



# Smarter Healing – How AI is Reshaping HealthCare

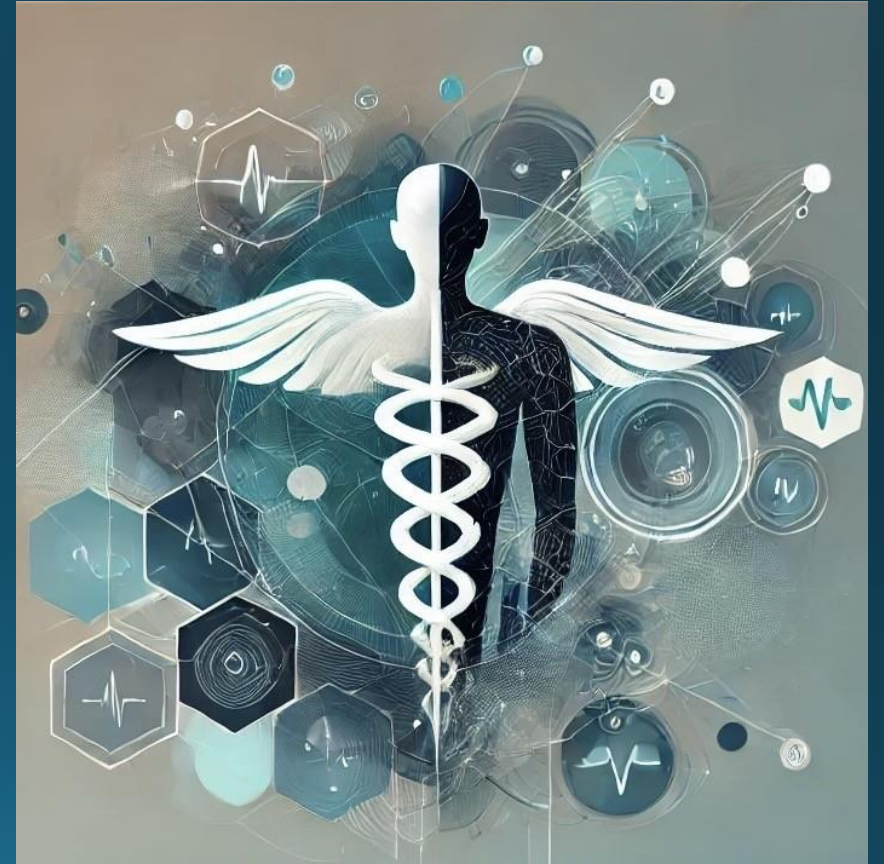
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# What is Artificial Intelligence?

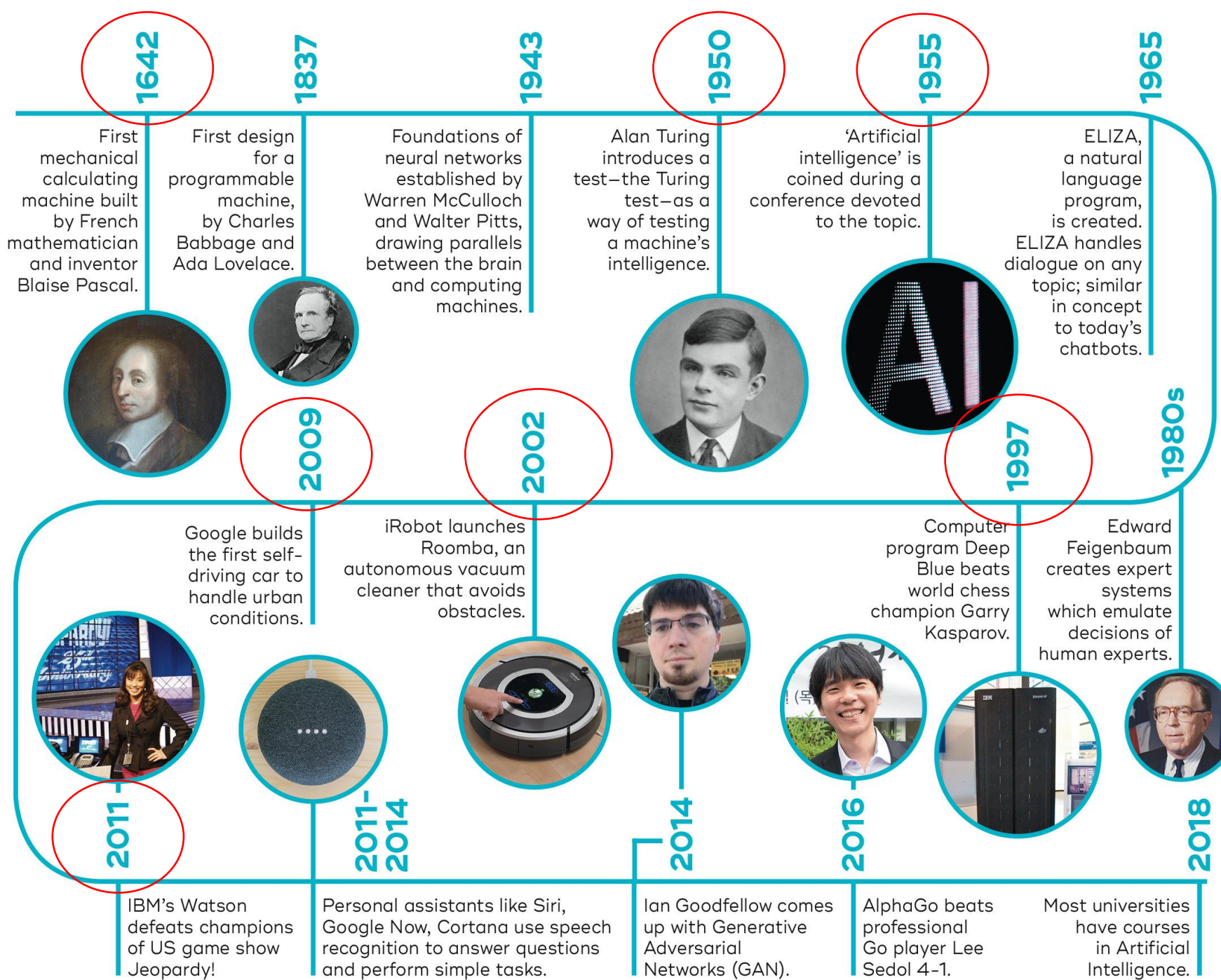
- Artificial intelligence (AI) is the simulation of human intelligence processes by machines, such as learning, reasoning, and self-correction. AI systems can analyze data, identify patterns, and make decisions with increasing autonomy.



# What does that mean?

- Machine Learning
  - Algorithms and statistical models to perform tasks
- Neural Networks
  - A series of algorithms that mimic thinking
- Deep Learning
  - Using layers of Neural Networks in large data sets
- Natural Language Processor
  - Enable computers to understand, interpret and generate language
- Computer Vision
  - Ability to interpret and make decisions based on visual input
- Robotics
  - Field assimilating AI to carry out actions
- Expert Systems
  - AI acting as an expert
- Knowledge Representation
  - AI learning from itself

