

AI Overview



Erasmus+ Webinar on Artificial Intelligence

June 6, 2024 | 10:00 - 11:00 CEST

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Enriching lives, opening minds





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AI in the Eyes of Researchers

- "I propose to consider the question, 'Can machines think?'"

- — Alan Turing 1950

- The branch of computer science concerned with making computers behave like humans.

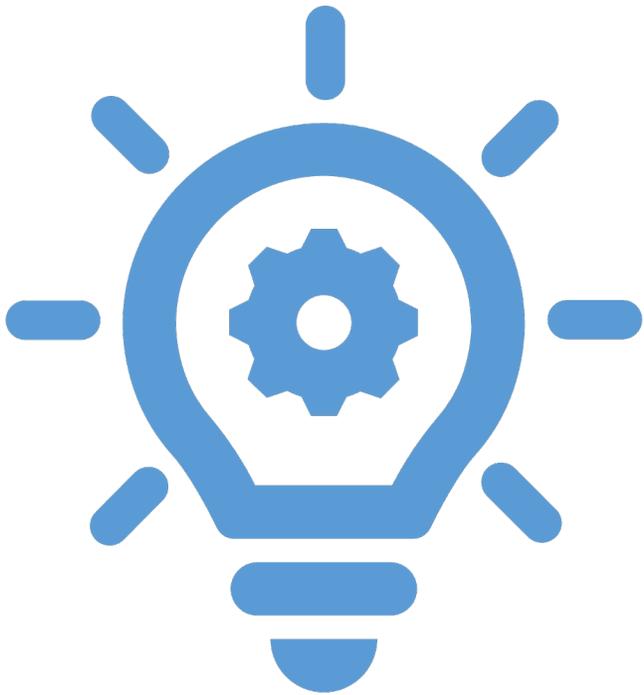
- — John McCarthy 1956

- The science of making machines do things that would require intelligence if done by men.

- — Marvin Minsky

the Dartmouth College AI Conference on "The Fifty Years Since Dartmouth"



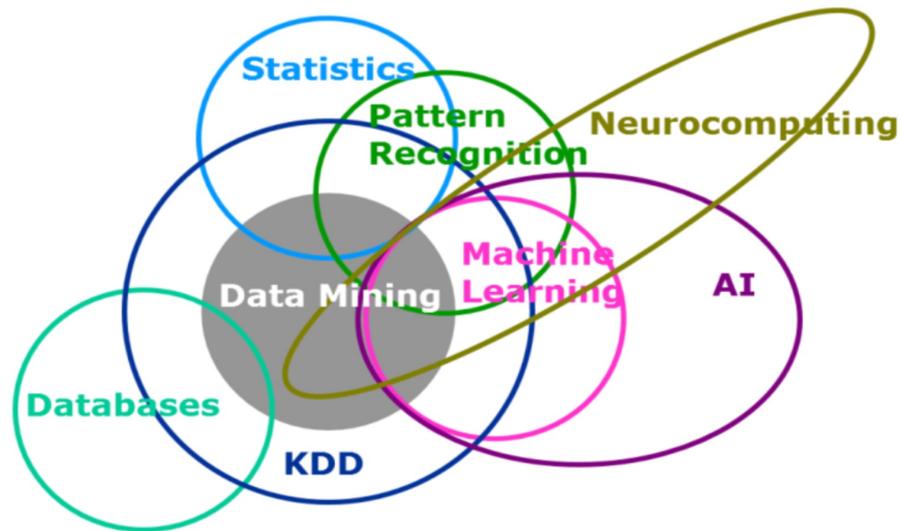


What Are Intelligences?

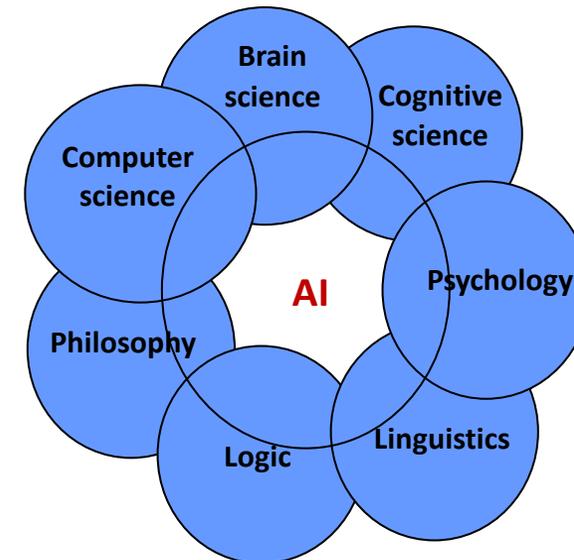
- Howard Gardner's Multiple Intelligences
- Human intelligences can be divided into seven categories:
 - Verbal/Linguistic
 - Logical/Mathematical
 - Visual/Spatial
 - Bodily/Kinesthetic
 - Musical/Rhythmic
 - Inter-personal/Social
 - Intra-personal/Introspective

What Is AI?

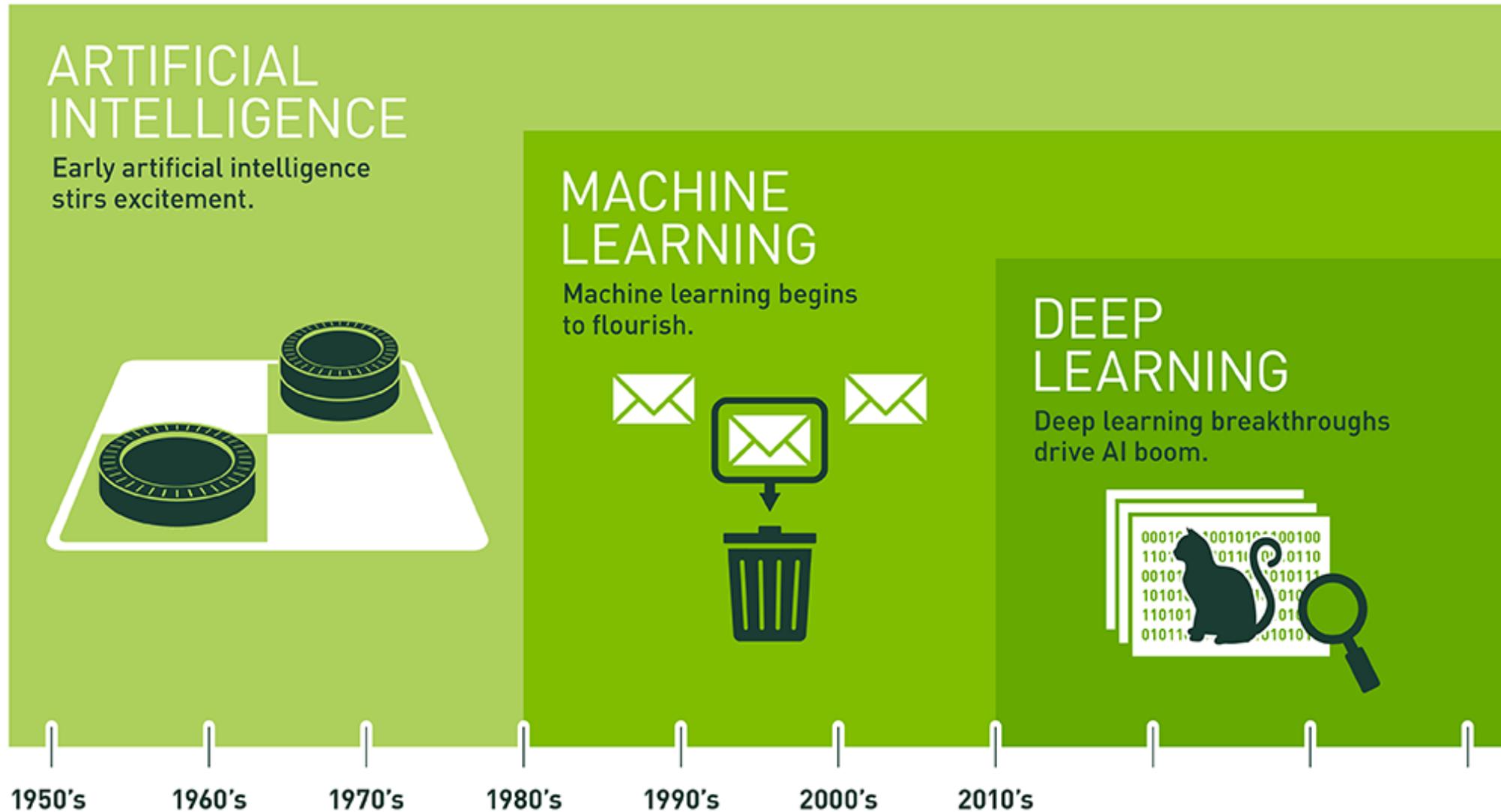
- Artificial Intelligence (AI) is a new technical science that studies and develops theories, methods, techniques, and application systems for simulating and extending human intelligence. In 1956, the concept of AI was first proposed by John McCarthy, who defined the subject as "science and engineering of making intelligent machines, especially intelligent computer program". AI is concerned with making machines work in an intelligent way, similar to the way that the human mind works. At present, AI has become an interdisciplinary course that involves various fields.



