



Smarter Healing – How AI is Reshaping HealthCare

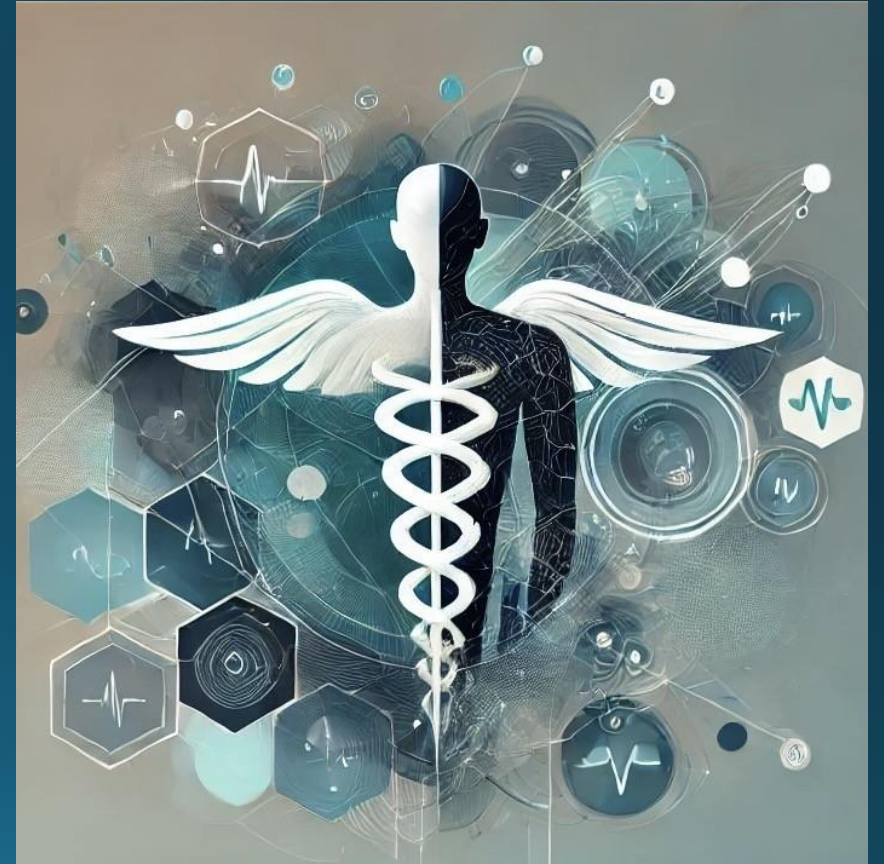
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What is Artificial Intelligence?

- 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.



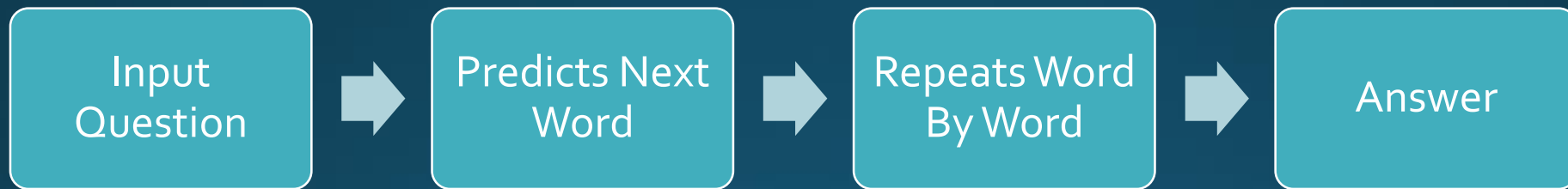
What is a Language Model?

- A large language model (LLM) is a type of machine learning 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)

How Does ChatGPT Work? (Simplified)



