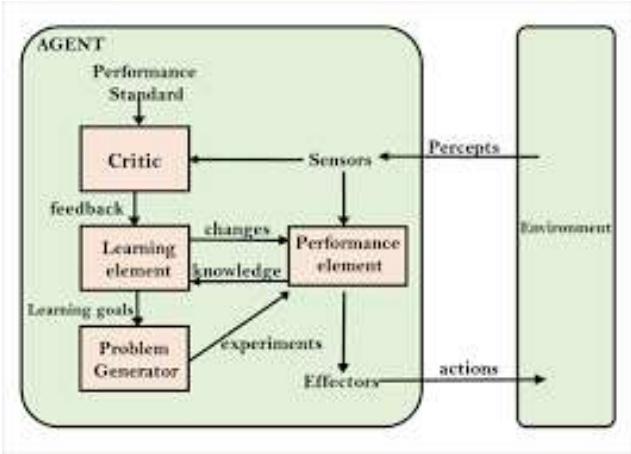
AI tools: how can we benefit society?

- Need comes from existing problems in the world, and techniques developed by the AI community happen to be useful for that.

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Intelligent Agents in AI

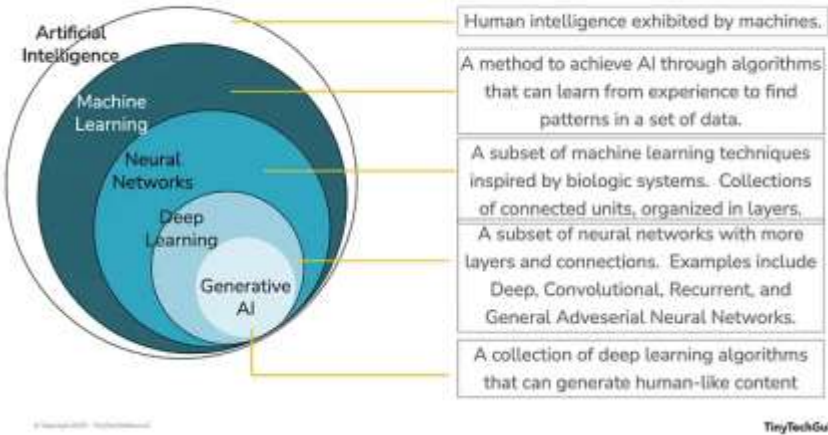


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<https://www.geeksforgeeks.org/agents-artificial-intelligence/>

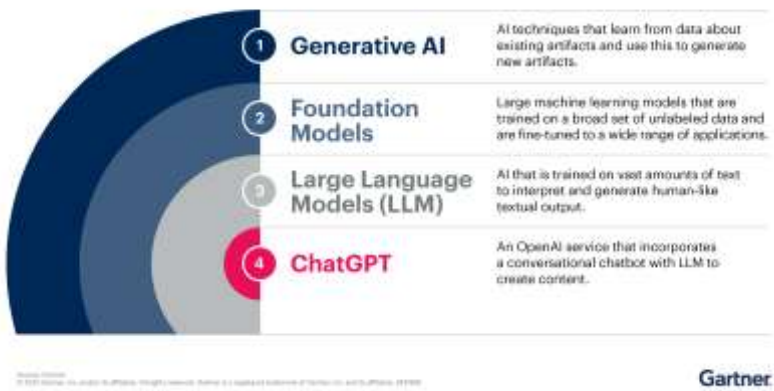
Artificial Intelligence



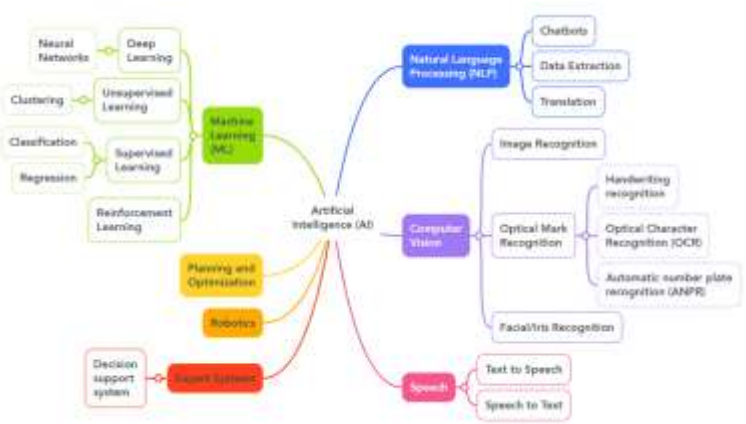
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<https://medium.com/@davidsweenor/generative-ai-vs-traditional-ai-whats-better-f2f9e86a61ef>

What Is Generative AI?