Identification of concepts related to AI and machine learning
AI Development Report 2020



Relationship of AI, Machine Learning, and Deep Learning



Metrics

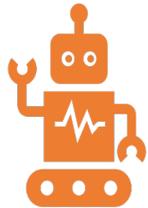
$$\text{Precision} = \frac{\text{True Positive}}{\text{True Positive} + \text{False Positive}}$$

$$\text{Recall} = \frac{\text{True Positive}}{\text{True Positive} + \text{False Negative}}$$

$$\text{Accuracy} = \frac{\text{True Positives} + \text{True Negatives}}{\text{All Samples}}$$

		Positive	Negative		
		True Positive (TP)	False Positive (FP)		
Predicted Label	Positive	True Positive (TP)	False Positive (FP)	Positive	
	Negative	False Negative (FN)	True Negative (TN)		
		True Label			

Relationship of AI, Machine Learning and Deep Learning



AI: A new technical science that focuses on the research and development of theories, methods, techniques, and application systems for simulating and extending human intelligence.



Machine learning: A core research field of AI. It focuses on the study of how computers can obtain new knowledge or skills by simulating or performing learning behavior of human beings, and reorganize existing knowledge architecture to improve its performance. It is one of the core research fields of AI.



Deep learning: A new field of machine learning. The concept of deep learning originates from the research on artificial neural networks. The multi-layer perceptron (MLP) is a type a deep learning architecture. Deep learning aims to simulate the human brain to interpret data such as images, sounds, and texts.

Three Major Schools

Families of Artificial Intelligence (1)



John McCarthy
(1927-2011)



Allen Newell
(1927-1992)

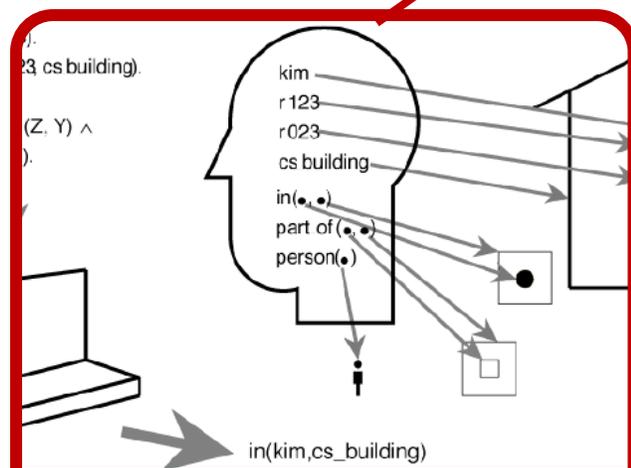


Herbert Simon
(1916-2001)

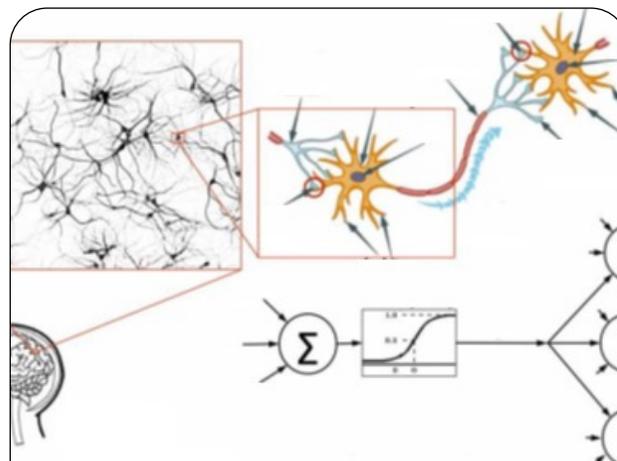


Edward Feigenbaum
(1936-)

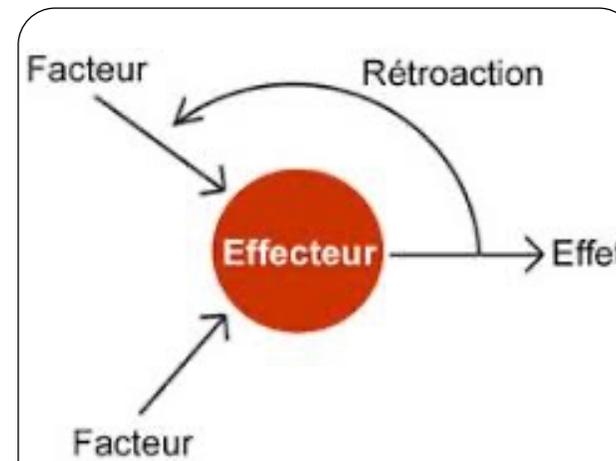
Symbolism has long been prominent and has significantly contributed to the development of AI, especially in expert systems. It has been essential for the application of AI in engineering applications. Symbolism has remained a dominant current, even as other AI theories have emerged.



Symbolicism

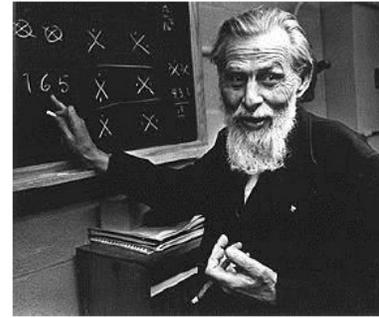


Connectionism



Actionism

Families of Artificial Intelligence (2)



Warren S. McCulloch
(1898-1969)

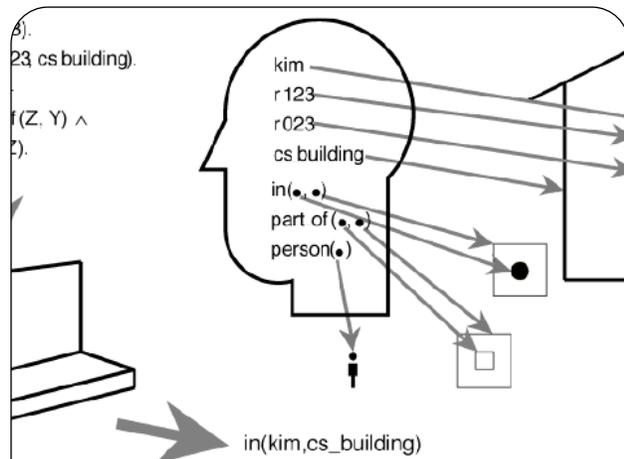


Walter H. Pitts
(1923-1969)

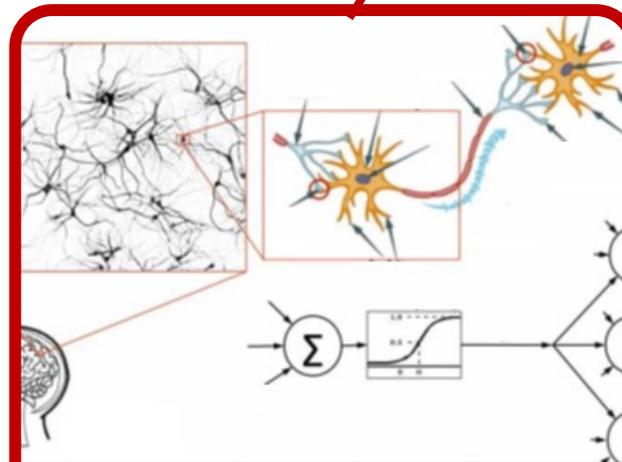


Marvin Minsky
(1927-2016)

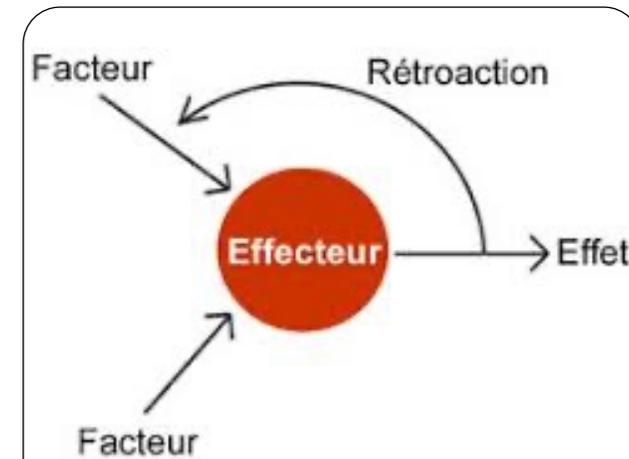
Neural network, connection mechanism, and learning algorithm between neural networks. Origin: bionics, particularly the study of the human brain model. The neuron, instead of the symbolic processing operation, is the basic unit of thought.



