L’intelligence artificielle dans l’enseignement médical

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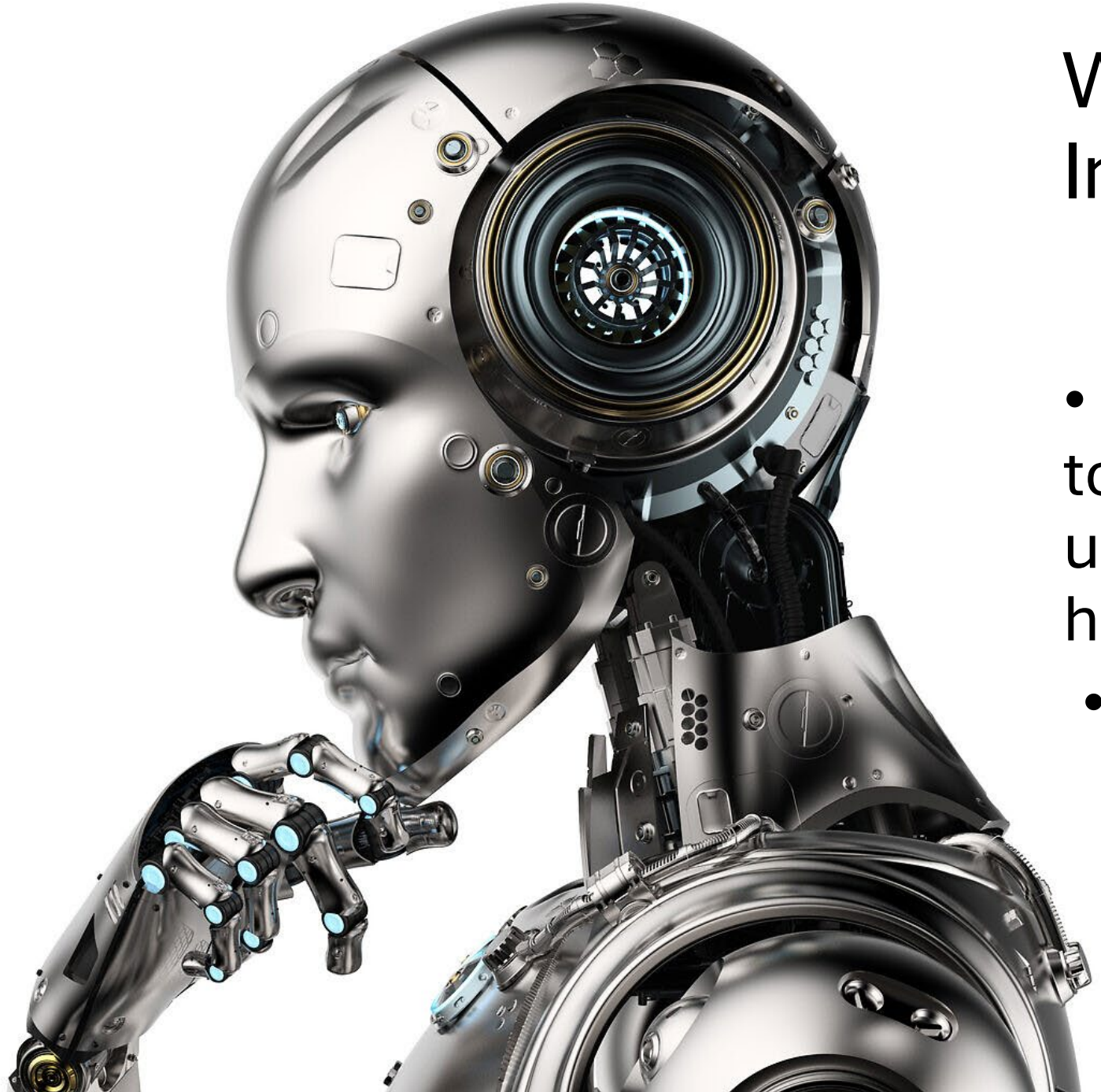
HUG Hôpitaux Universitaires Genève

Disclosures

- We have decided to present our slides in English (for the most part) and to speak in French.
- In AI, information changes quickly…
- We may mention the use of certain tools, but we have no financial interest to declare.



What is Artificial Intelligence ?

- «Ability of computers to perform tasks usually performed by humans»
  - Term first used in 1956!

HISTOIRE DE L'IA

Temps forts de 1940 à aujourd'hui

1950 - 1970

Naissance et développement de l'IA

1943

Premier réseau de neurones artificiel par Warren McCulloch et Walter Pitts

1950

Travaux de John Von Neumann et Alan Turing, création du Test de Turing

1956

Terme "intelligence artificielle" introduit à la conférence de Dartmouth.

1980 - 1990

"Hiver de l'IA" durant les années 1980 et début des années 1990

2010

Essor de l'IA nouvelle génération

1996 - 1997

IBM Deep Blue bat Garry Kasparov aux échecs

2011

IA Watson d'IBM remporte Jeopardy!