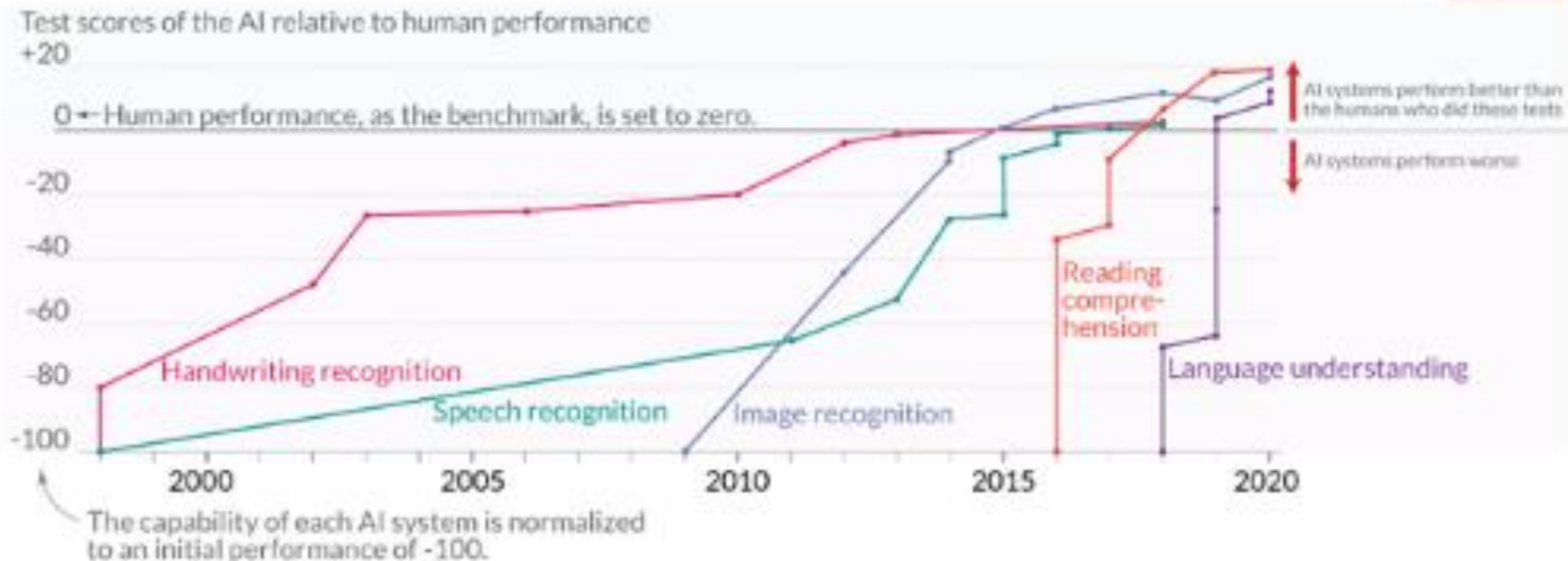




2020's

## Language and image recognition capabilities of AI systems have improved rapidly

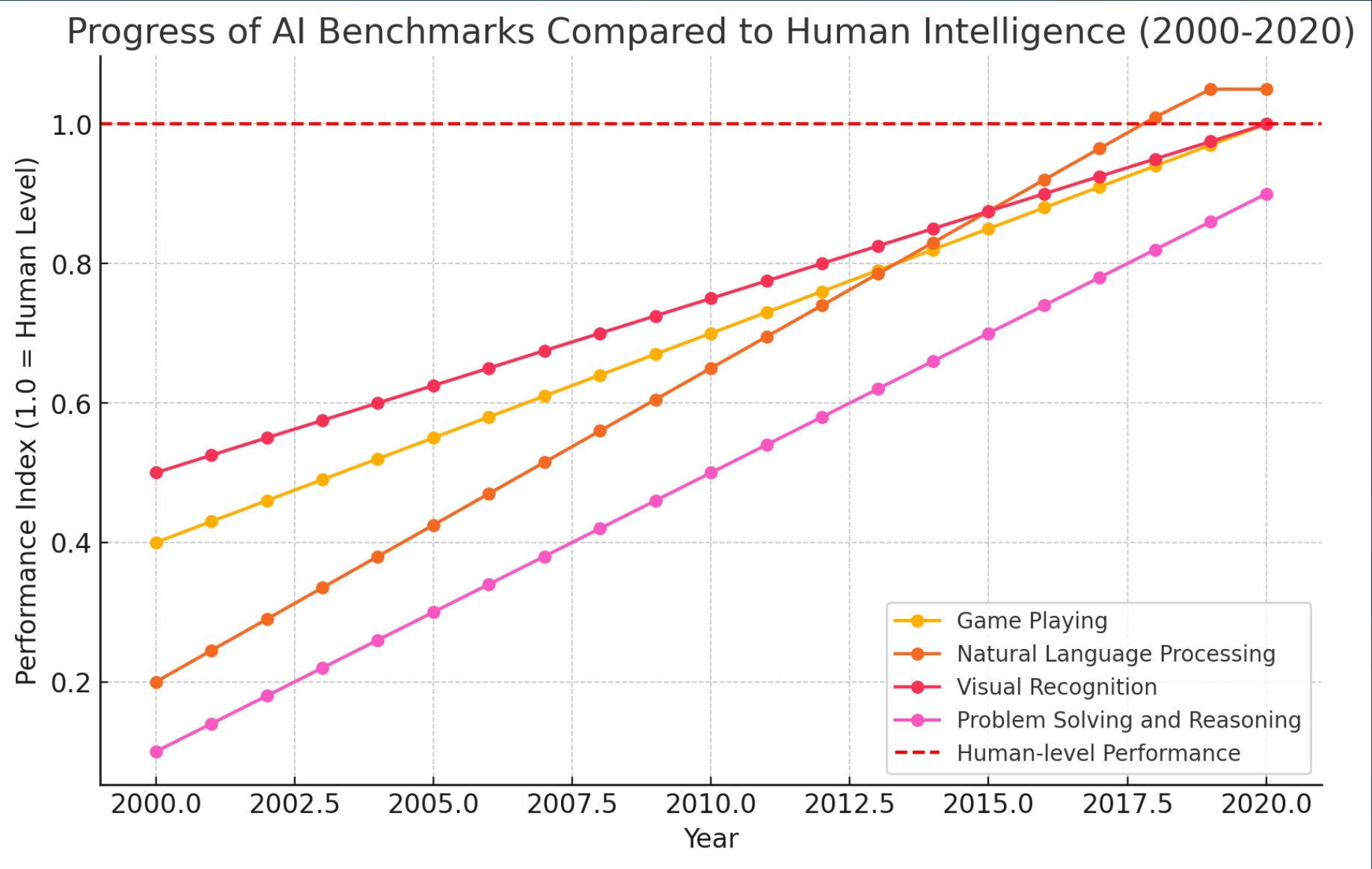
Our World  
in Data



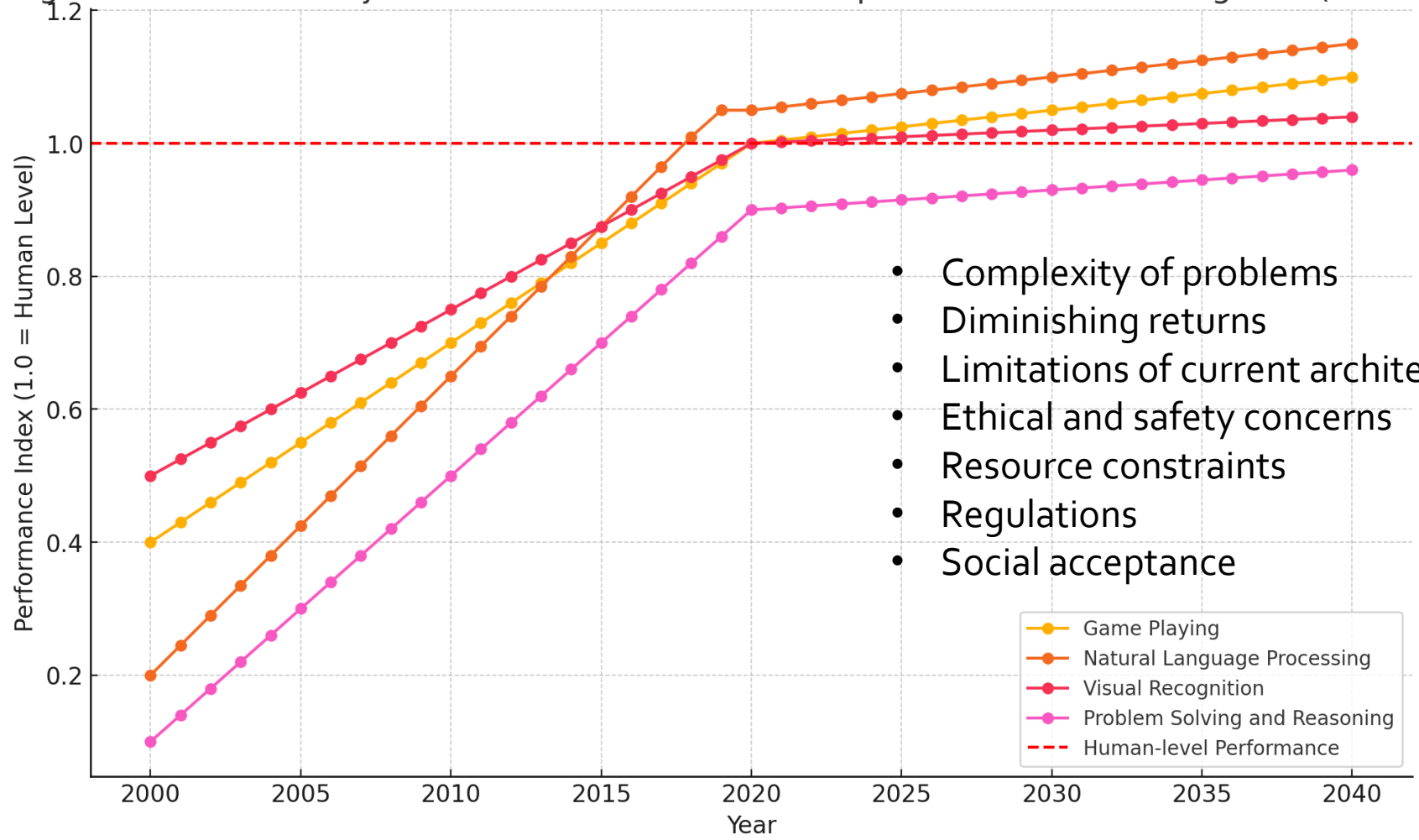
Data source: Kiela et al. (2021) – Dynabench: Rethinking Benchmarking in NLP  
OurWorldinData.org – Research and data to make progress against the world's largest problems.

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What Does AI think about  
Itself?



Progress and Future Projections of AI Benchmarks Compared to Human Intelligence (2000-2040)



- Complexity of problems
- Diminishing returns
- Limitations of current architectures
- Ethical and safety concerns
- Resource constraints
- Regulations
- Social acceptance

What Does AI think about Itself?

# What is a Language Model?

- A large language model (LLM) is a type of machine learning (built on data) model designed for natural language processing tasks such as language generation.
- Chat GPT is a Large Language Model (LLM)
- Predicts next word in a sequence
- Like advanced autocomplete, like crazy advance autocomplete
- Learns from text, not facts
  - Not conscious reasoning
- It doesn't know  $1+2=3$  in a math sense, rather it knows from training that given that sequence 3 is most likely to come next





# A Quick History of Language Models

Year	Milestone
2018	GPT-1 (OpenAI's first attempt, small scale)
2019	GPT-2 (bigger, better, controversial release)
2020	GPT-3 (massive model, over 175 billion parameters)
2022	ChatGPT launched (fine-tuned from GPT-3.5)
2024	GPT-4 (smarter, multimodal inputs like images)

# What was it trained on?

- Publicly available information that *was chosen for it*

# Strengths of Language Models



FAST, FLUENT TEXT



DRAFT NOTES,  
EMAILS, EDUCATION



SUMMARIZE LARGE  
TEXT



BRAINSTORMING  
HELP

