


AI in Healthcare: Is it all hype?



Presenter: Simon Ellershaw

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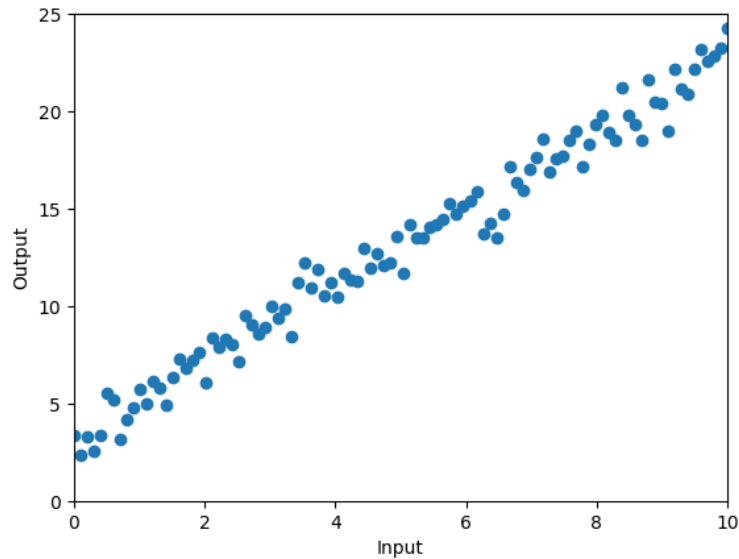
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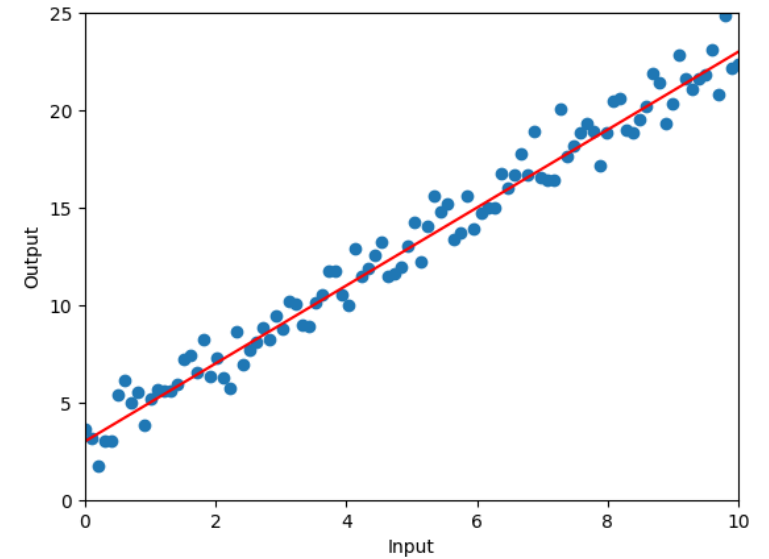
Content

- Why has “AI” hype happened now?
- Use cases in healthcare
- Crowdsourcing possible research directions...

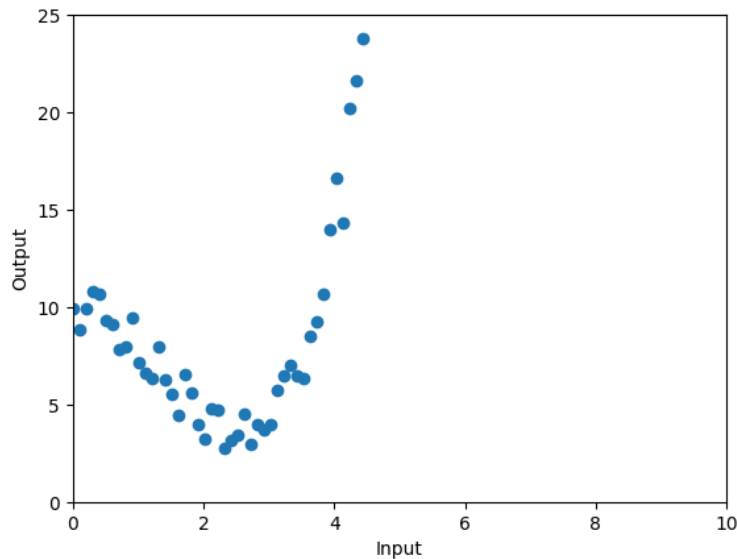
What is an AI model?