2012

Google X crée une IA de reconnaissance d'image

2016

Alpha Go de Google bat le champion du monde de go

2020

Démocratisation de l'IA

Lancement de GPT-3 par OpenAI

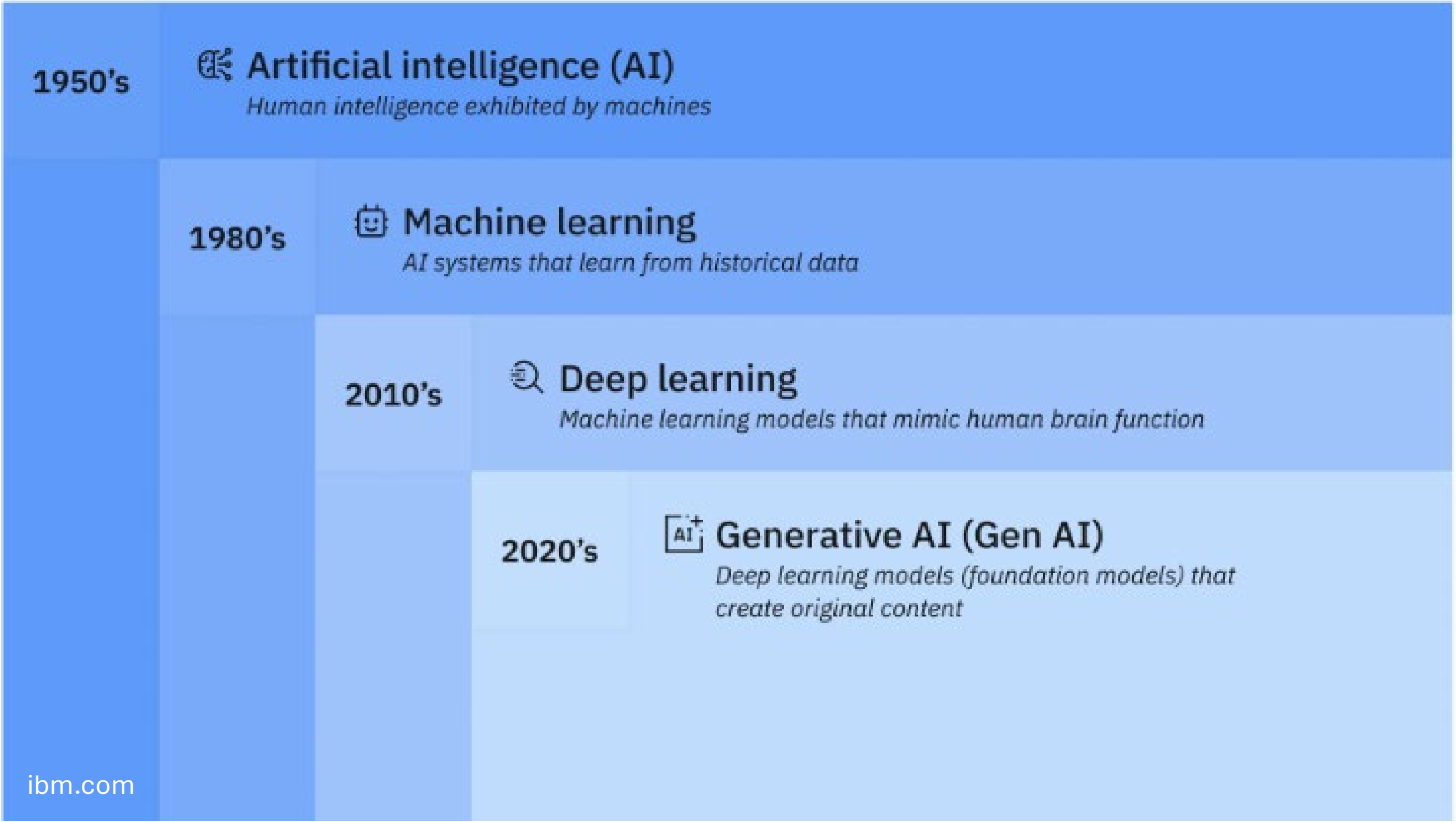