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

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

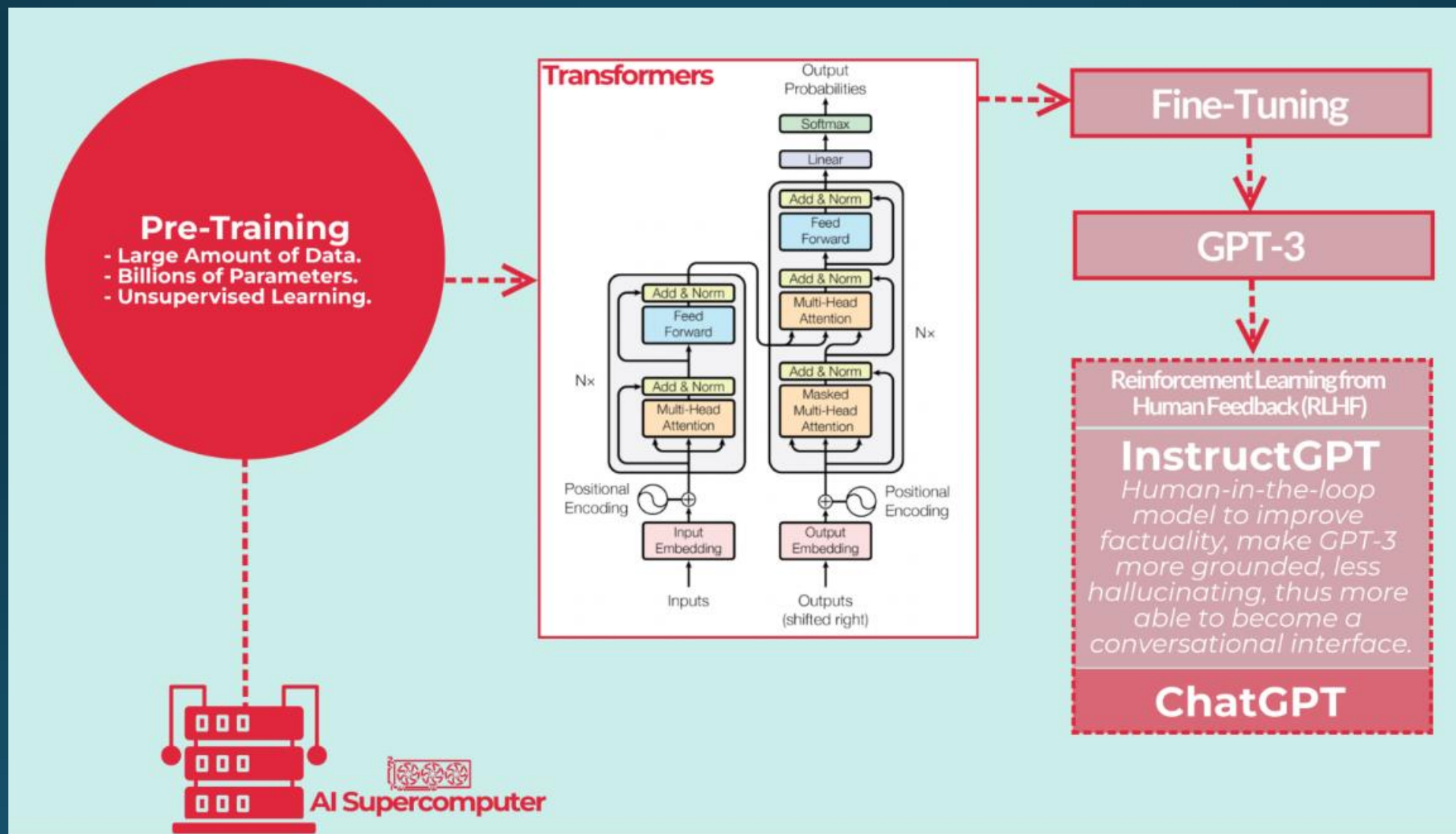
1. **Generative AI** - AI models that can create new content such as text, images, or audio by learning from existing data. Used for automating content creation and personalization in healthcare.
2. **Machine Learning** - Algorithms that learn from data to make predictions or decisions without being 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.

Back to ChatGPT...