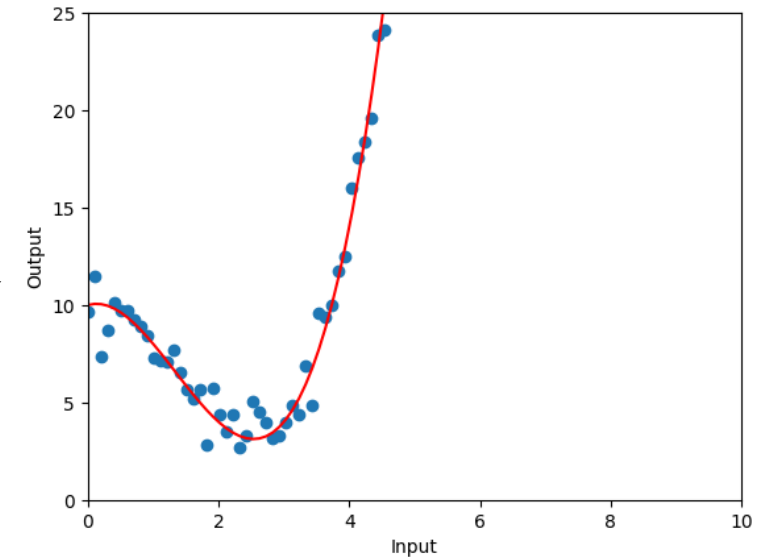
→ **$y = \underline{m}x + \underline{c}$** →



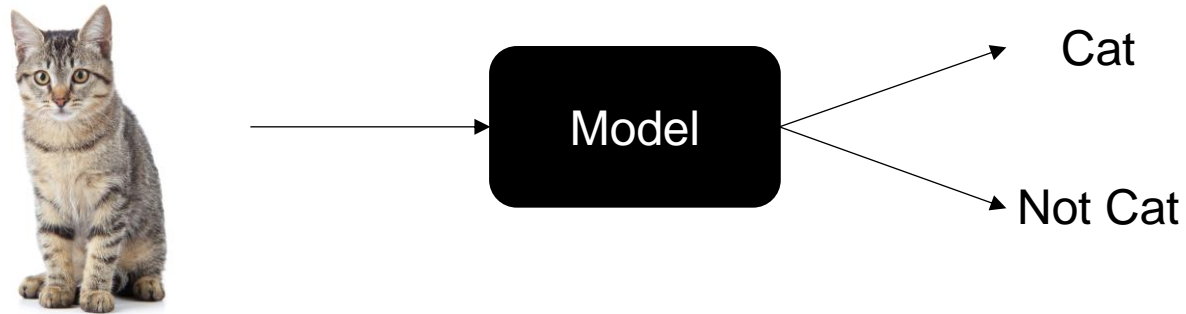
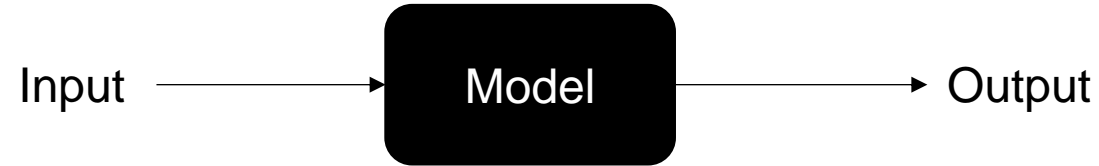
What is an AI model?