2021

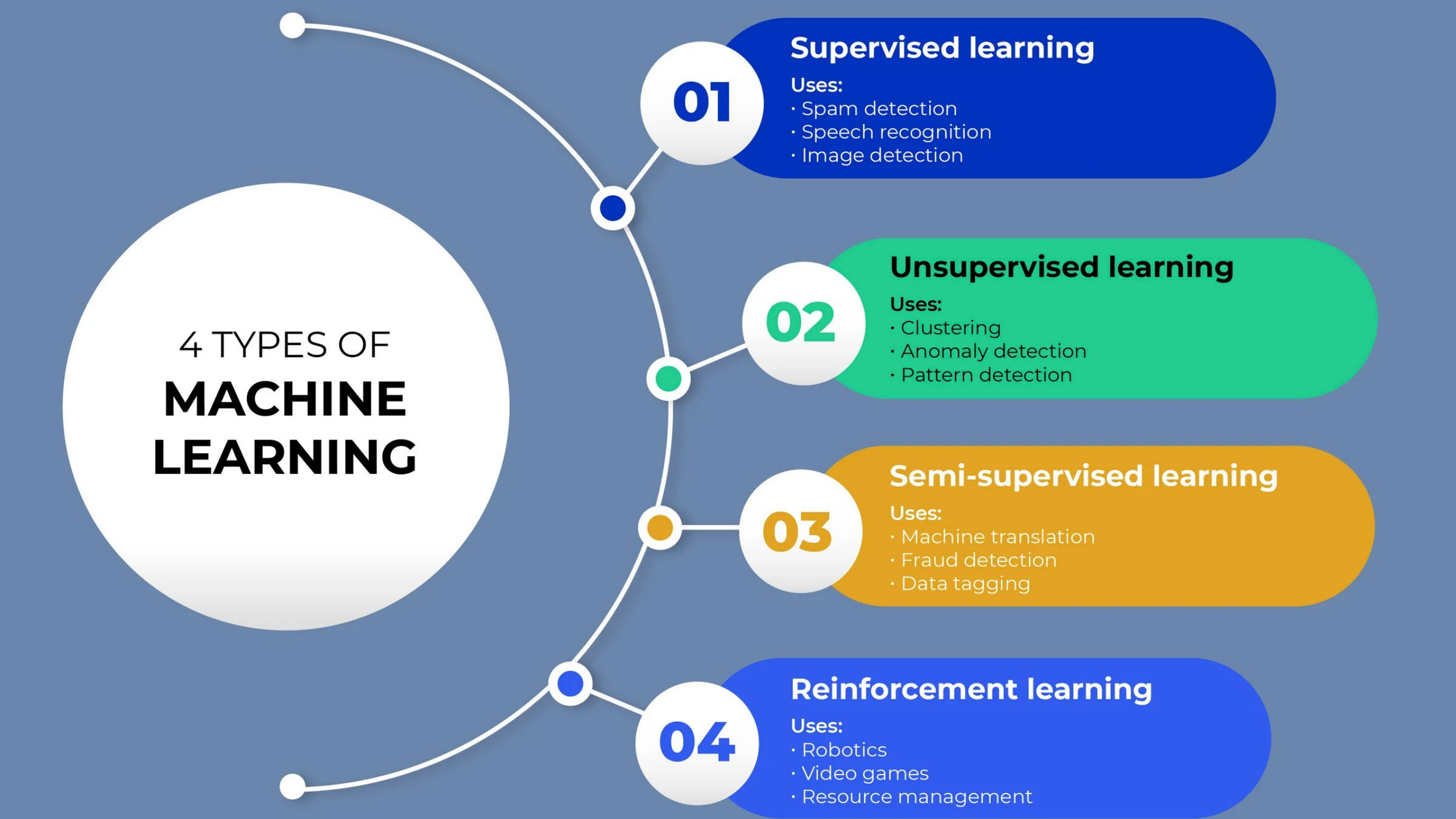
Introduction de Codex et DALL-E par OpenAI

2023

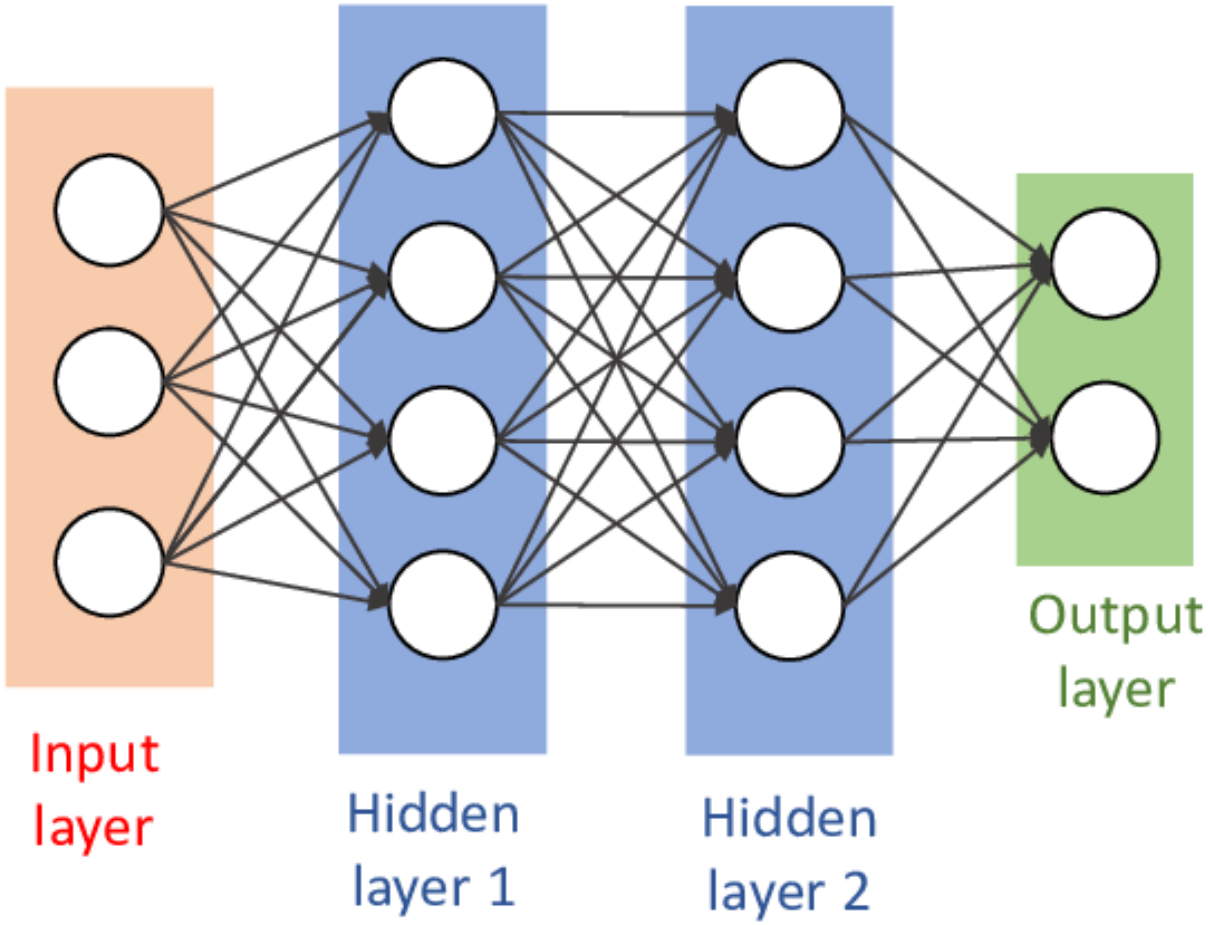
Lancement de GPT-4, intégration de DALL-E dans ChatGPT Plus