# Limitations and Cautions

Hallucinations:  
inaccurate  
outputs

No true  
understanding

Bias in data

- Garbage in is  
garbage out

Privacy  
concerns

# Hallucinations



## AI from LLM's

confidently generates false, misleading, or nonsensical information that appears plausible



## Key Elements

Factual inaccuracy

- Incorrect dates, names, citations, claims

Fabrications

- Invent studies or quotations

Overconfidence

- Presented in convincing tone



## Why does it occur

It predicts text based on patterns in its training data

- May try to “fill in the gaps”




5-10% in general inquiries  
20-50% in highly specialized tasks like medical or legal




# Hallucinations

Google's Bard chatbot incorrectly claiming that the James Webb Space Telescope had captured the world's first images of a planet outside our solar system



Microsoft's chat AI, Sydney, admitting to falling in love with users and spying on Bing employees



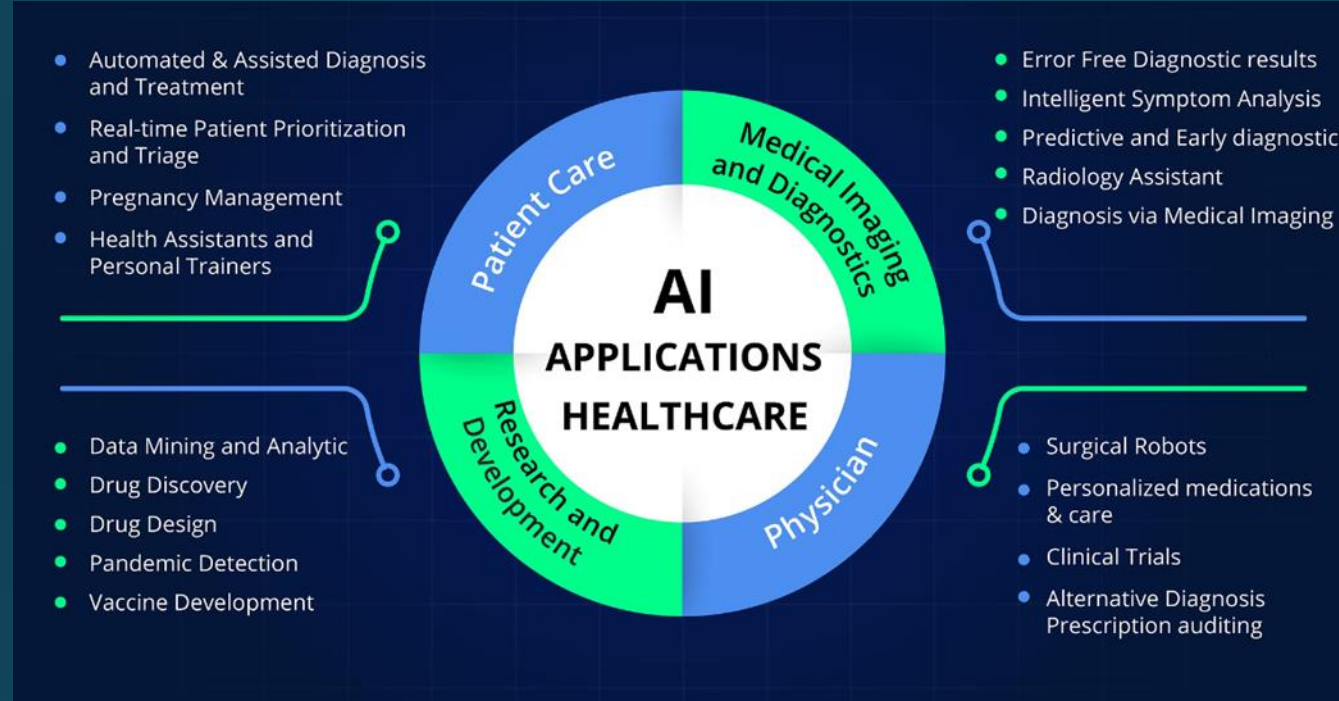
Meta pulling its Galactica LLM demo in 2022, after it provided users inaccurate information, sometimes rooted in prejudice



# Types of AI in Healthcare

1. **Generative AI** - AI models that can create new content such as text, images, or audio by learning from existing data. Used for automating content creation and personalization in healthcare.
2. **Machine Learning** - Algorithms that learn from data to make predictions or decisions without being explicitly programmed. Applied in healthcare for disease diagnosis, treatment optimization, and patient risk assessment.
3. **Natural Language Processing** - AI that can understand, interpret, and generate human language. Enables chatbots, medical language processing, and structured data extraction from clinical notes.
4. **Agentics** - refers to a platform that enables users to create and interact with autonomous agents using neural interface technology.