Symbolicism



Connectionism

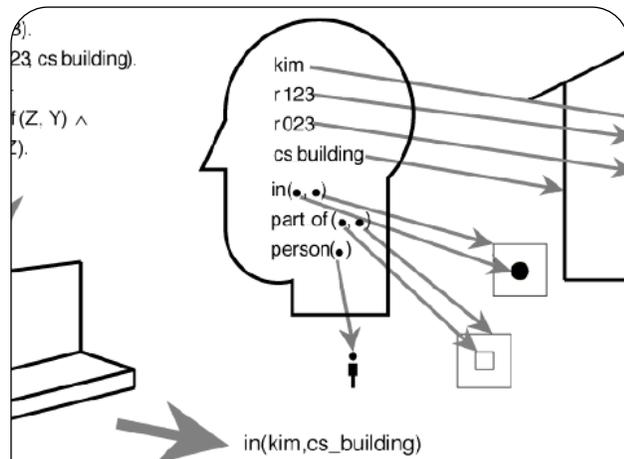


Actionism

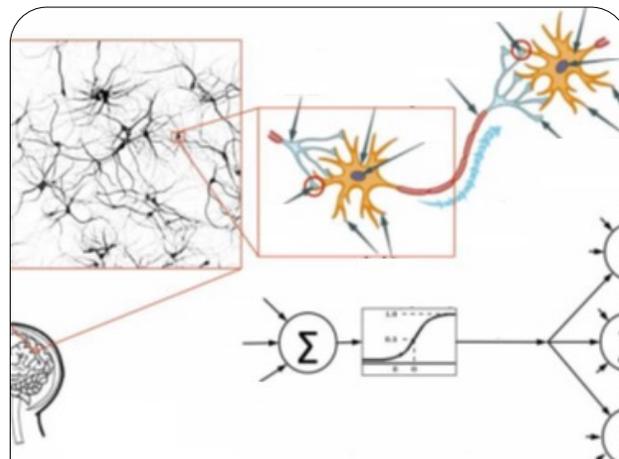
Families of Artificial Intelligence (3)

Actionism (evolutionism and cybernetics) Principle:

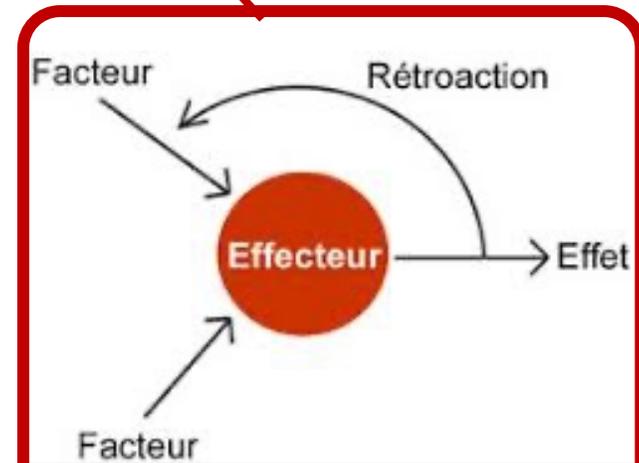
cybernetics and perception-action control system - Origin: cybernetics Concept: Intelligence depends on perception and actions. The "perception-action" mode of intelligent behavior is proposed. Intelligent behavior can only interact with the surrounding environment in the real world.