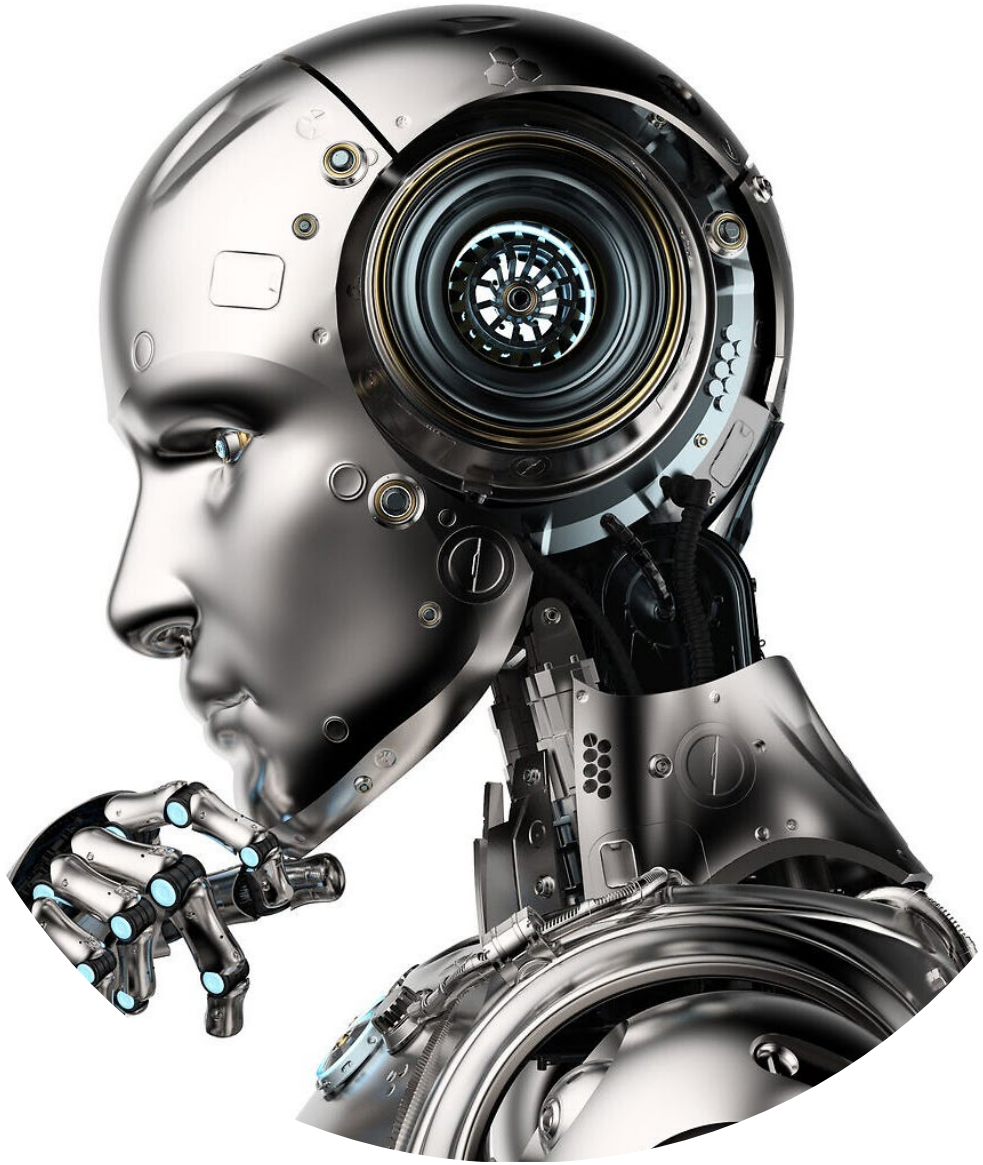
Ouverture au public de Google Bard et de Bing Chat