→ $y = \underline{a}x^3 + \underline{b}x^2 + \underline{c}x + \underline{d}$ →



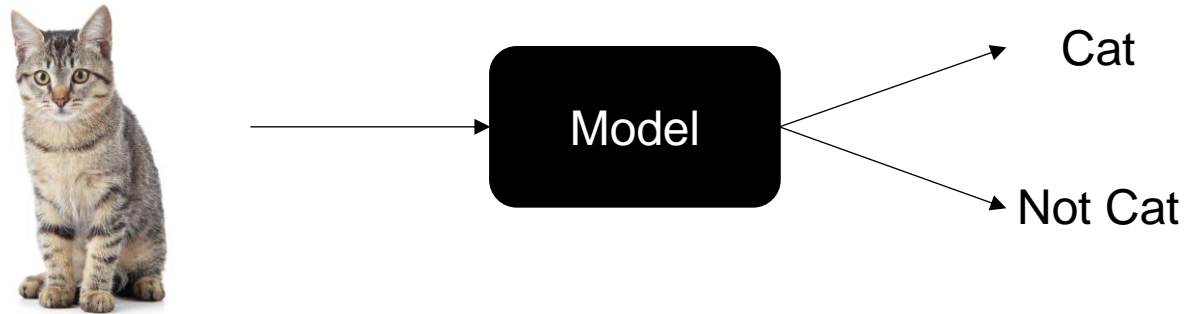
What is an AI model?



Recipe For Supervised Learning

1. Get a large labelled dataset of input -> outputs
2. Define a model which handles input and output format
3. Define a measure of how close model outputs are from the true outputs (loss)
4. Loop through
 1. Make predictions
 2. Evaluate loss
 3. Update model parameters to reduce loss (with some maths)

What is an AI model?



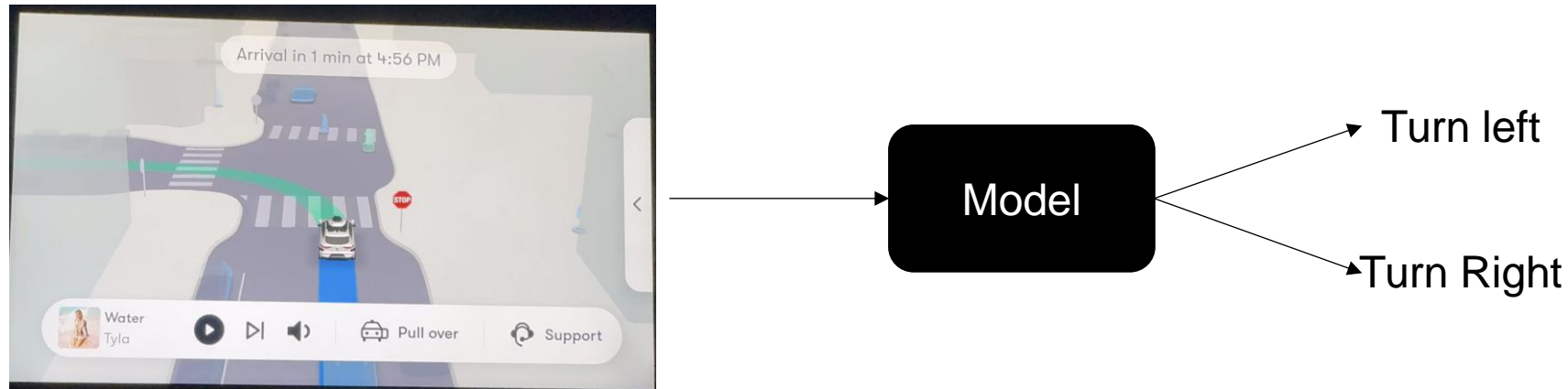
What is an AI model?



“Barack Hussein Obama II
(born August 4, 1961) is
an American attorney and
politician who served as
the 44th President of the
United States”