Symbolism

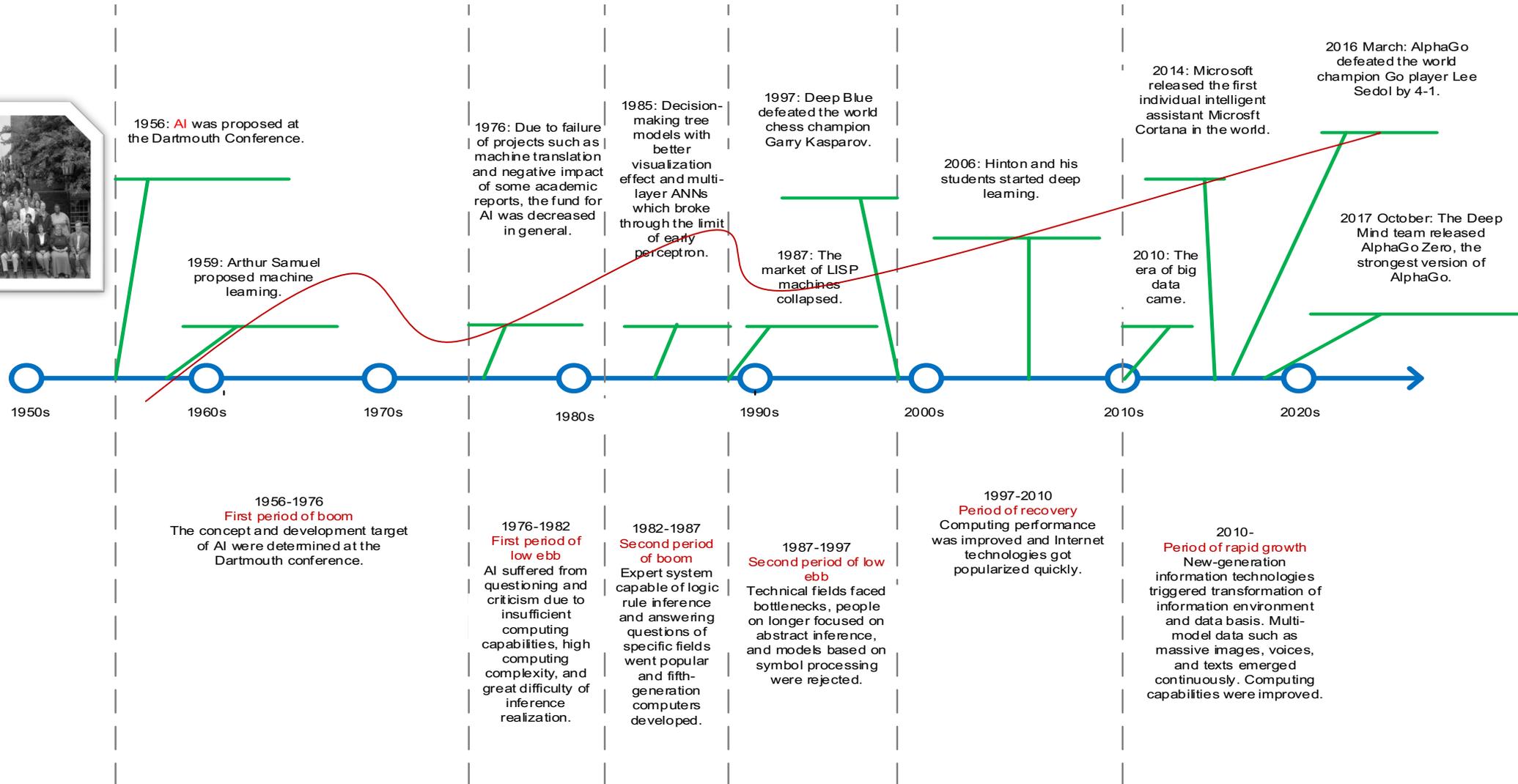


Connectionism



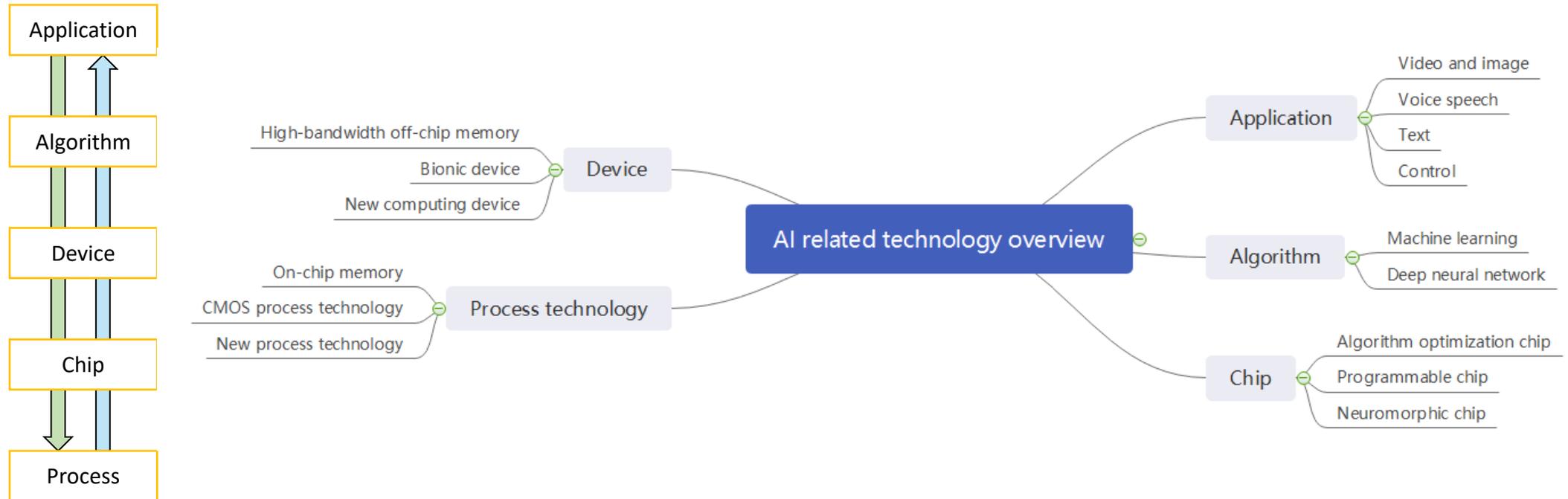
Actionism

Brief Development History of AI



Overview of AI Technologies

- AI technologies are multi-layered, covering the application, algorithm mechanism, toolchain, device, chip, process, and material layers.





Types of AI

- Strong AI
 - The strong AI view holds that it is possible to create intelligent machines that can really reason and solve problems. Such machines are considered to be conscious and self-aware, can independently think about problems and work out optimal solutions to problems, have their own system of values and world views, and have all the same instincts as living things, such as survival and security needs. It can be regarded as a new civilization in a certain sense.
- Weak AI
 - The weak AI view holds that intelligent machines cannot really reason and solve problems. These machines only look intelligent, but do not have real intelligence or self-awareness.

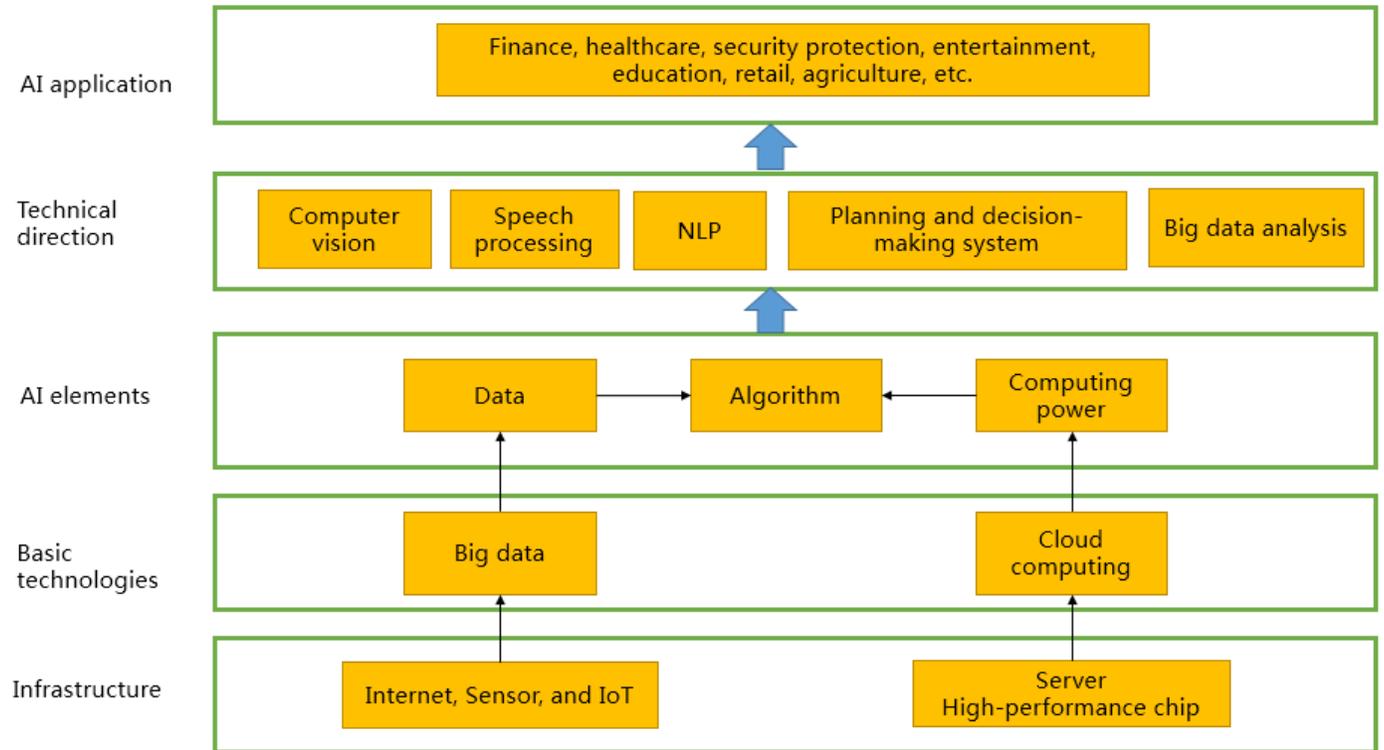
Classification of Intelligent Robots

- Currently, there is no unified definition of AI research. Intelligent robots are generally classified into the following four types:
 - "Thinking like human beings": weak AI, such as Watson and AlphaGo
 - "Acting like human beings": weak AI, such as humanoid robot, iRobot, and Atlas of Boston Dynamics
 - "Thinking rationally": strong AI (Currently, no intelligent robots of this type have been created due to the bottleneck in brain science.)
 - "Acting rationally": strong AI