1950's
Artificial intelligence (AI)
Human intelligence exhibited by machines
1980's
Machine learning
AI systems that learn from historical data
2010's
Deep learning
Machine learning models that mimic human brain function
2020's
Generative AI (Gen AI)
Deep learning models (foundation models) that create original content
ibm.com


4 TYPES OF
MACHINE LEARNING
01
Supervised learning
Uses:
· Spam detection
· Speech recognition
· Image detection
02
Unsupervised learning
Uses:
· Clustering
· Anomaly detection
· Pattern detection
03
Semi-supervised learning
Uses:
· Machine translation
· Fraud detection
· Data tagging
04
Reinforcement learning
Uses:
· Robotics
· Video games
· Resource management

Deep learning





Generative AI

- «Models such as large language models that generate new content, such as text, images, or music, from their trained parameters.»

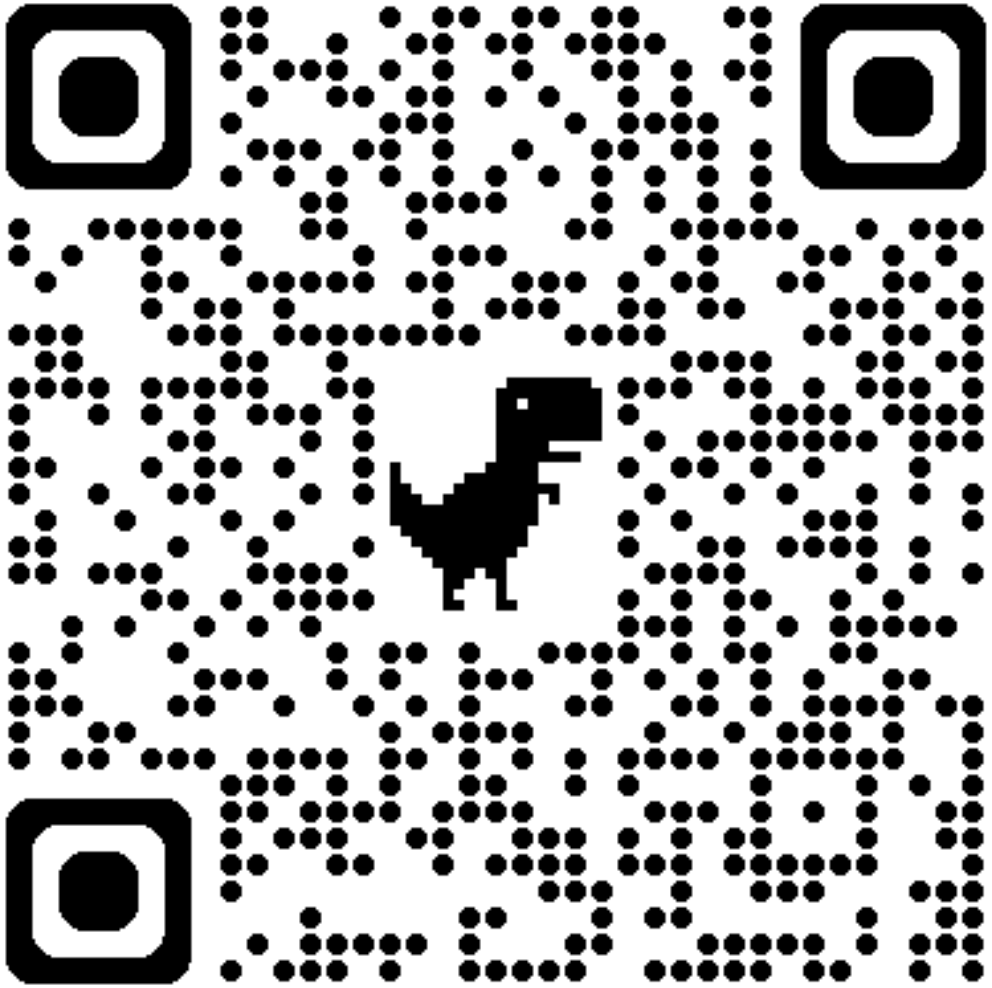

A photograph of a sunflower with sunglasses on in the middle of the flower in a field on a bright sunny day
From Dall-E

ChatGPT (Chat Generative Pre-Trained Transformer)

- Came to the market in November 2022
- Web-based chatbot
- Based on “large language models” capable of generating and predicting responses
- It is supported by a “deep learning neural network” that is trained by interactions between neuron artificial machines. These interactions are stored as numerical values called “parameters».

“Create an outline for a 90-minute workshop on AI in medical education and residency training”

https://chatgpt.com/



AI is everywhere…

- Suggestions in Netflix, Cumulus, Supercard, etc.