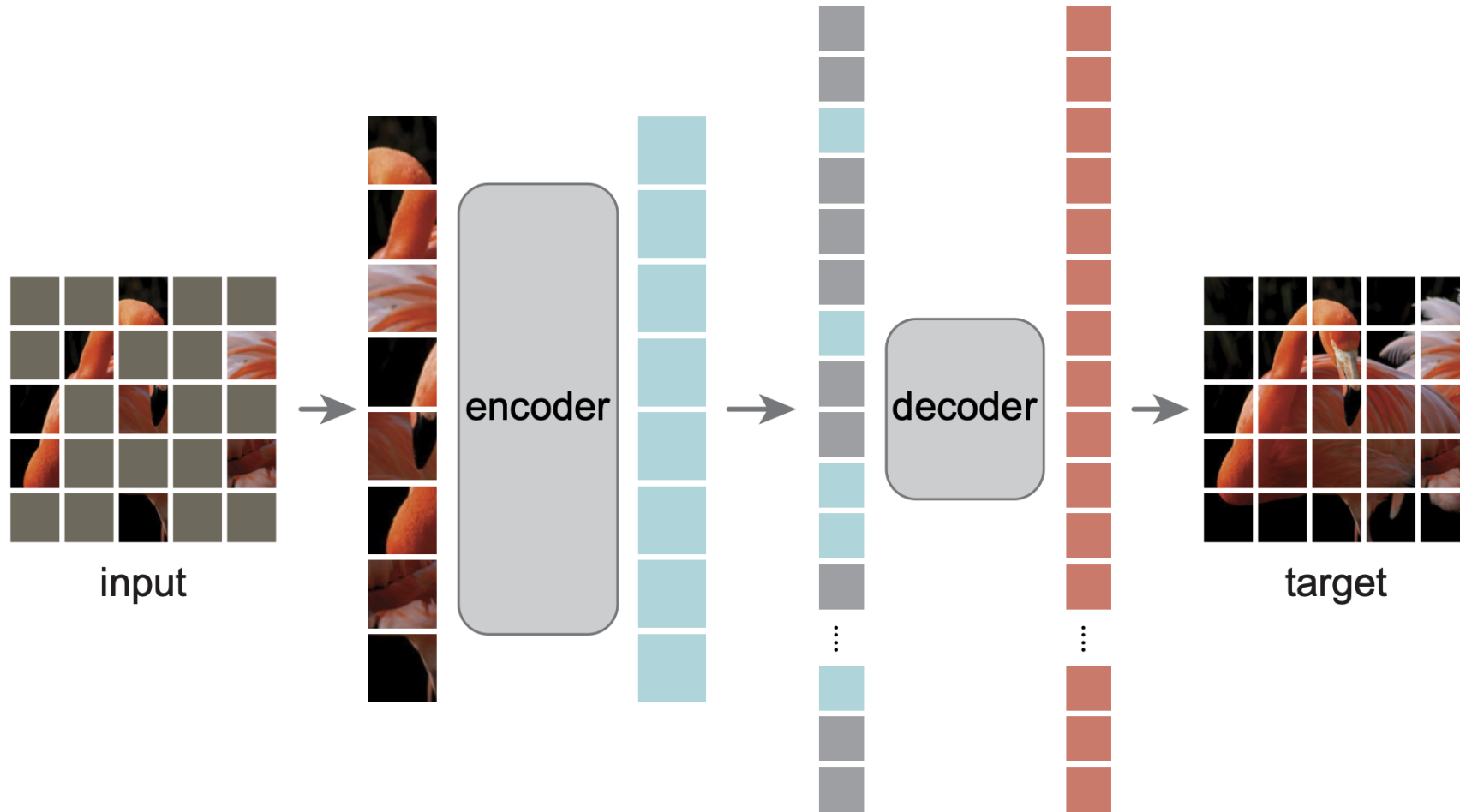
What is an AI model?