# AI's Benefits in Healthcare



## Improved Diagnostics

AI-powered diagnostic tools can analyze medical images and patient data with unparalleled speed and accuracy, enabling earlier detection of diseases and more personalized treatment plans.

## Enhanced Patient Engagement

Chatbots and virtual assistants powered by AI can provide personalized support and guidance to patients, improving their overall experience and outcomes.

## Optimized Workflows

AI can streamline administrative tasks, automate scheduling, and optimize resource allocation, allowing healthcare professionals to focus more on patient care.



# Concerns Around AI in Healthcare

**1**

## **Bias and Fairness**

AI algorithms can perpetuate or amplify existing biases in healthcare, potentially leading to disparities in access and treatment.

**2**

## **Privacy and Data Security**

The vast amounts of patient data required for AI systems raise significant concerns about data privacy and security, requiring robust safeguards.

**3**

## **Relationship with Patients, Accountability, and Trust**

Healthcare professionals and patients may struggle to understand and trust the "black box" nature of AI decision-making, highlighting the need for transparency and accountability.

# Guiding Principles Around Use of AI

## Patient at the Center

How will the technology bring us closer to our patients and allow us more focused time on patient care.

## Promote Transparency

Clear communication strategies that showcase the responsible and ethical use of AI, building trust with the community. Educate patients and the public about how AI is being used in healthcare, emphasizing the benefits while addressing concerns around bias, privacy, and accountability.

## Human in the Loop

Partner the AI with our team members:

- Understand the benefits
- Tune the tools for accuracy and improved quality
- Monitor responsible use

## Own the Output

Have ethical ownership of the output of AI. Considerations of plagiarism and reference expertise should always be considered.



# Rising AI in Healthcare



## Electronic Health Record

Analyzing large amounts of data



## Diagnostic Imaging

Uses algorithms to analyze images



## Personalized Medicine

Genetic analysis and treatment planning  
Comparisons with other patients



## AI Assisted Surgery

Time stamping  
Deviation alerts  
Instrument/Supply count

# Rising AI in Healthcare



## Virtual Health Assistants

Appointment management  
Prescription Refills  
Transitions of Care



## Predictive Analytics

Predict sepsis, admissions, hospice, and even mortality



## Clinical Decision Support

Amalgamation of data  
Incidental Findings



## Remote Patient Monitoring

Pressure Ulcers, Fall risks, Vitals



## AI Analysis of Pathology

Looking at pixels

# Rising AI in Healthcare



## Healthcare Operations Optimization

Predict patient flow,  
resource needs, supplies,



## Mental Health Applications

AI powered assessments  
and therapy??



## Drug Discovery

Target ID, Molecular  
screening, drug design,  
clinical trials



## Epidemiologic Surveillance

Process data for public  
health records, social  
media, and other sources  
to identify and predict  
public health concerns



## Genomics

Read human genome and  
compare to mutations



## Biometrics

Using human  
observations to predict  
disease

# Use Cases of AI In Healthcare



## Ambient Documentation

Generative AI note capture from ambient listening. Creates a providers note allowing providers more time with patients.

West is leading the industry with partnership of Microsoft Nuance.

## Generative Patient Messages

Suggested patient message creation in response to increase interaction and contact with patients through patient portal.

## Computer Assisted Coding

Revenue Cycle focused functionality to provide insights and recommendation to complex coding requirements

## Device Management AI

Implementing summer of 2024. This software will be used on for MRI Scans for post processing of the images. The AI will have the ability to completed the 3D rendering and post processing, in half of the time it takes a technologist to complete manually. to complex coding requirements

## Radiologist Virtual Assistant

AI that will be used by Radiologists to help assist in their day-to-day activities, increasing their proficiency throughout the day. The software uses AI to learn the habits of the provider and predicts their “next move.” MM has included UMHW in on the presentations, and they are working through their RFP Process.

# Use of AI Improved Diagnostics



## Mammography

Artificial intelligence that uses machine learning with AI to identify possible breast cancer and identify it for the Mammographer. Studies show this technology has been able to identify breast cancer 3-5 years before a radiologist early. It has allowed our providers to get care to our patients sooner and increased the rate of remission.



## Stroke Detection

This mobile app is used by our stroke providers to assist with immediate intervention. The Software uses AI to identify potential bleeds on a patient's brain scan, so the Neurointerventional can quickly look at the area identified by AI to decide if an intervention is needed. Since implementing this software, our providers have been able to shorten their decision time, making the needed intervention started on the patient in less time..



# Use of AI in Patient Experience

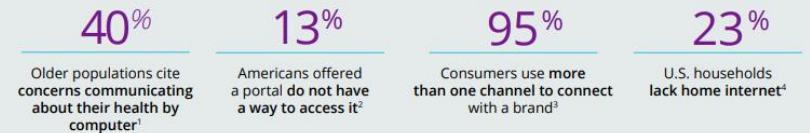


## Automated Call Center

Generative AI conversation automation for scheduling, patient questions, future Prescription Refills and Care Gaps. Operating 24/7. Allows our PSRs to spend more time with patient needing added attention

Agentics

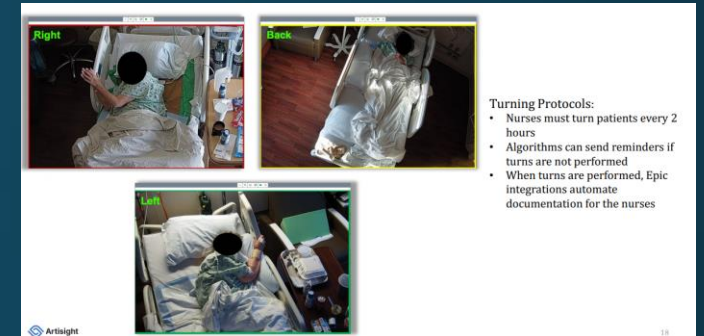
- Expand lines of communication to voice, email, SMS, online chat
- Include patients **without patient portal accounts**
- Automate delivery of custom, branded, ad hoc messages outside of EHR-triggered events
  - Preventative and follow-up care reminders
  - Weather or construction alerts
  - Wellness program announcements



## Conversational Support

Generative Conversational AI to support our patient portal help line. Since go-live, technology has a capture rate of 83% of monthly help calls, allowing our HITS team to focus on optimizations and innovations of patient portal.

# Use of AI Optimized Workflows and the Smart Patient Room



## Smart Room Technology

Utilizing tele-medicine, nursing, and sensors in the room to maximize the surveillance and care of patients

## Ambient Documentation Capture

Ambient listening in the room can capture conversations and utilize generative AI to document in the patient's chart

## Pressure Injury

Surveillance sensors to indicate if a patient has not moved in a prescribed time and alert staff to the risk.

## Hand Hygiene Compliance

Using sensors to monitor hand hygiene compliance, reducing the need for human capital to monitor.

## Fall Risk

Sensors are used to monitor a patient. An algorithm can detect that a all-risk patient is attempting to get up, verbally address the patient and alert nursing staff.