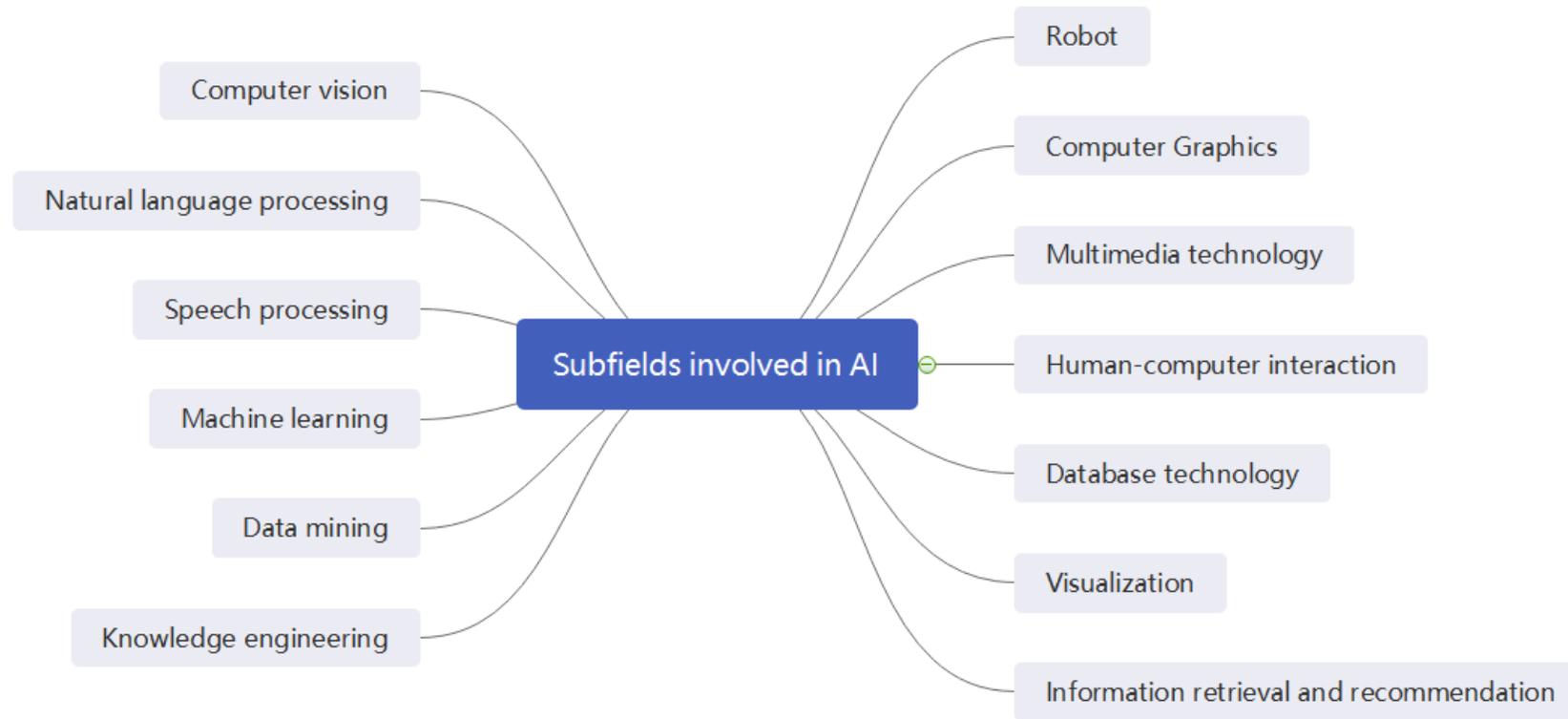


AI Industry Ecosystem

- The four elements of AI are data, algorithm, computing power, and scenario. To meet requirements of these four elements, we need to combine AI with cloud computing, big data, and IoT to build an intelligent society.

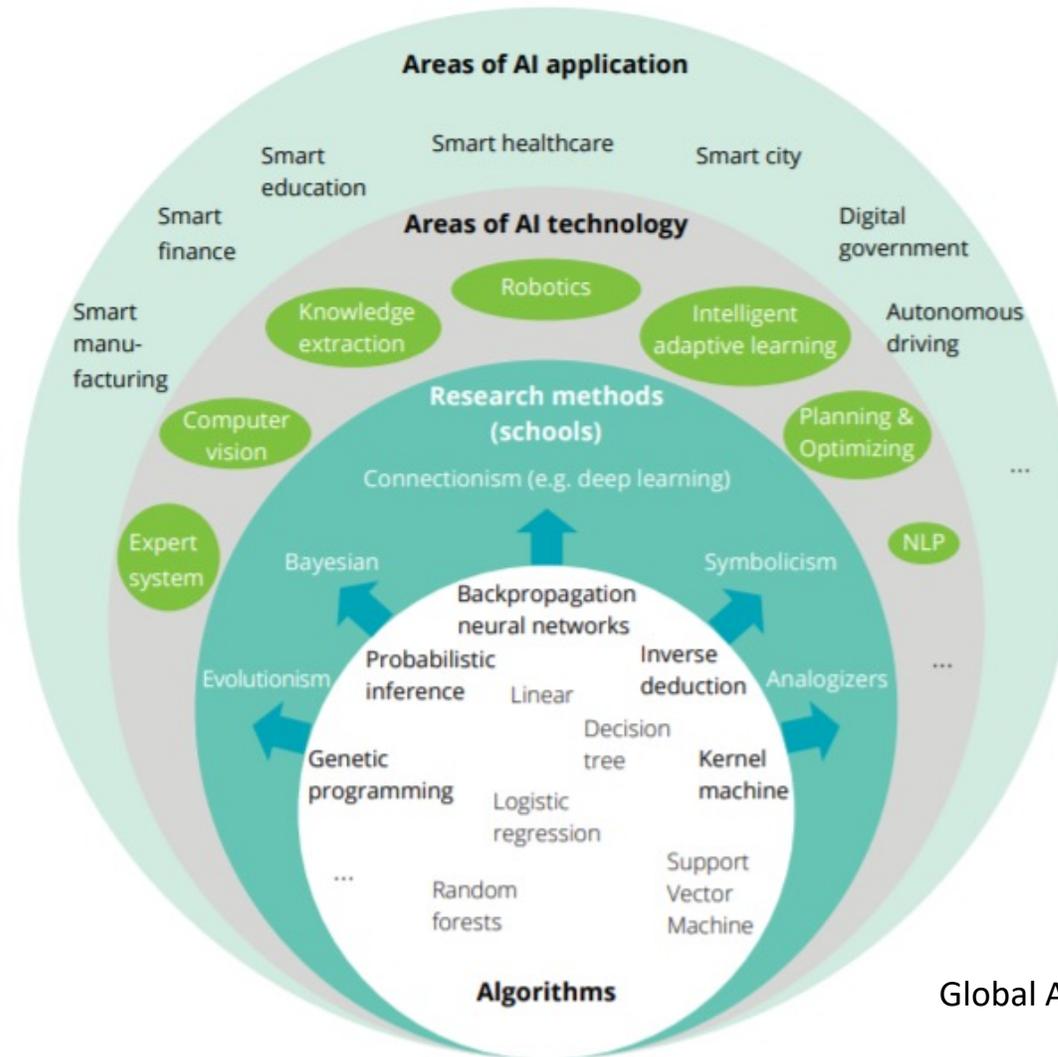


Sub-fields of AI



AI Development Report 2020

Technical Fields and Application Fields of AI

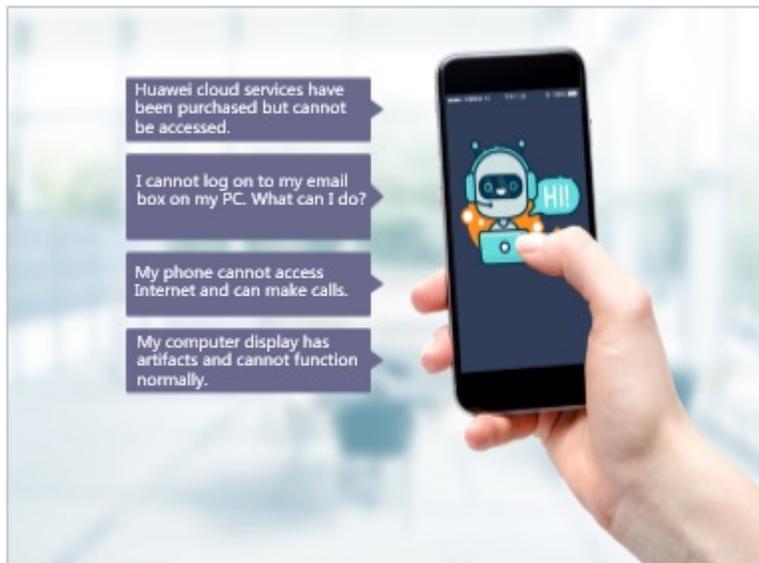


Global AI Development White Paper 2020

Voice Processing Application Scenario (1)

- The main topics of voice processing research include voice recognition, voice synthesis, voice wakeup, voiceprint recognition, and audio-based incident detection. Among them, the most mature technology is voice recognition. As for near field recognition in a quite indoor environment, the recognition accuracy can reach 96%.
- Application scenarios:

Question Answering Bot (QABot)