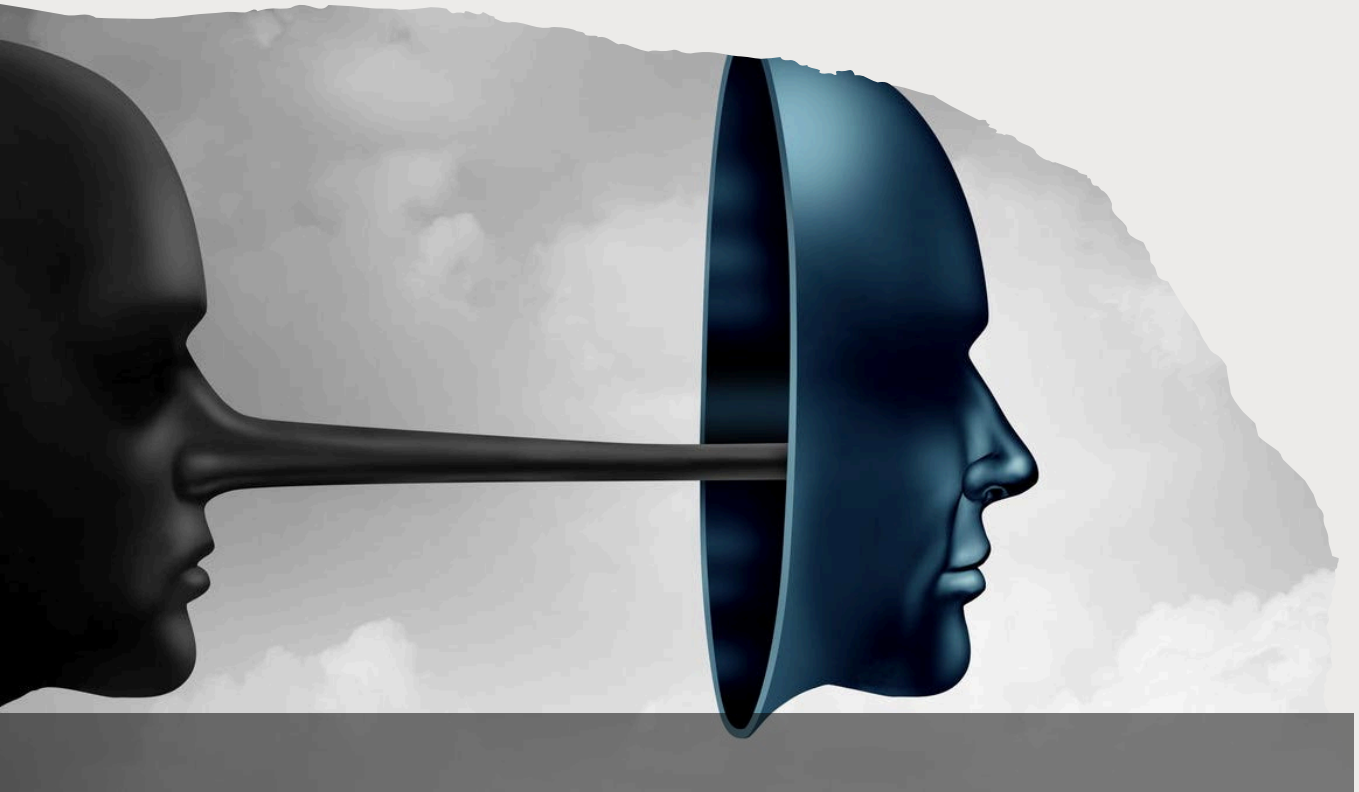
Use of Gen IA is also rapidly increasing:

- Use of ChatGPT has exploded since 2022
- Translation tools
- Learning tools
- Transcription tools, planning tools, etc.

Questions for you

- Who uses AI?
- In what context?
- What are your concerns about AI?

AI Hallucinations



"AI hallucination is a phenomenon wherein a large language model (LLM)—often a generative AI chatbot or computer vision tool—perceives patterns or objects that are nonexistent or imperceptible to human observers, creating outputs that are nonsensical or altogether inaccurate."

ibm.com

wildpixel/iStock via Getty Images

Strengths and pitfalls of Gen AI

Strengths:

- Summarization
- Translation
- Creation and improvements of texts/images/videos
- Optimizing processes (sorting emails, choosing files, etc.)

Pitfalls:

- Uncertain reliability (hallucinations)
- Lack of transparency
- Monitoring required
- Data bias
- Ethics and intellectual properties
- Carbon footprint +++

Other ethical considerations

- Discrimination (access)
- Digital divide
- Intellectual property

Reminders

- GenAI looks accurate… but it isn’t
- GenAI looks intelligent… but it isn’t
- GenAI looks as if it understands… but it doesn’t.