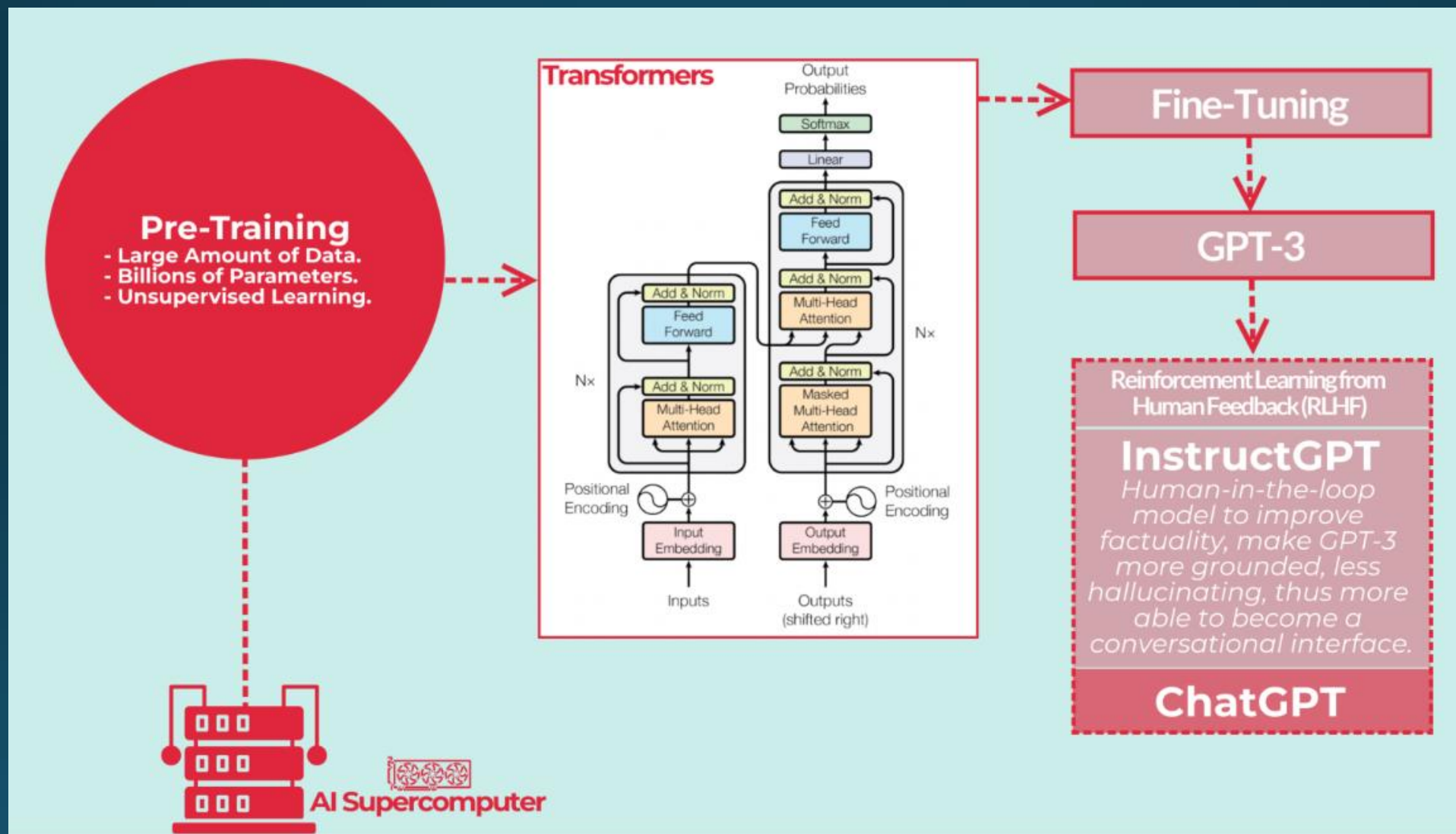


# Back to ChatGPT...

- GPT = Generative  
Pre-trained  
Transformer
- Large Language  
Model (LLM)

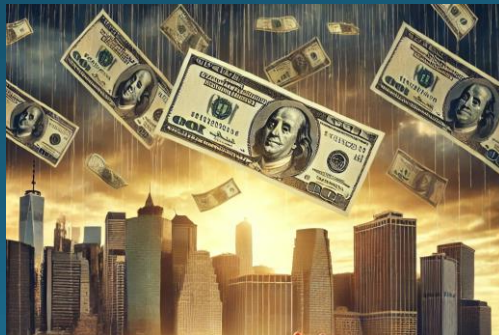


# Roadmap



# Pre-Training

- For models like GPT-3 and GPT-4, pre-training took weeks to months
- Why so long?
  - Billions of words from books, websites, and articles
- Trained on supercomputers using thousands of powerful GPUs (graphics processing units) running in parallel
  - #Nvidia



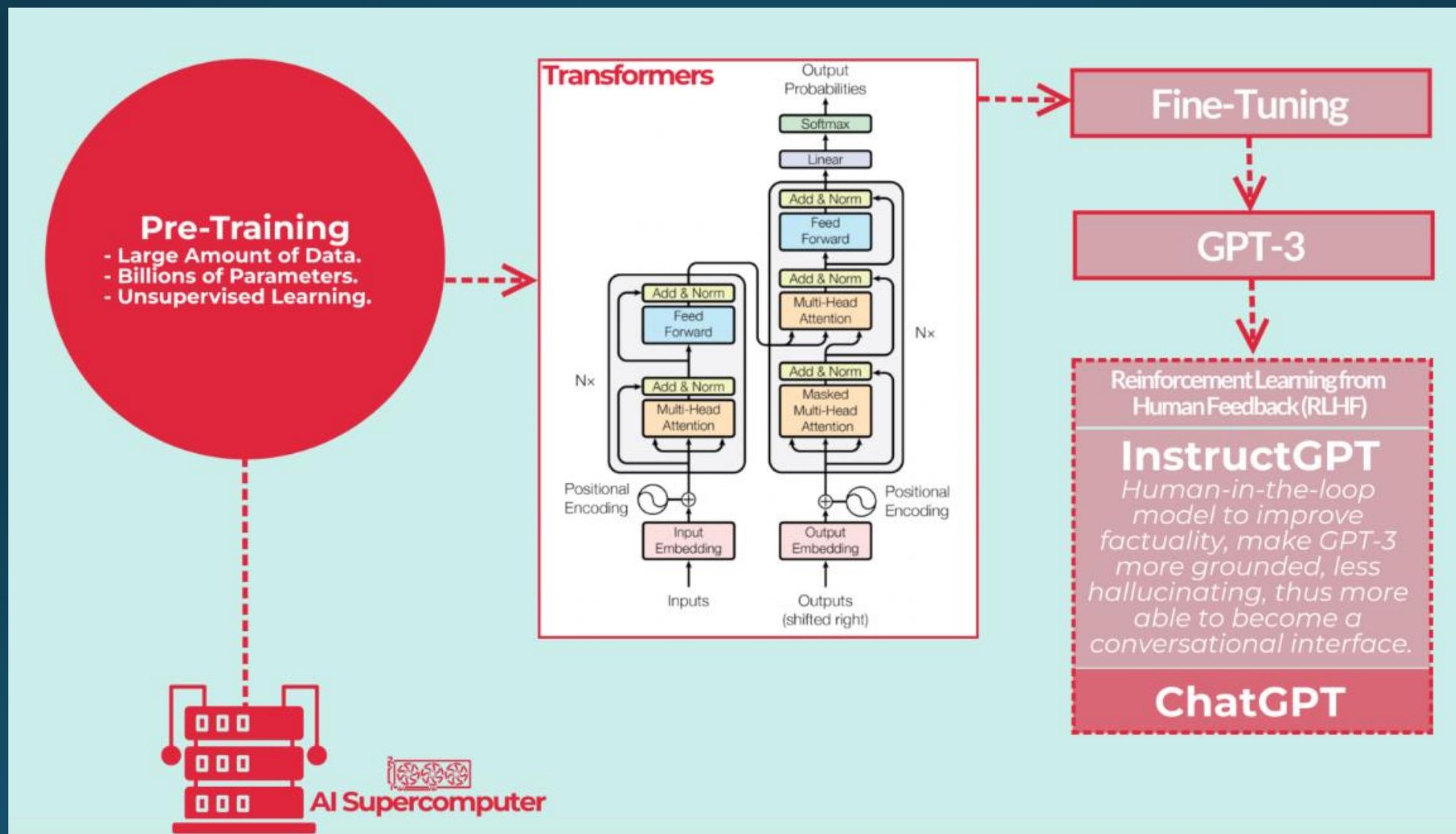


# Unsupervised Learning

- How is it fed into Chat GPT?
  - Automated web crawlers and curated datasets to gather large amounts of publicly available text.
  - This text is then processed and fed into the model, allowing it to identify patterns within that text, not from specific, targeted articles or URLs