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

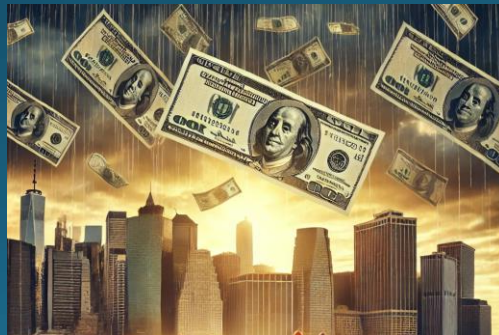


Roadmap



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

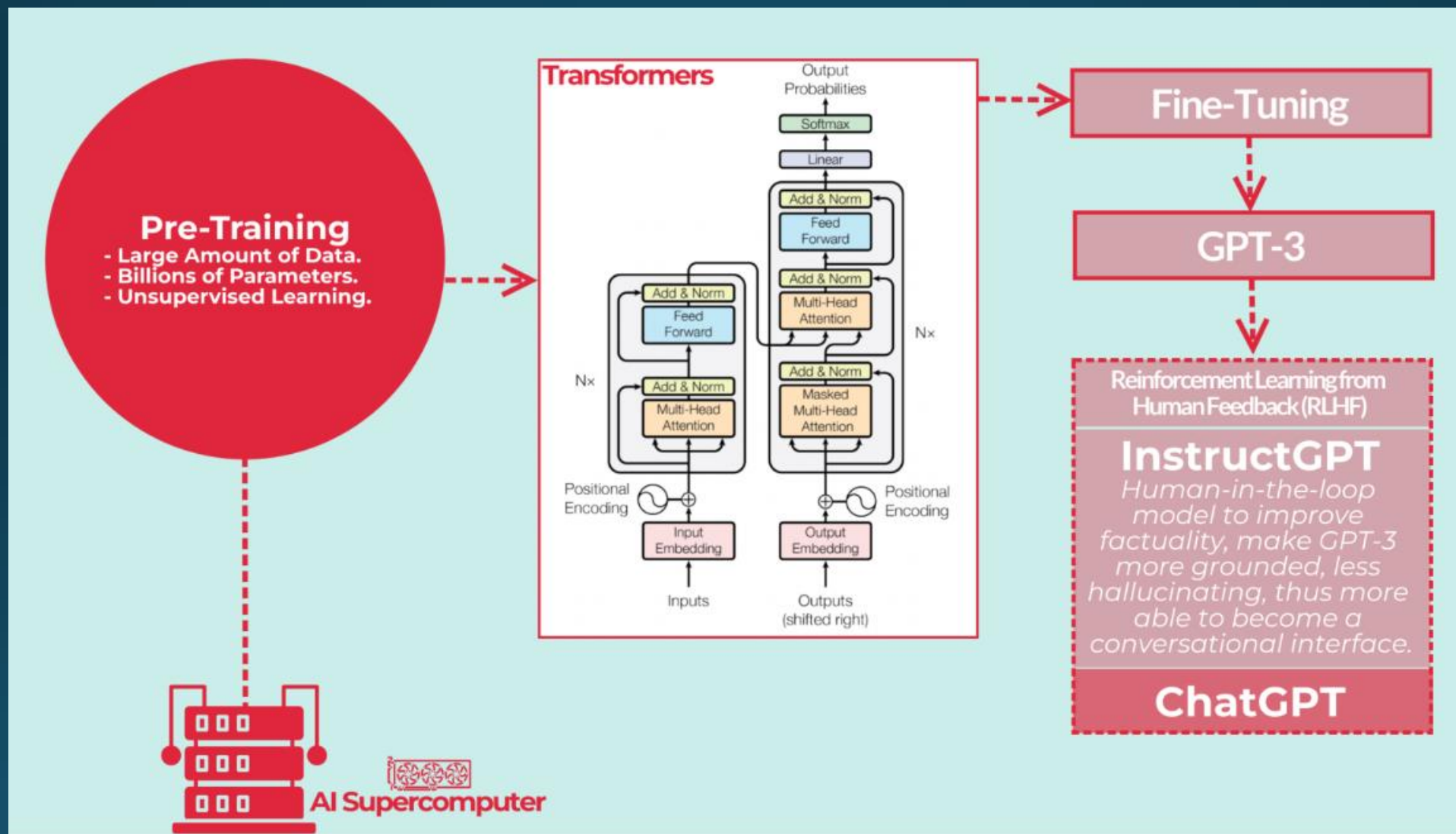


Unsupervised Learning

- 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