➢ Augmented decision-making : human review of AI suggestions

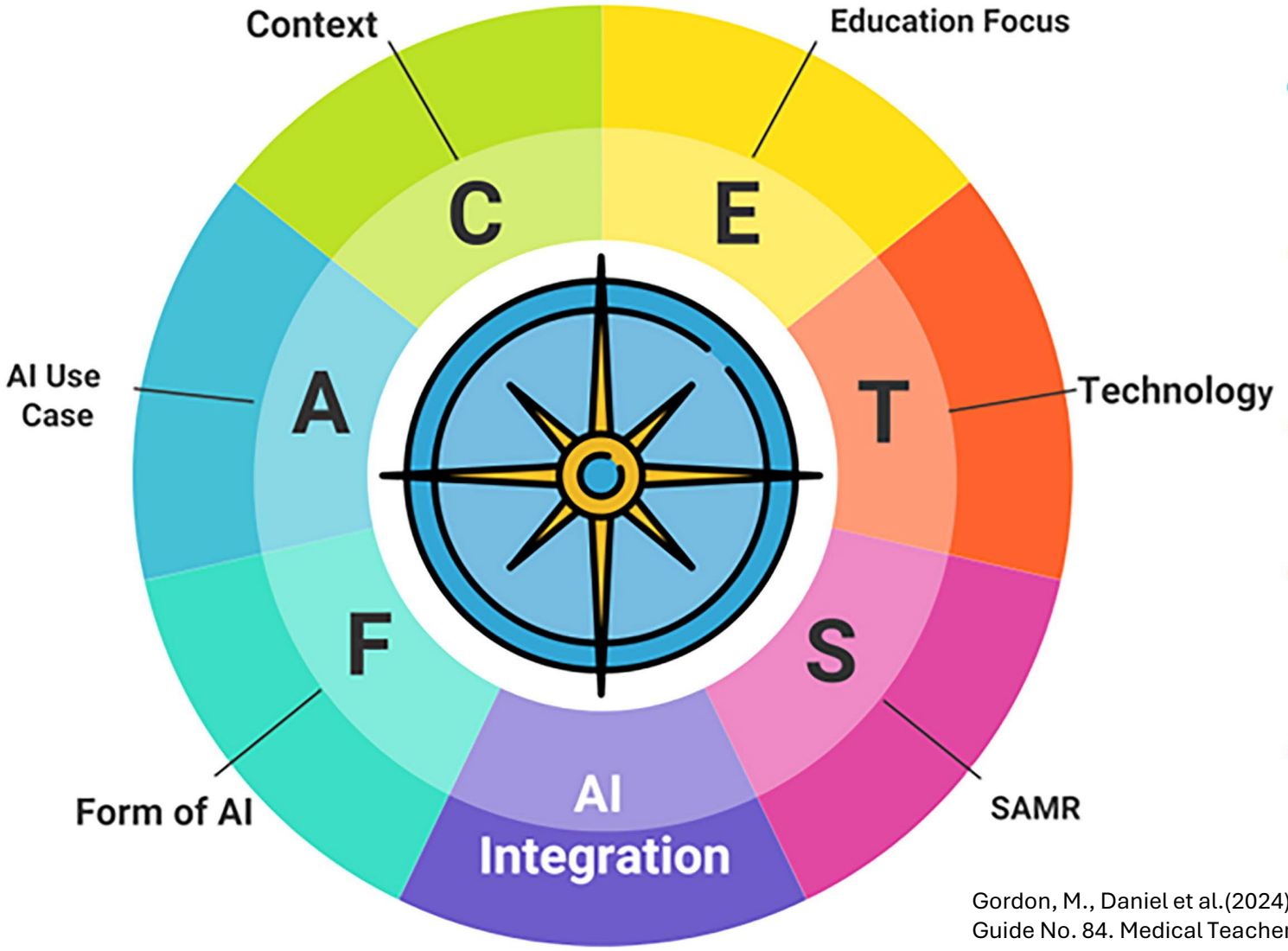
For the clinician

- Clinical skills:
  - Diagnostic tools -> radiology, dermatology
  - Prognostic tools to guide decision-making
  - Precision medicine -> huge datasets
- Administrative burden:
  - E-mail overload
  - Clinical documentation : time-consuming and burdensome

AI in hospitals

- **AI is already present in many places in hospitals** (e.g., billing, decision support, alerts).
- The use of AI is not necessarily intentional – we don't always know when there is AI!
  - **Survey on the use of translation tools**: Approximately **one-third** of people copy-paste into Google Translate or Deepl, which do not guarantee data security.
- **AI and medical devices**: Certification CE is needed.
- **Importance of human validation for any AI suggestion**! (augmented AI)