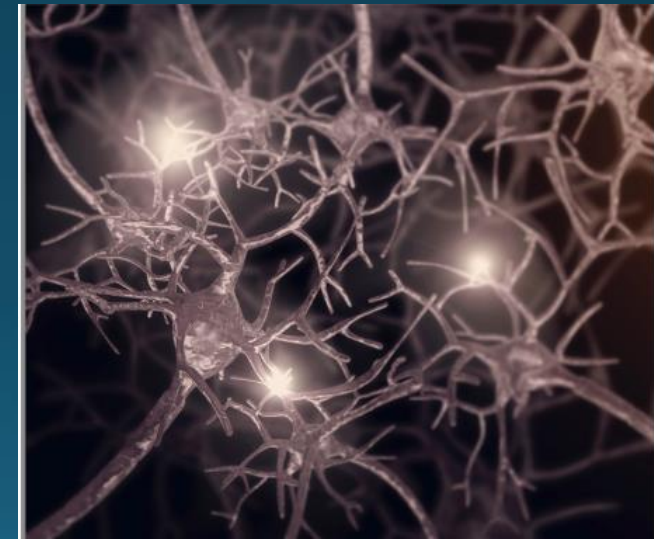


# Roadmap



# Transformers

- Core technology behind ChatGPT
  - A form of neural networks designed to process text and understand context
    - This is done by self-attention
- Neural Network
  - Computer program inspired by the human brain
  - Layers of nodes (neurons) that process and pass information
  - Each layer takes input, processes it and sends to the next layer
  - Able to identify patterns



# Self-Attention Mechanism

Speed Reading!

- 
- The patient was having chest pain and labs showed elevated troponins

# Self-Attention Mechanism

1. The **doors** of the **jaguar** were open.
2. The **jaguar** made a **howling** noise.

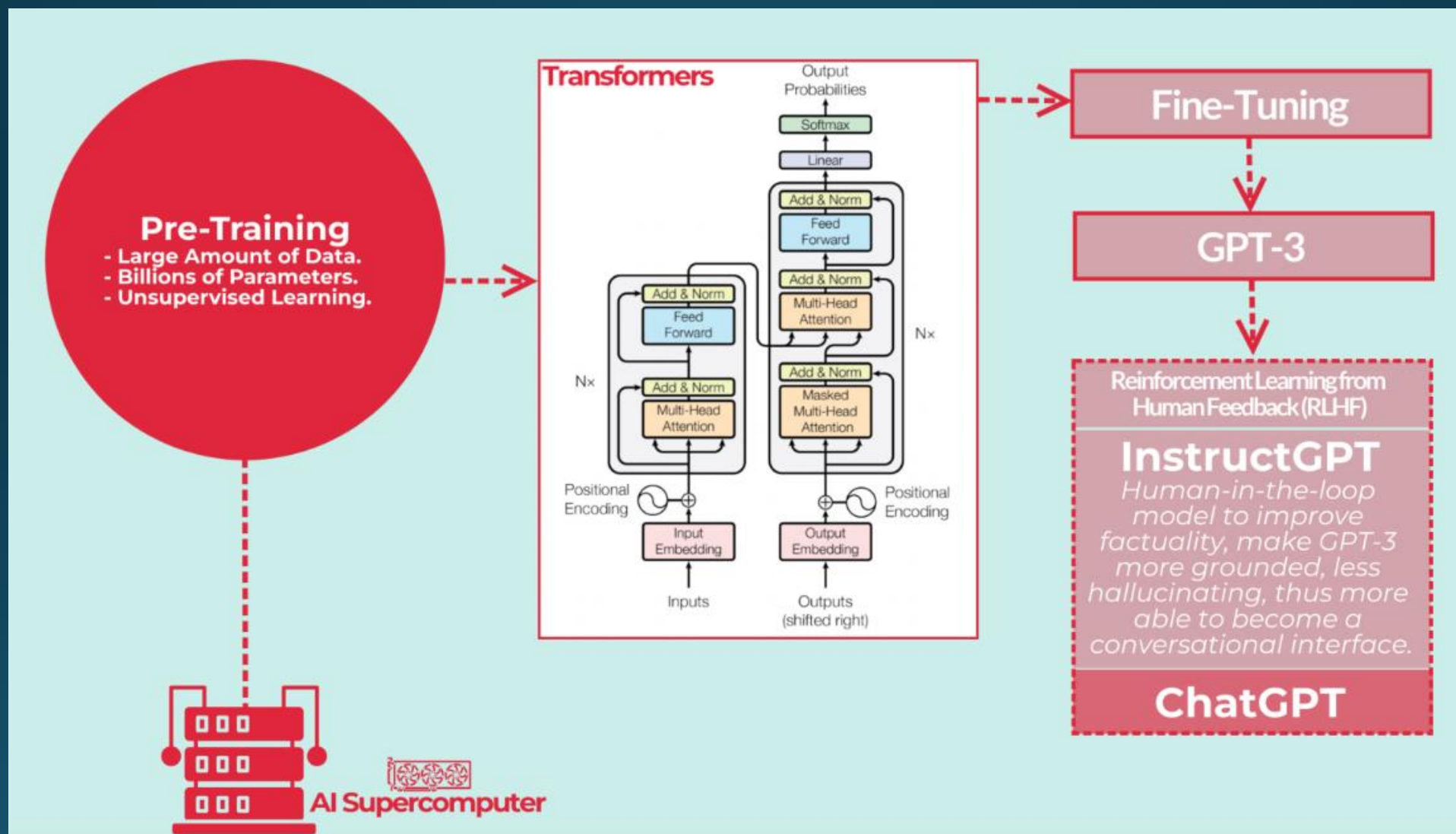
Because it reviews ongoing threads, it can use context

# Transformers

- A highly efficient team of doctors reviewing a complex patient case
  - Instead of going through the chart sequentially, each doctor **quickly scans the entire record** at once, identifying the most relevant details—medical history, lab results, symptoms, and past treatments—**all at the same time** to make the best decision
  - Surfaces these most relevant elements and identifies patterns and context



# Roadmap





# Last Checkpoint

- Fine-Tuning Phase:
  - Human feedback refines responses
  - Reinforcement Learning with Human Feedback (RLHF)
- Key Points:
  - No real-time web search
  - Knowledge is static after training

- Training GPT-3 reportedly took thousands of petaflop days
  - 1 quadrillion calculations per second
  - 86,400 seconds in a day
  - 86,400,000,000,000,000,000 calculations per day