Overview of AI technologies



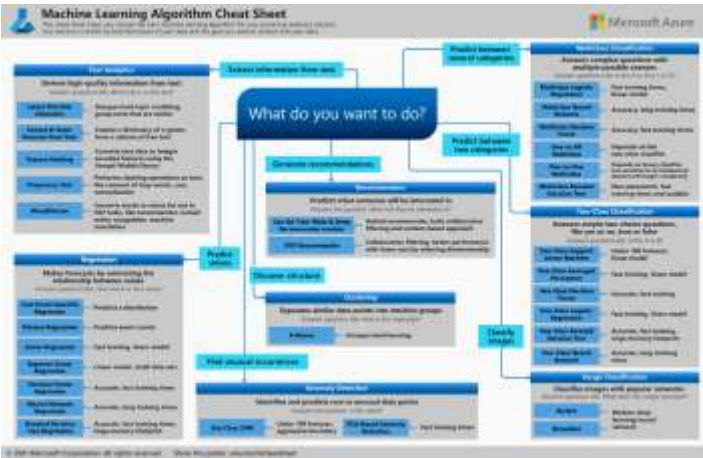


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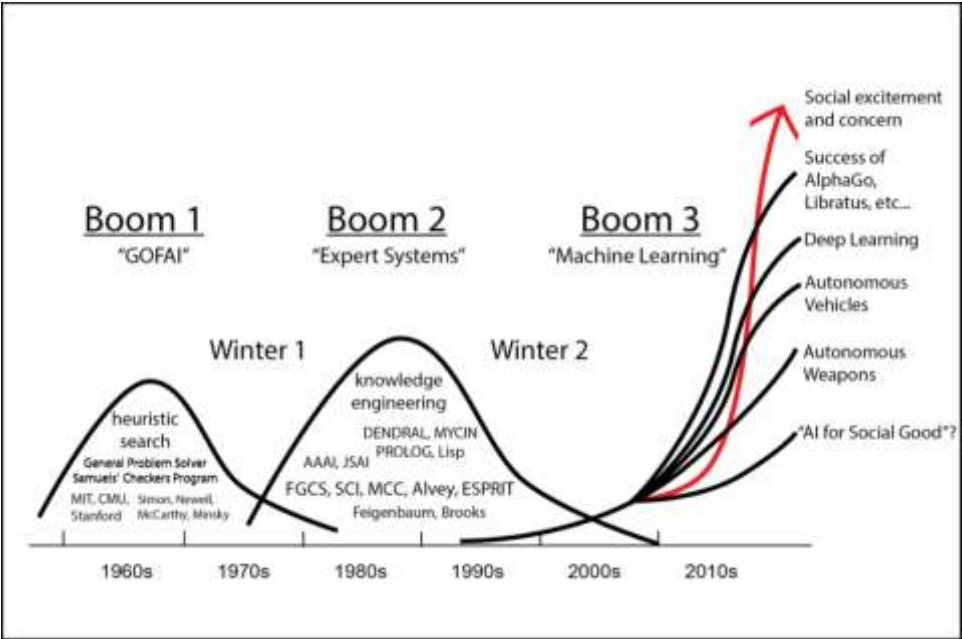