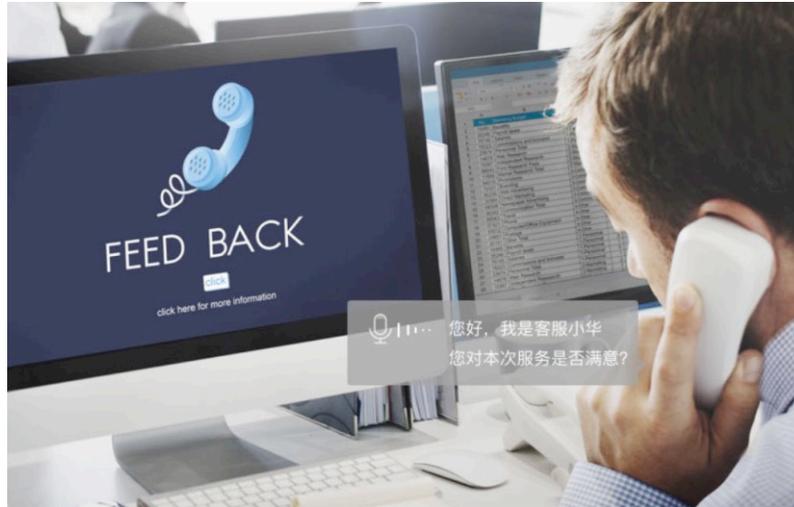


Voice navigation



Voice Processing Application Scenario (2)

Return Visit



Real-time conference records

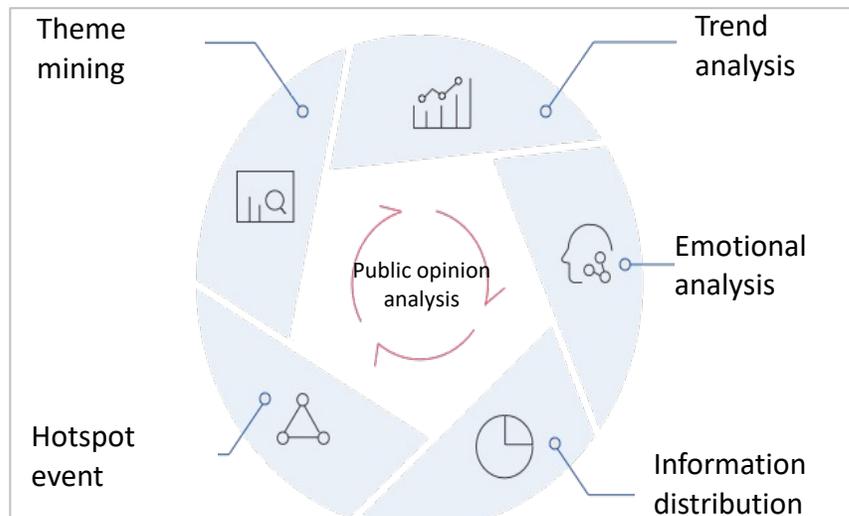


- Other applications:
 - Spoken language evaluation
 - Diagnostic robot
 - Voiceprint recognition
 - Smart sound box
 - ...

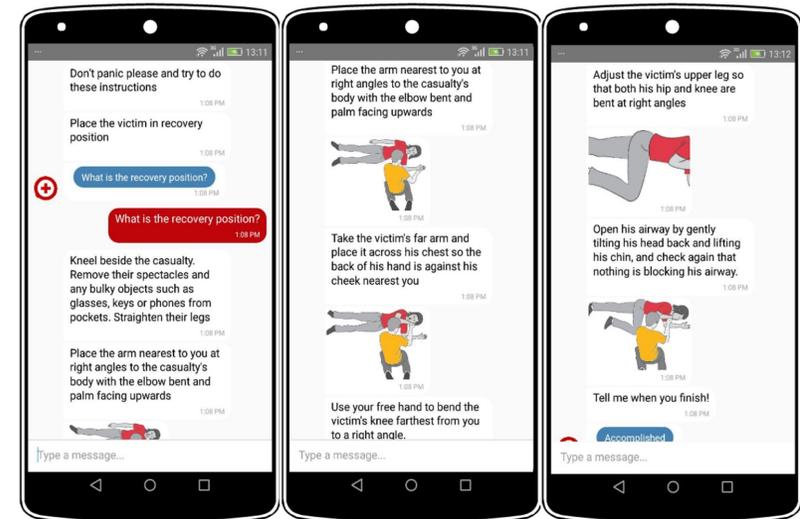
NLP Application Scenario (1)

- The main topics of NLP research include machine translation, text mining, and sentiment analysis. NLP imposes high requirements on technologies but confronts low technology maturity. Due to high complexity of semantics, it is hard to reach the human understanding level using parallel computing based on big data and parallel computing only.
- In future, NLP will achieve more growth: understanding of shallow semantics → automatic extraction of features and understanding of deep semantics; single-purpose intelligence (ML) → hybrid intelligence (ML, DL, and RL)
- Application scenarios:

Public opinion analysis

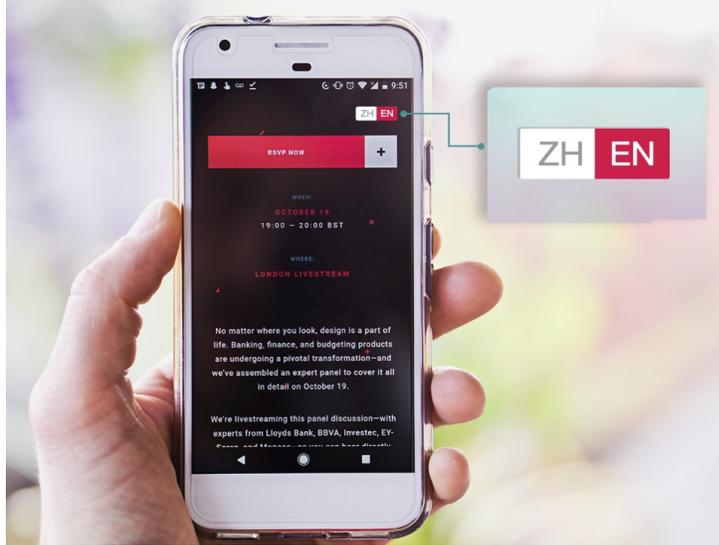


Evaluation analysis



NLP Application Scenario (2)

Machine translation



Text classification



- Other applications:
 - Knowledge graph
 - Intelligent copywriting
 - Video subtitle
 - ...

AI Application Field - Intelligent Healthcare

Medicine mining: quick development of personalized medicines by AI assistants

Health management: nutrition, and physical/mental health management

Hospital management: structured services concerning medical records (focus)

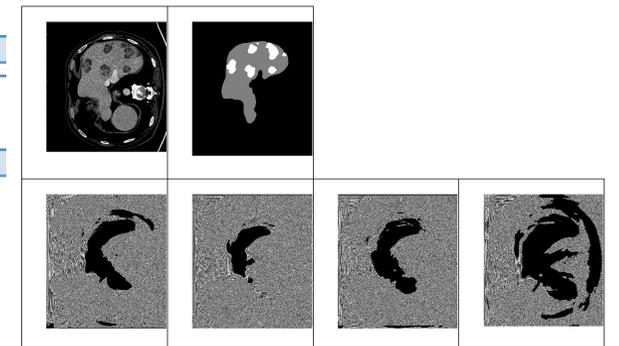
Assistance for medical research: assistance for biomedical researchers in research

Virtual assistant: electronic voice medical records, intelligent guidance, intelligent diagnosis, and medicine recommendation

Medical image: medical image recognition, image marking, and 3D image reconstruction

Assistance for diagnosis and treatment: diagnostic robot

Disease risk forecast: disease risk forecast based on gene sequencing



AI Application Field - Smart Home

- Based on IoT technologies, a smart home ecosystem is formed with hardware, software, and cloud platforms, providing users personalized life services and making home life more convenient, comfortable, and safe.

Control smart home products with voice processing such as air conditioning temperature adjustment, curtain switch control, and voice control on the lighting system.

Develop user profiles and recommend content to users with the help of machine learning and deep learning technologies and based on historical records of smart speakers and smart TVs.