86.4 quintillion  
PER DAY TIMES A  
THOUSAND

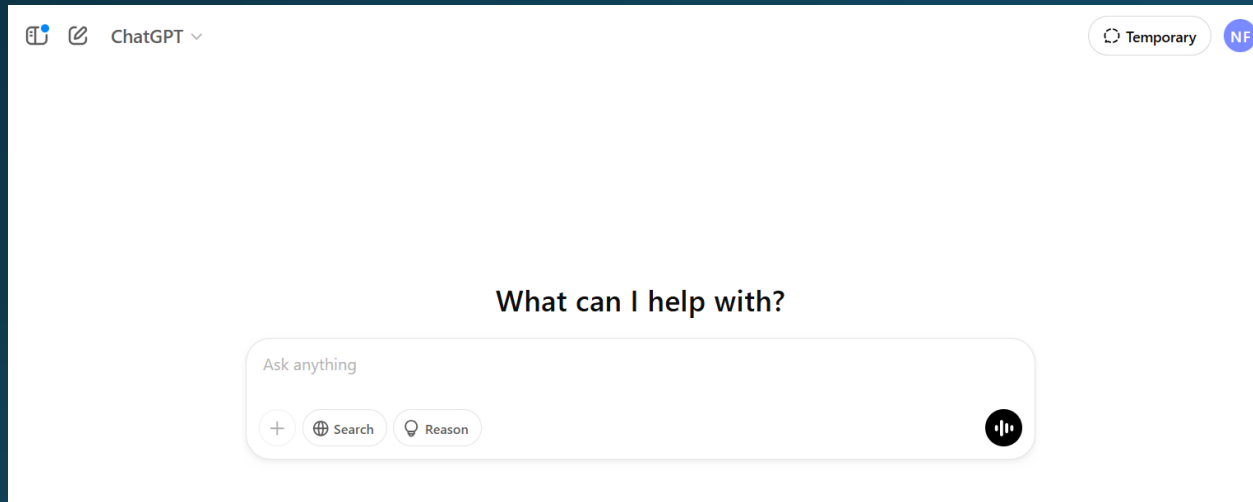


# Let's Get Real

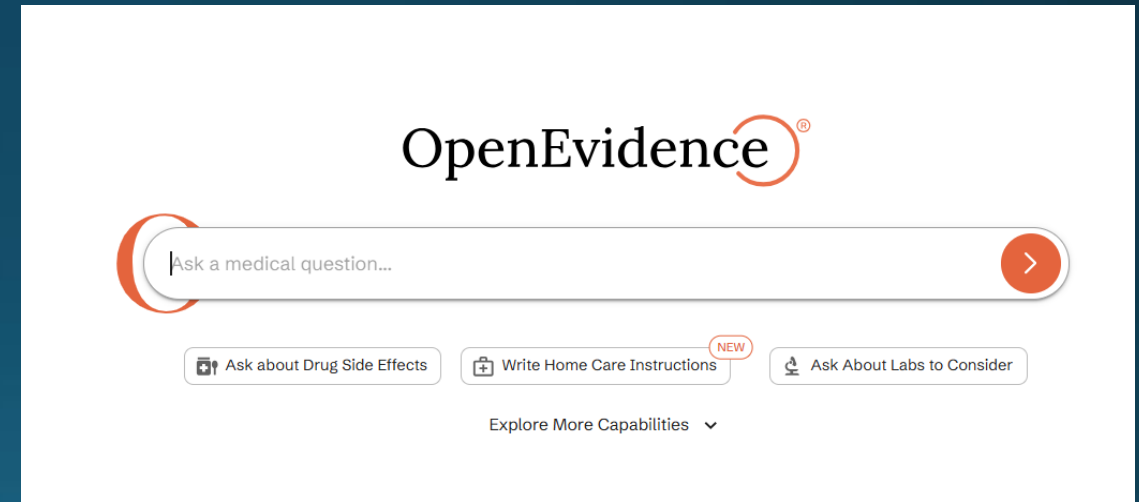
- Having a foundational understanding allows you to understand where the information is coming from
- Currently 2 main resources for providers (ever evolving)
  - ChatGPT
  - OpenEvidence
  - Clinical Key



## ChatGPT



## OpenEvidence



**OpenEvidence uses a comprehensive database of peer-reviewed medical literature to ensure that all responses are based on reliable and accurate information.**

The database is regularly updated with new articles, ensuring that the information is always up to date.

# OpenEvidence vs ChatGPT

- **OpenEvidence:** Typically, OpenEvidence is more specialized in sourcing data from scientific journals, clinical studies, academic papers, and other trusted, peer-reviewed resources
- It may use APIs or databases like PubMed, clinical trial repositories, or medical guidelines to provide real-time evidence-based insights
- Could be live data pulls
- **ChatGPT:** ChatGPT's training data includes a large collection of publicly available text from the internet, but it doesn't have direct access to specialized databases like PubMed or real-time scientific publications
- It can't query or access specific, up-to-date evidence unless OpenAI's model is connected to a service that has access to that information

# OpenEvidence vs ChatGPT

- **OpenEvidence:** Citations are listed and readily available for reference

Patients with persistent or worsening symptoms after appropriate antibiotic therapy should be reevaluated. Chronic carriers of GAS may not require treatment unless symptomatic or in specific epidemiologic contexts.<sup>[1][5]</sup>

👍 Helpful    👎 Not Helpful

## References

1. [Streptococcal Pharyngitis: Rapid Evidence Review.](#)  
Hamilton JL, McCrea II L.  
American Family Physician. 2024;109(4):343-349.
2. [Common Questions About Streptococcal Pharyngitis.](#)  
Kalra MG, Higgins KE, Perez ED.  
American Family Physician. 2016;94(1):24-31.
3. [Notes From the Field: Group A Streptococcal Pharyngitis Misdiagnoses at a Rural Urgent-Care Clinic--Wyoming, March 2015.](#)  
Harrist A, Van Houten C, Shulman ST, Van Beneden C, Murphy T.  
MMWR. Morbidity and Mortality Weekly Report. 2016;64(50-51):1383-5. doi:10.15585/mmwr.mm6450a4.  
☆ Leading Journal ⓘ

- **ChatGPT:** Citations are available but less clear

**Strep throat** is a bacterial infection caused by *Group A Streptococcus*. Treatment is aimed at relieving symptoms, preventing complications (like rheumatic fever), and reducing transmission.

## ✅ First-line treatment:

- Antibiotics (typically for 10 days):
  - Penicillin V (oral) or Amoxicillin (oral)
  - If allergic to penicillin:
    - Azithromycin, Clindamycin, or a first-generation cephalosporin (if not anaphylactic allergy)

## 💊 Common antibiotic regimens:

- Amoxicillin: 50 mg/kg once daily (max 1000 mg) or 25 mg/kg twice daily
- Penicillin V: 250 mg 2–3x daily for children; 500 mg 2–3x daily for adults
- Azithromycin: 12 mg/kg once daily (max 500 mg) for 5 days





## Management of displaced radial fracture, closed in elderly woman

Expanded question: **What** is the management of a displaced radial fracture, closed, in an elderly woman?

The management of a displaced radial fracture in an elderly woman typically involves a decision between operative and non-operative treatments.

**Non-operative treatment** is often preferred for elderly patients due to similar long-term outcomes and lower complication rates compared to surgical options. The American Academy of Orthopaedic Surgeons (AAOS) and the American Society for Surgery of the Hand (ASSH) recommend non-operative treatment for geriatric patients, as operative treatment does not lead to improved long-term patient-reported outcomes. Non-operative management usually involves closed reduction followed by immobilization with a cast for approximately 5 weeks.<sup>[1-2]</sup>

**Operative treatment** with volar locking plate fixation can be considered, especially in cases where anatomical alignment is crucial for the patient's functional demands. Studies have shown that while surgical fixation may improve radiographic outcomes and grip strength, it does not significantly enhance long-term functional outcomes compared to non-operative treatment. Additionally, operative management is associated with higher complication rates, including stiffness and chronic regional pain syndrome.<sup>[3-6]</sup>

In summary, **non-operative treatment** with closed reduction and casting is generally recommended for displaced radial fractures in elderly patients, as it provides similar functional outcomes with fewer complications compared to surgical options. ■

# Chat GPT

**Management of a displaced radial fracture** (specifically a distal radius fracture) in an elderly woman requires careful consideration due to factors such as bone density, healing capacity, comorbidities, and functional demands. Here's an approach to managing this condition:

## Initial Assessment and Imaging

History and Physical Examination: Assess for signs of neurovascular compromise (e.g., pain, swelling, deformity, decreased sensation, or pulse) and evaluate for potential co-existing injuries.