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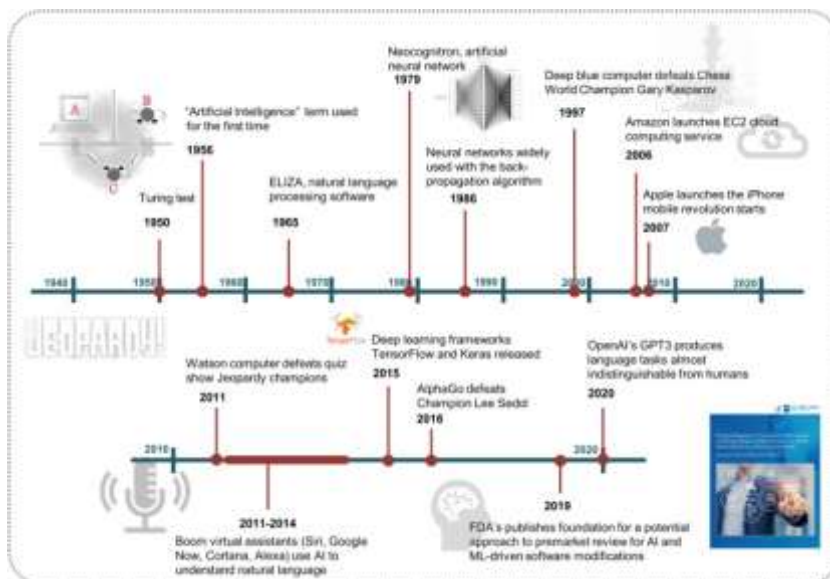
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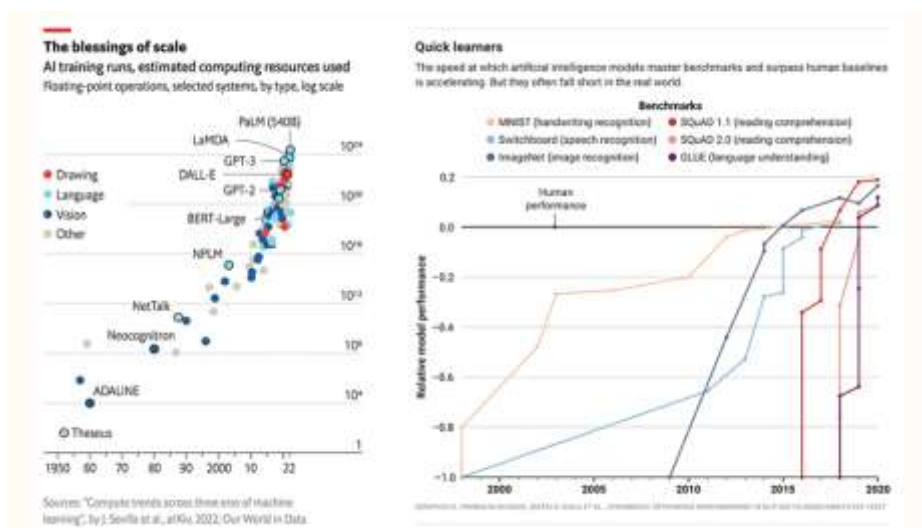
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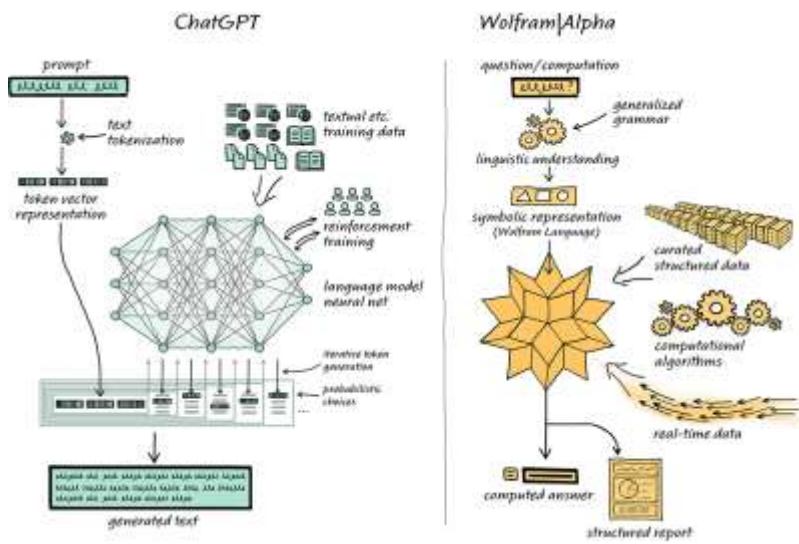
<https://www.sciencedirect.com/book/9780128202395/precision-medicine-and-artificial-intelligence>