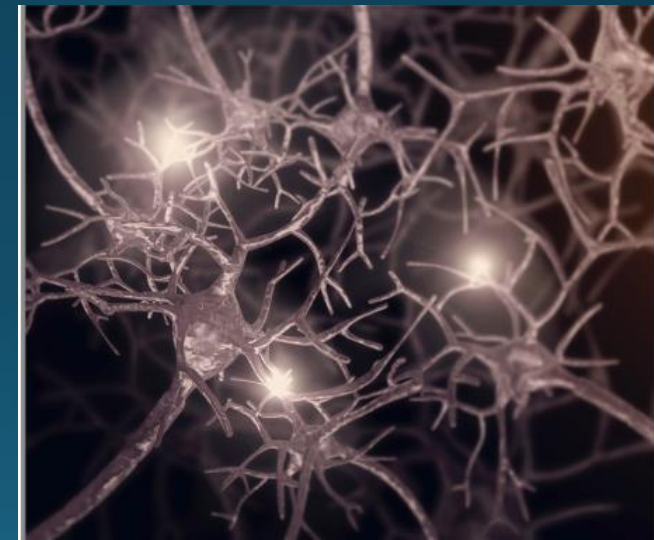


Roadmap



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

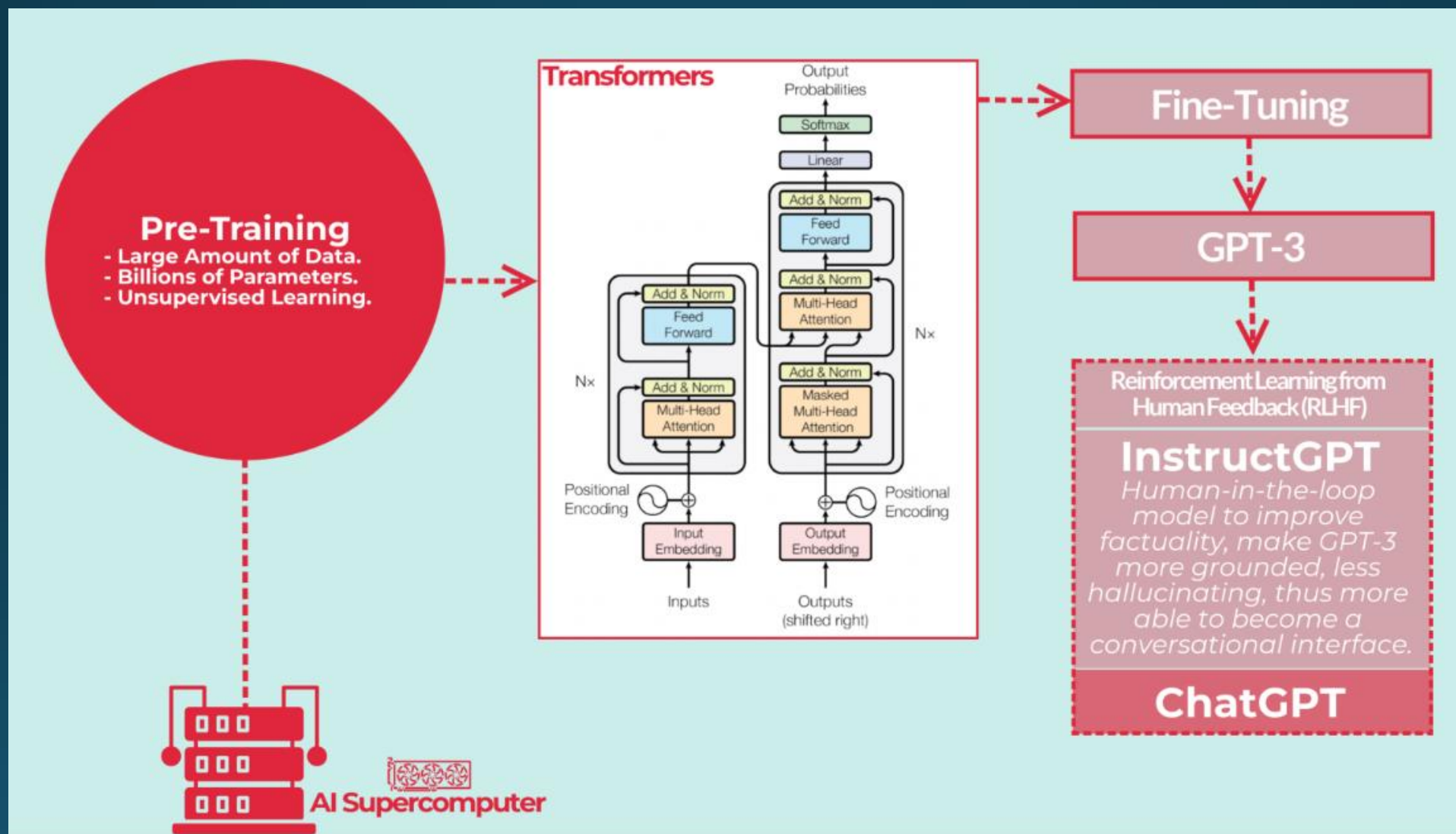
1. The **doors** of the **jaguar** were open.
2. The **jaguar** made a **howling** noise.