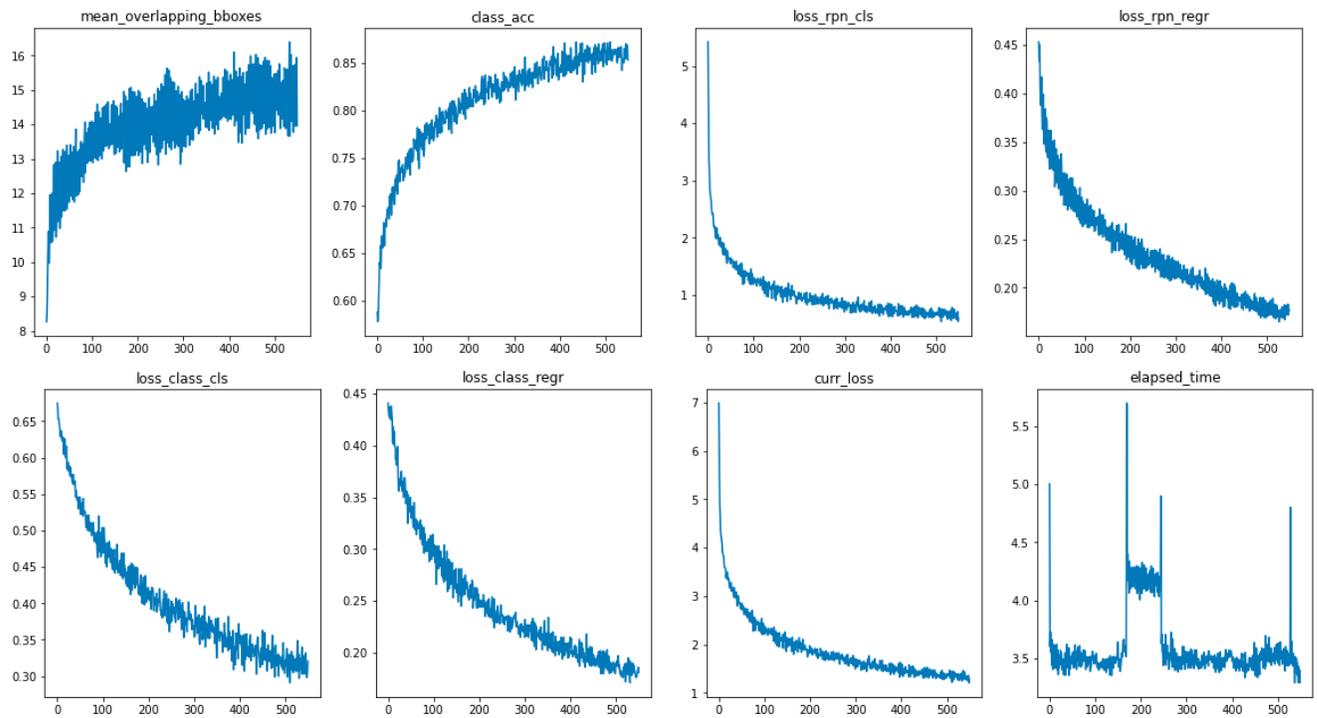
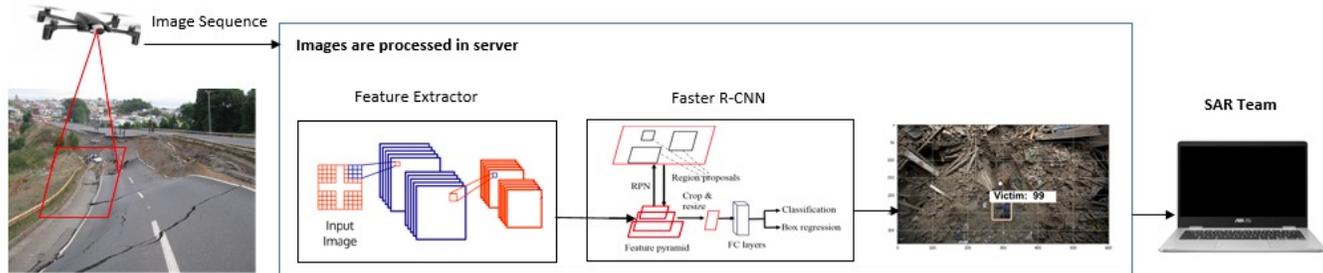


AI Application Field - Retail

- AI will bring revolutionary changes to the retail industry. A typical symptom is unmanned supermarkets. For example, Amazon Go, unmanned supermarket of Amazon, uses sensors, cameras, computer vision, and deep learning algorithms to completely cancel the checkout process, allowing customers to pick up goods and "just walk out".
- One of the biggest challenges for unmanned supermarket is how to charge the right fees to the right customers. So far, Amazon Go is the only successful business case and even this case involves many controlled factors. For example, only Prime members can enter Amazon Go. Other enterprises, to follow the example of Amazon, have to build their membership system first.



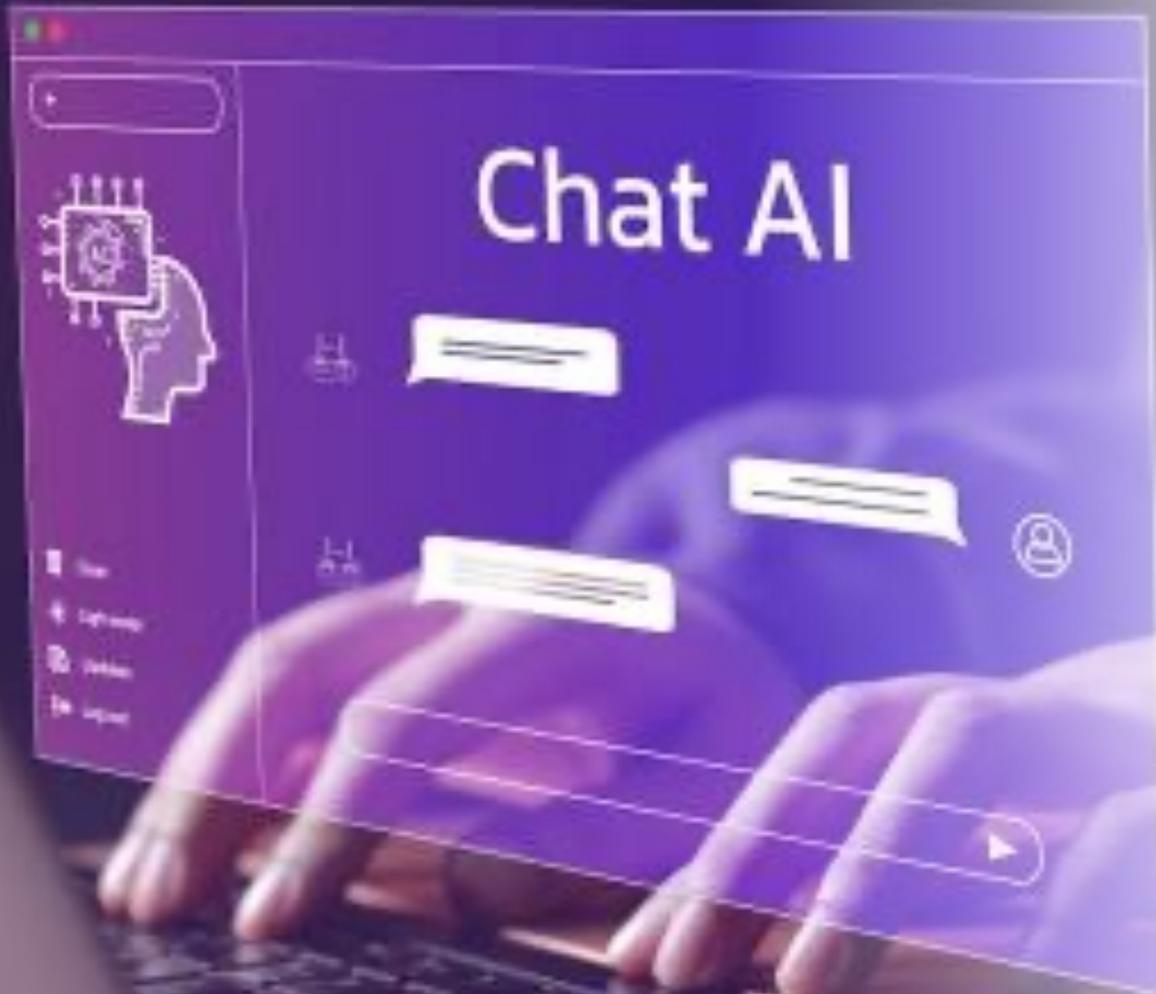
AI approach to victim detection



Problems to Be Solved

- Are AI-created works protected by copyright laws?
- Who gives authority to robots?
- What rights shall be authorized to robots?
- ...