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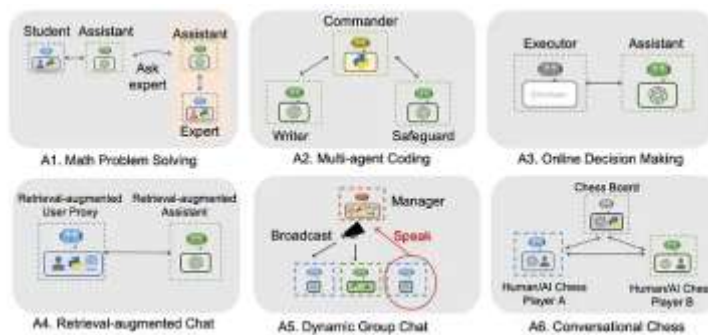
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<https://www.sequoiacap.com/article/generative-ai-a-creative-new-world/>



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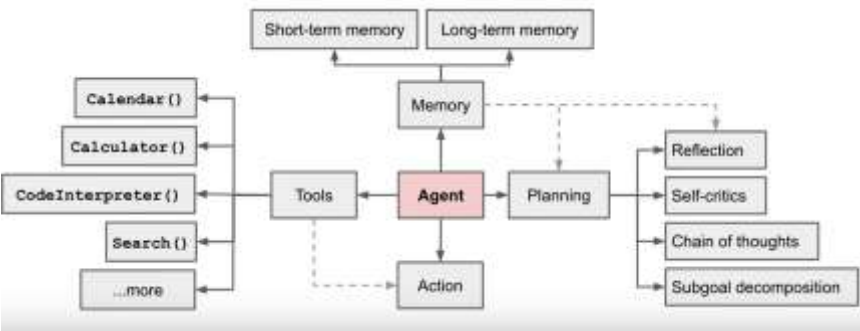
Meet AutoGen because using a single LLM is so 2020!



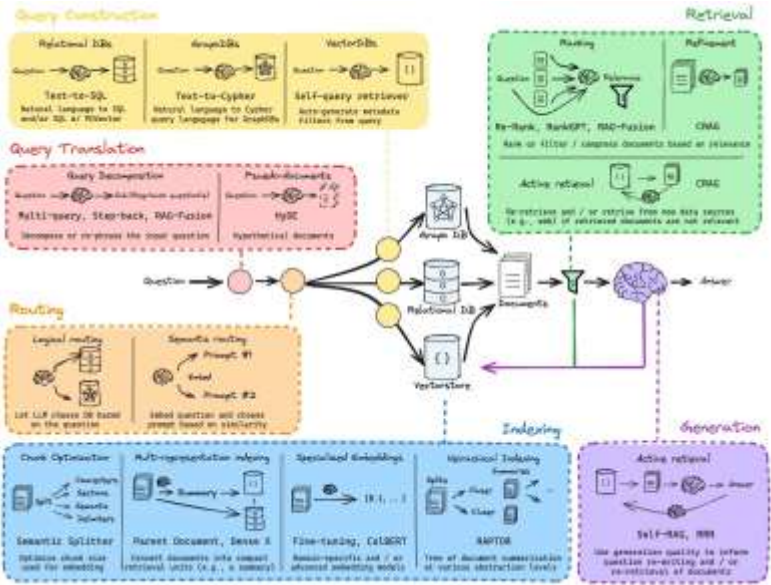
<https://medium.com/@datadrifters/meet-autogen-because-using-a-single-llm-is-so-2020-4b65556b3522>

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Internal components of an agent