Imaging: Obtain X-rays (AP, lateral, and oblique views) to assess the fracture pattern, displacement, and involvement of the joint. A CT scan may be needed in complex cases for more detailed evaluation.

## Non-Surgical Management (if appropriate)

Indications: Non-surgical management is considered if the fracture is not severely displaced and the patient is a poor surgical candidate due to comorbidities or high surgical risks.

Reduction: If displaced, a closed reduction should be attempted under appropriate analgesia or sedation to restore anatomical alignment.

Casting/Splinting: Following a successful reduction, the fracture is typically immobilized in a cast (short-arm cast or sugar-tong splint) for 4-6 weeks, depending on the fracture's stability and healing.

Follow-Up: Regular follow-up X-rays to monitor fracture healing. Early mobilization of the fingers and wrist may be encouraged to prevent stiffness.

## Differential for child with fevers, cough, erythematous, papular rash

OpenEvidence

New Question

FI

### Most Likely Diagnoses:

1. **Viral Exanthem:** Viral infections such as enteroviruses can present with fever, cough, and erythematous, papular rashes. Hand, foot, and mouth disease (HFMD) caused by coxsackievirus A6 or A16 can present with widespread exanthema.<sup>[1]</sup>
2. **Measles:** Characterized by a prodrome of fever, cough, coryza, and conjunctivitis, followed by an erythematous maculopapular rash starting on the face and spreading to the trunk and extremities. Koplik spots on the buccal mucosa are pathognomonic.<sup>[2]</sup>
3. **Rubella:** Presents with a mild fever, generalized lymphadenopathy, and a maculopapular rash that starts on the face and spreads to the body. The rash is typically mild and lasts up to 3 days.<sup>[3]</sup>
4. **Roseola:** Typically affects infants and young children, presenting with high fever followed by a sudden onset of a maculopapular rash as the fever subsides.<sup>[4]</sup>
5. **Scarlet Fever:** Caused by *Streptococcus pyogenes*, it presents with fever, sore throat, and a characteristic sandpaper-like rash. "Strawberry tongue" is a notable feature.<sup>[5]</sup>

### Most Important Not to Miss Diagnoses:

1. **Kawasaki Disease:** This vasculitis presents with prolonged fever, conjunctivitis, rash, mucosal changes, extremity changes, and cervical lymphadenopathy. It is the leading cause of acquired heart disease in children and requires prompt treatment with IVIG and aspirin.<sup>[6]</sup>
2. **Meningococemia:** Presents with fever, rash, and signs of sepsis. The rash can be petechial or purpuric. Early symptoms include leg pain, photophobia, and neck stiffness. Immediate antibiotic therapy is crucial.<sup>[7]</sup>

## Differential for child with fevers, cough, erythematous, papular rash

A child with fevers, cough, and an erythematous, papular rash requires a thorough differential diagnosis, as these symptoms can be indicative of several viral or bacterial infections. Here is a list of potential conditions to consider:

### 1. Measles (Rubeola)

- **Key Features:**
  - **Fever**, often high (104°F or 40°C).
  - **Cough**, **coryza**, and **conjunctivitis** (the "3 Cs").
  - **Erythematous, maculopapular rash** that starts on the face and spreads downwards.
  - **Koplik spots** (white spots on the buccal mucosa) often precede the rash by 1-2 days.
- **Transmission:** Highly contagious, spread through respiratory droplets.

### 2. Scarlet Fever

- **Key Features:**
  - **Fever** and **sore throat** (may be associated with **strep pharyngitis**).
  - **Erythematous, sandpaper-like rash** (papular or raised), which often starts on the chest and abdomen, then spreads.
  - **Strawberry tongue** and **pastia's lines** (red streaks in skin folds).

# Clinical Key AI



**Built on the foundation from  
Elsevier's database**

Trusted Content



**Daily Updates**



**Responsible Principles**

Transparency

Human Oversight

Data Governance

# UpToDate



## AI Labs

Using AI to drive clinical decision support for interpreting lab results



## AI Search

Delivers more succinct medical information



## Partnerships

Working with dictation solutions to embed evidence-based information



# Privacy

- Not HIPPA Compliant
- Not HIPPA Compliant
- Be very aware of any LinkedIn Vendors
  - Security assessment
  - Is information stored
  - Where is it stored

Tell me about Nathan Fitton

Dr. Nathan J. Fitton, D.O., is a board-certified family medicine physician specializing in sports medicine. He serves as an Associate Professor at Michigan State University's College of Osteopathic Medicine and holds the position of Chief Medical Information Officer at MSU Health Care. [APP.QWOTED.COM](https://app.qwoted.com)

Dr. Fitton earned his undergraduate degree from Defiance College, graduating summa cum laude. He completed his medical education at Michigan State University's College of Osteopathic Medicine. Following medical school, he pursued a residency in family medicine at Metro Health Hospital in Grand Rapids, where he served as chief resident during his senior year. He further advanced his expertise by completing a Sports Medicine Fellowship at Sparrow Hospital/Michigan State University.

[OSTEOPATHICMEDICINE.MSU.EDU](https://osteopathicmedicine.msu.edu)



# Other AI Resources

- Clinical Documentation and Workflow Automation
  - DAX/Dragon Copilot
  - Abridge
  - Ambience
  - Suki
  - Nabla
- Clinical Decision Support
  - Watson for Oncology – AI supported treatment recommendations
  - VisualDx – Image recognition
  - PEPID – AI tools for drug interactions

# Other AI Resources

- Medical Imaging and Diagnostics
  - Aidoc – Tool for detecting acute conditions on imaging
  - Zebra Medical Vision – Automated image analysis (CT, Xray, MRI)
  - Butterfly iQ+ with AI – Pocket sized US with AI guidance for images and interpretation
- Remote Patient Monitoring
  - Current Health – Remotely monitor/trend patient vitals
  - Health Recovery Solutions – incorporates predictive analytics
  - TytoCare – Remote physical exam tools
  - CareSignal – Chronic Condition Management
- Population Health and Predictive Analytics
  - Large Data Set (Epic Cosmos)
  - Health Catalyst – AI driven care gap analysis and tracking
  - ClosedLoop.ai – Predictive Modeling and risk stratification

# Other AI Resources

- Patient Engagement
  - Microsoft PES – AI powered call center automation
  - Bright.md – Asynchronous viral care with AI triage
  - Gyant – Conversational AI chatbot
- Education, Research, and Genomics
  - DeepMind AlphaFold – protein folding predictions
  - Google Med-Palm – AI assistant for research
  - BioRender AI Assistant – AI for creating scientific and medical illustrations



# So...what can we expect?

Greater  
integration and  
automation

Cross sectional  
partnerships

Advanced  
personalized  
medicine

Improved  
predictive  
analytics

Expansion of  
virtual medicine  
and remote  
patient monitoring

Robotic  
interventions

Ethical AI and  
Regulation

Global health  
equity

Collaborative AI  
tools

# Smart Healthcare of the Future



# Get involved!



EXPLORE THE  
TECHNOLOGY



DEVELOPMENT AND  
TRAINING OF AI  
MODELS



IMPLEMENTATION  
AND INTEGRATION



ETHICAL OVERSIGHT



RESEARCH AND  
CONTINUOUS  
IMPROVEMENT



GOVERNANCE





Questions?