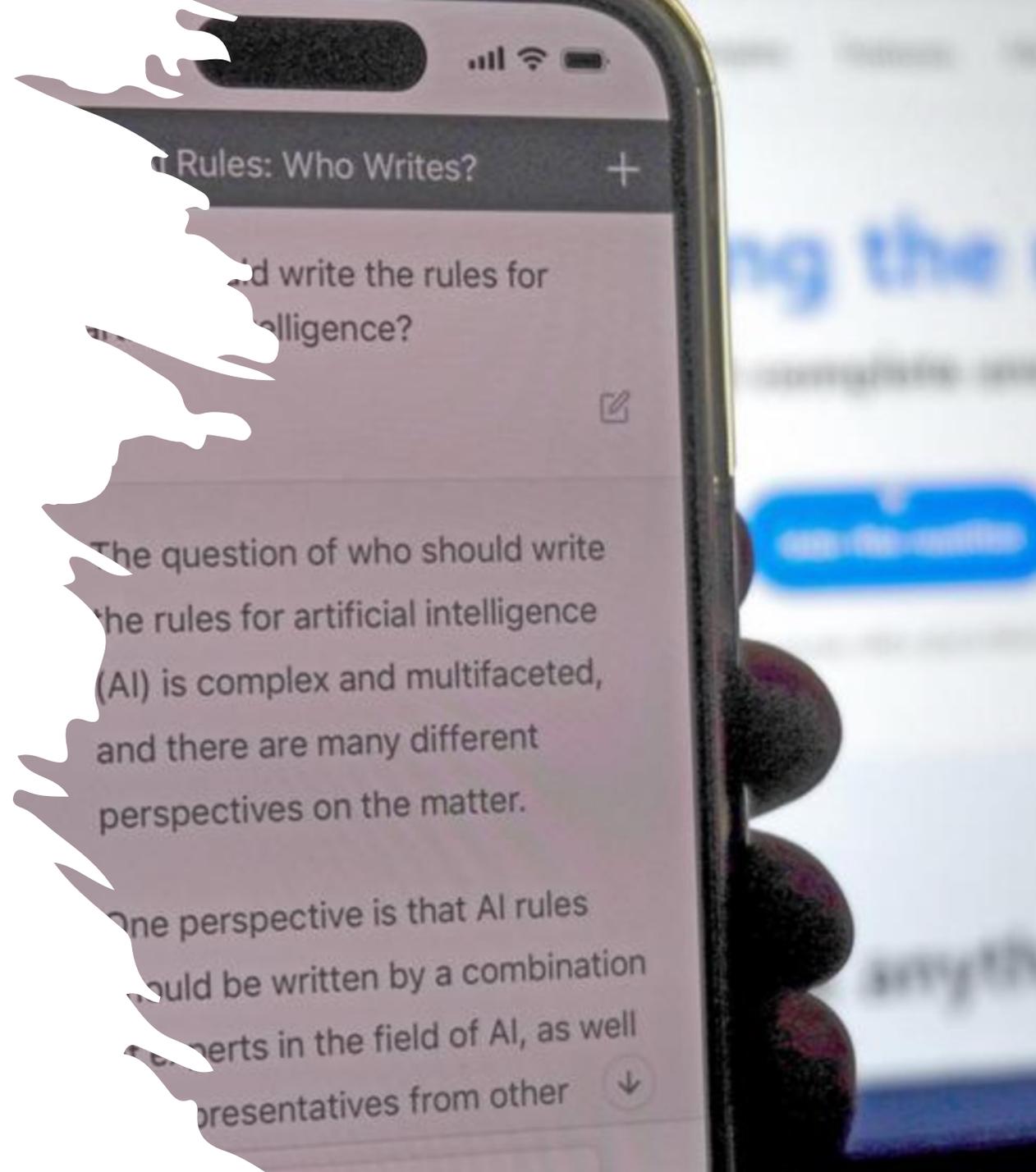




Chat AI

27

Chat Generative Pre-trained Transformer



Chat Generative Pre-trained Transformer – GPT4



- **Versatility:** ChatGPT can be used for a wide range of applications, from customer service chatbots to personal assistants and creative writing support.
- **Natural Conversations:** ChatGPT creates natural and engaging conversations, making interactions with AI more user-friendly and human-like.
- **Scalability:** ChatGPT can scale to handle large volumes of conversations simultaneously, making it suitable for use in various scenarios.
- **Customization:** Users can fine-tune ChatGPT to suit specific needs and vocabularies, ensuring it aligns with the desired tone and style.
- **Efficiency:** ChatGPT can quickly generate responses to queries, enhancing productivity and streamlining communication processes.
- **Continuous Learning:** ChatGPT continuously learns from interactions, improving its responses over time and becoming more accurate in its conversations.
- **Cost-Effective Solution:** Implementing ChatGPT can be a cost-effective way to handle customer inquiries, provide support, and save time on repetitive tasks.

ChatGPT : Biases and Discrimination



- **Generation of Inappropriate Content:** There is a risk that ChatGPT may generate inappropriate, offensive, or harmful content based on training data and previous interactions.
- **Data Security:** Using ChatGPT for sensitive conversations can raise issues of data privacy and security if exchanged information is not properly protected.
- **Misunderstandings and Errors:** Like any AI system, ChatGPT may occasionally misinterpret questions or provide incorrect responses due to limitations in its understanding or the data available.

Research and innovation

Home > Living guidelines on the responsible use of generative AI in research

Living guidelines on the responsible use of generative AI in research

GENERAL GUIDELINES | 20 March 2024

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Guidelines on the responsible use of generative AI in research developed by the European Research Area Forum

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European approach to artificial intelligence

The EU's approach to artificial intelligence centers on excellence and trust, aiming to boost research and industrial capacity while ensuring safety and fundamental rights.

The way we approach Artificial Intelligence (AI) will define the world we live in the future. To help building a resilient [Europe for the Digital Decade](#), people and businesses should be able to enjoy the benefits of AI while feeling safe and protected.

The [European AI Strategy](#) aims at making the EU a world-class hub for AI and ensuring that AI is human-centric and trustworthy. Such an objective translates into the [European approach to excellence and trust](#) through concrete rules and actions.



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AI Tools(1/2)

1. Krisp : Supprime les voix de fond, les bruits et l'écho lors des appels.

Lien : <https://krisp.ai/>

2. Beatoven : Crée de la musique unique libre de droits.

Lien : <https://www.beatoven.ai/>

3. Cleanvoice : Supprime les sons parasites, le bégaiement et les sons de la bouche de vos podcasts.

Lien : <https://cleanvoice.ai/>

4. Podcastle : Permet d'enregistrer des podcasts de qualité studio, directement depuis un simple ordinateur.

Lien : <https://podcastle.ai/>

5. Flair : Génère des shooting photos de vos produits.

Lien : <https://flair.ai/>

6. Illustroke : Crée des images vectorielles à partir de prompts.

Lien : <https://illustroke.com/>

7. Patterned : Génère des motifs libres de droits.

Lien : <https://www.patterned.ai/>

8. Stockimg : Une autre IA de génération d'image.

Lien : <https://stockimg.ai/>

9. Copy : Génère du contenu et évite le syndrome de la page blanche.

Lien : <https://www.copy.ai/>

10. CopyMonkey : Facilite la rédaction de fiches produits sur Amazon.

Lien : <http://copymonkey.ai/>

AI Tools (2/2)

11. Ocoya : Facilite la création et la programmation du contenu sur les réseaux sociaux.

Lien : <https://www.ocado.com/>

12. Unbounce : Génère des landings pages et des emails.

Lien : <https://unbounce.com/>

13. Vidyo : Génère des capsules vidéos pour les réseaux sociaux à partir de vidéos plus longues.

Lien : <https://vidyo.ai/>

14. Quickchat : Les chatbots qui parlent comme des humains pour la relation client.

Lien : <https://www.quickchat.ai/>

15. Puzzle : Crée une base de connaissances ou un glossaire à partir de documents.

Lien : <https://www.puzzlelabs.ai/>

16. Soundraw : Génère des musiques d'ambiances.

Lien : <https://soundraw.io/>

17. Cleanup.picture : Supprime les objets, les défaut, les personnes ou les textes de vos images.

Lien : <https://cleanup.pictures/>

18. Looka : Génère des noms de marques et des logos.

Lien : <https://looka.com/>

19. Synthesia : Facilite la création de vidéos de formation en tapant simplement du texte.

Lien : <https://www.synthesia.io/>

20. Otter : Enregistre les réunions et prends des notes en temps réel.

Lien : <https://otter.ai/>

21. Thundercontent : Génère tout types de contenus.

Lien : <https://lnkd.in/ejYYuSyD>

Thank you.