<https://www.youtube.com/watch?v=p8Be1pk8H4>



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Agent ecosystems



The Generative AI Landscape

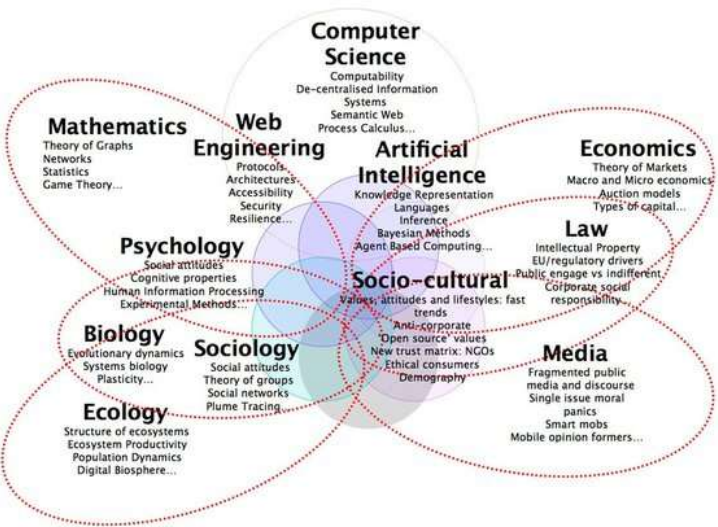
| | Example Use Cases | Example Startups |
|-------------------|----------------------|--|
| Business Function | Marketing | Copywriting, SEO optimization, brand personalization Jasper, copy.ai,Writesonic |
| | Sales | CRM automation, sales coaching Clay, Replo, EngageBay |
| | Customer Success | User insights, answering tickets Zendesk, Gorgias, Intercom |
| | HR | Job description writing, interviewing, performance reviews, AI coach, training Bloom, Onloop, GPTHR |
| | Legal | Document drafting, synthesis, legal to non-legal translation Casetext |
| | Ops | Research, search, synthesis, knowledge retrieval and management, manual tasks You.com, Mem.ai, Aelf |
| | Finance | Data entry, data summarization - |
| | Internal Tooling | Natural language to code generation, fully custom tools that can be built by business users Adapt, Maya |
| | Asset Creation | Text-to-image, video, audio, gaming studios, movie studios, news channels Runway, Pika, Synthesia |
| | Frontend Development | AI can generate individual designs and iterate until it finds "best" Debuild |
| Developer | Coding | Generates test cases and creates test automation Test.ai, GitHub Copilot, Replit |
| | Training | Model Training Paperspace, Hugging Face, Lambda Labs |

This is a work in progress. Startups and Use Cases are not added to this table yet.

OpenAI Imagines Our AI Future

| Stages of Artificial Intelligence | |
|-----------------------------------|---|
| Level 1 | Chatbots, AI with conversational language |
| Level 2 | Reasoners, human-level problem solving |
| Level 3 | Agents, systems that can take actions |
| Level 4 | Innovators, AI that can aid in invention |
| Level 5 | Organizations, AI that can do the work of an organization |

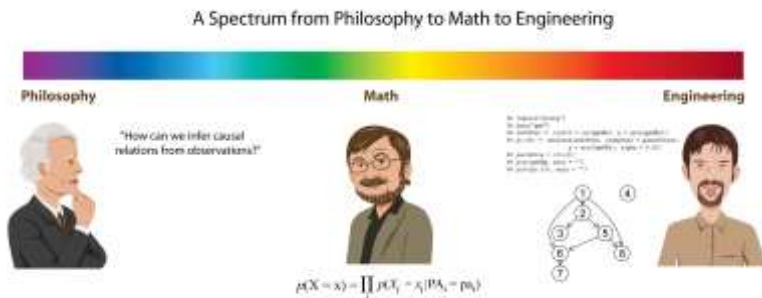
Source: Bloomberg reporting



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<https://www.quora.com/Is-AI-a-subset-of-any-discipline-like-computer-science-if-not-what-else>

Motives for researching AI



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Next lectures

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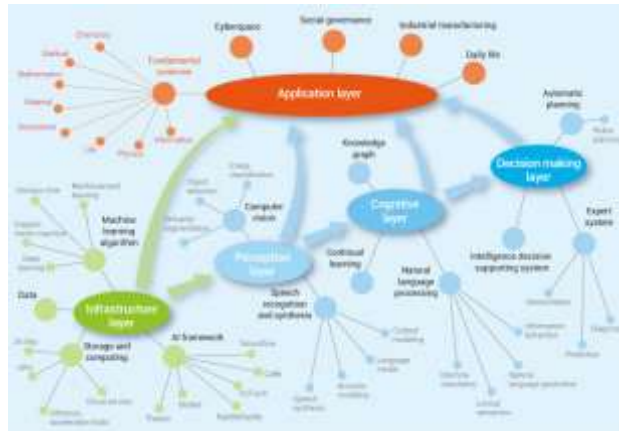
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The knowledge graph of the AI



<https://www.sciencedirect.com/science/article/pii/S2666675821001041#sec2>

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Summary

- Definition of Artificial Intelligence AI
- Two views of AI
- History of AI
- AI now
- Topics to be discussed

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References

- Stuart J. Russel, Peter Norvig, Artificial Intelligence: A Modern Approach, Prentice Hall, 2010.
- M. Muraszewicz, R Nowak (ed.), „Sztuczna Inteligencja dla inżynierów", Oficyna Wydawnicza PW, 2022