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

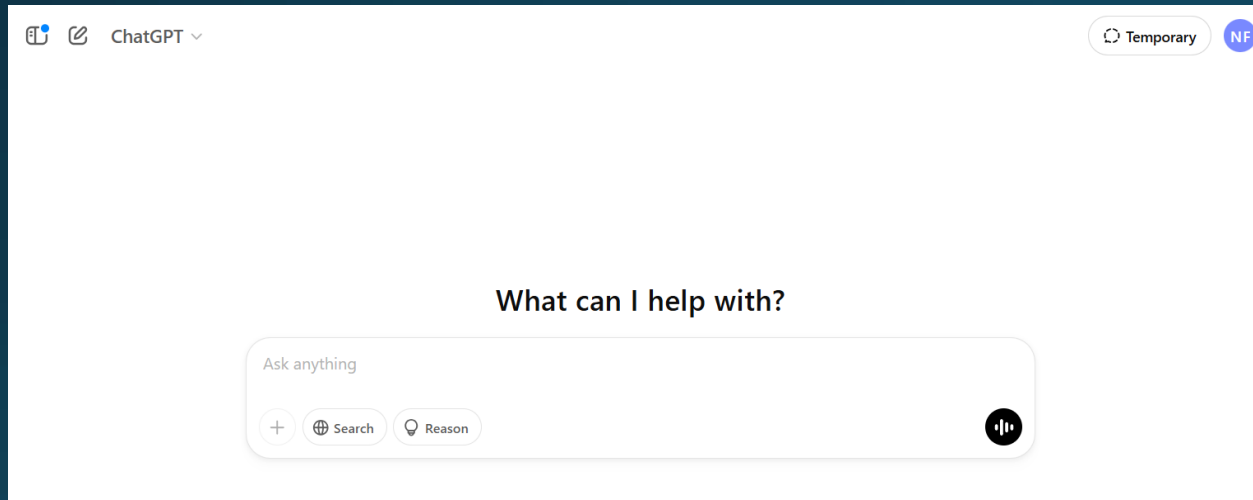


Let's Get Real

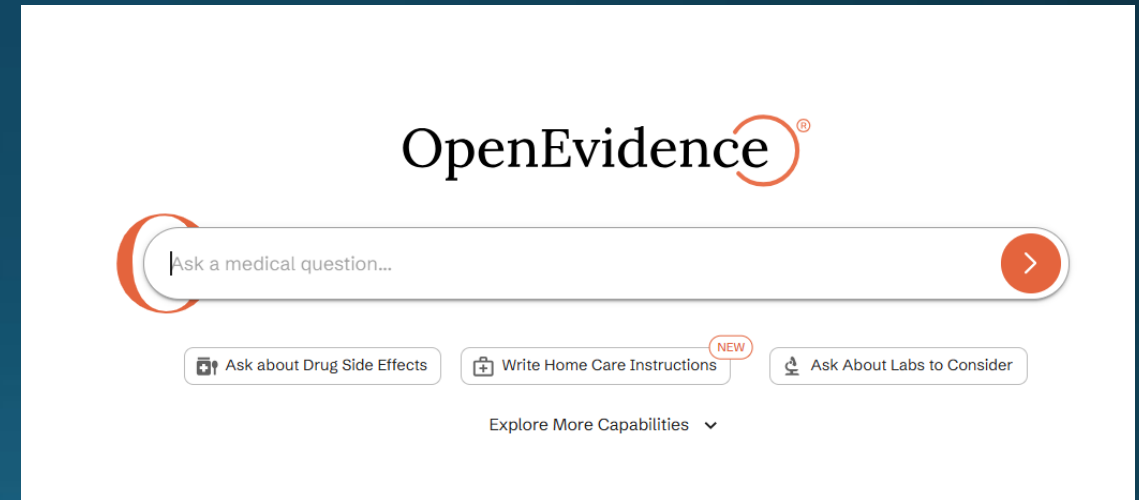
- Having a foundational understanding allows you to understand where the information is coming from
- Currently 2 main resources for providers (ever evolving)
 - ChatGPT
 - OpenEvidence
 - Clinical Key



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:** Since OpenEvidence focuses on evidence-based information, it often filters data based on credibility, such as peer-reviewed research, clinical trials, or professional guidelines. The output is generally more focused on highly reliable sources.
- **ChatGPT:** ChatGPT doesn't inherently distinguish between reliable and unreliable sources. It generates text based on patterns it learned from its training data, which means it could provide information from sources of varying reliability (some may be outdated or incorrect).



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.^[1-2]

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.^[3-6]

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

Expanded question: What is the differential diagnosis for a child with fevers, cough, and an erythematous, papul...

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.^[1]
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.^[2]
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.^[3]
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.^[4]
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.^[5]

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.^[6]
2. **Meningococcemia:** 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.^[7]

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).

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.

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Questions?