The FACETS Framework

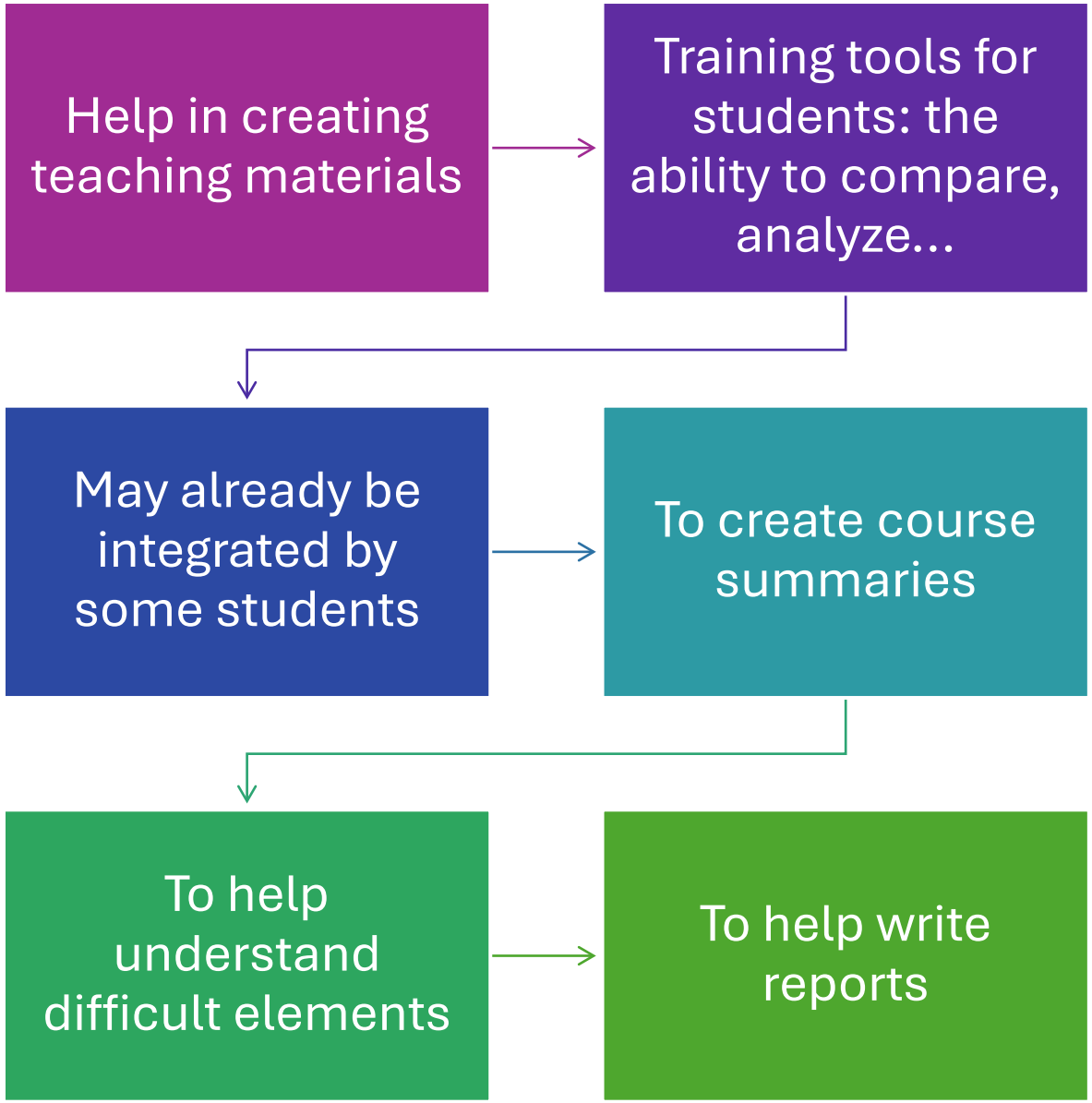


- **Form of AI**
  Definition: Category of AI
  Examples of content: Traditional ML, Deep Learning, Data Mining, NLP
- **AI Use Case**
  Definition: The end product, innovation, output or outcome achieved by the AI
  Examples of content: Virtual Patient, Personalised learning platform, Clinical guidance
- **Context**
  Definition: Stage of medical education, Area or specialism, Learner group
  Examples of content: UME / GME / CPD, Medicine, surgery, Primary care. Medics, Mixed or MDT
- **Education Focus**
  Definition: Area of medical education
  Examples of content: Selection / Curriculum/ Teaching / Assessment
- **Technology**
  Definition: Name of language model, software and programming language powering AI
  Examples of content: ChatGPT, CIRCSIM-Tutor, Noteboost
- **SAMR**
  Definition: Framework to describe level of technological integration
  Examples of content: Substitution, Augmentation, Modification, and Redefinition

Gordon, M., Daniel et al.(2024). A scoping review of artificial intelligence in medical education: BEME Guide No. 84. Medical Teacher, 46(4), 446-470. https://doi.org/10.1080/0142159x.2024.2314198

- **Today’s AI agents are like the self-driving cars of 10+ years ago**. That is, they can do things, but they’re not exactly reliable or autonomous yet. Kanjun Qiu, CEO and founder of AI startup Imbue

For the educator



For the educator

Keep up with new technologies -> adapt what and how we teach

- Variable use of AI -> what do we need to teach to avoid discrimination?
- Modify certain activities -> Review articles for memoirs?
- Maintain some competencies : clinical reasoning, ability to summarize a clinical situation for handoffs

Possible impact:

- Require analysis of AI contribution, if AI is allowed
- Type of exams ? (AI can pass certification exams – without understanding anything!)
- More sophisticated simulators ?

Prompt Engineering: The FIVE «S» Model for Educators

1. Set the scene
2. Be Specific
3. Simplify your language
4. Structure the output
5. Share feedback

Game time!

CREATE SOME POETRY

SUBJECT: THE JOY OF BEING A DOCTOR

Merci beaucoup pour votre attention!

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