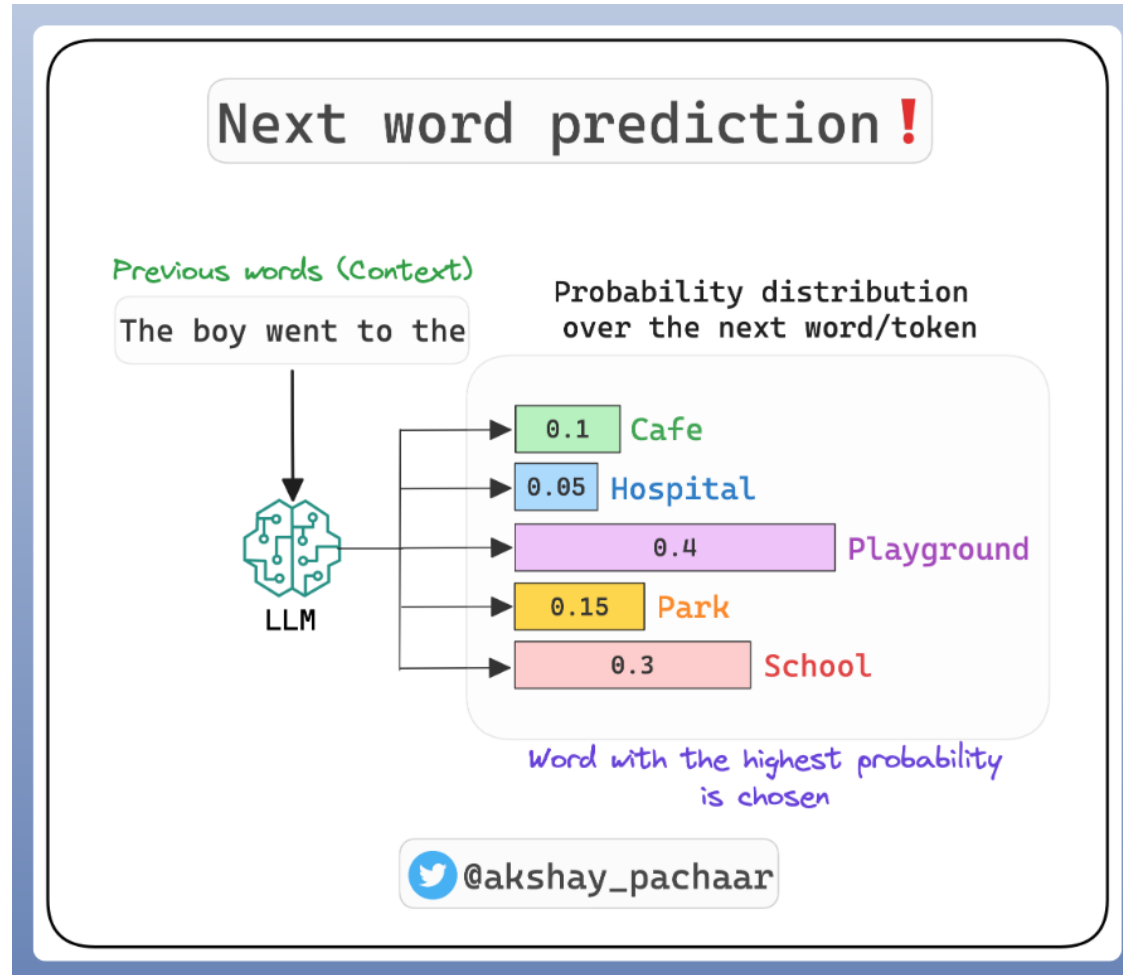
But...



What's this Generative AI thing?



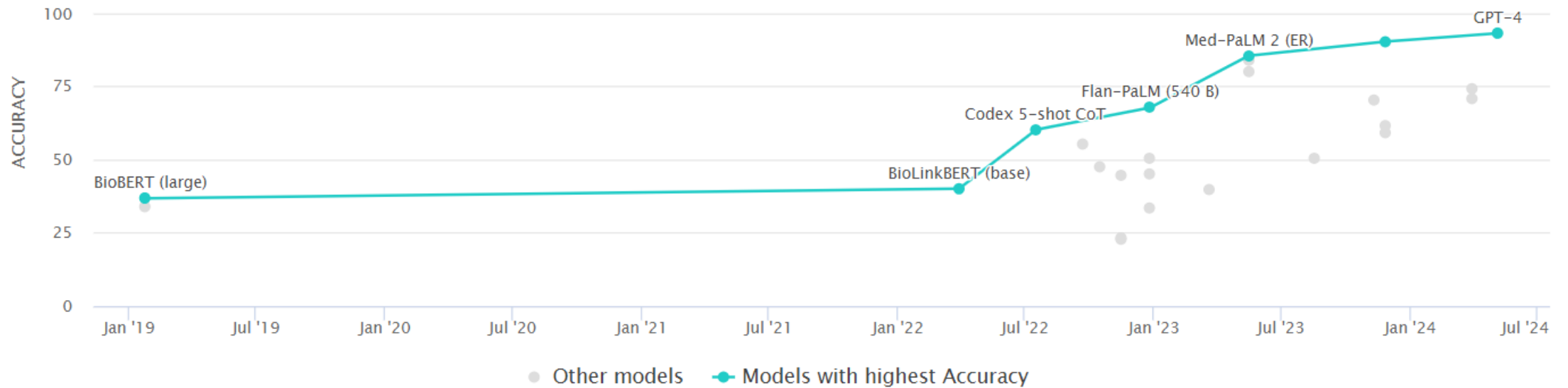
What's this Generative AI thing?



Next word prediction -> Zero-Shot Learning

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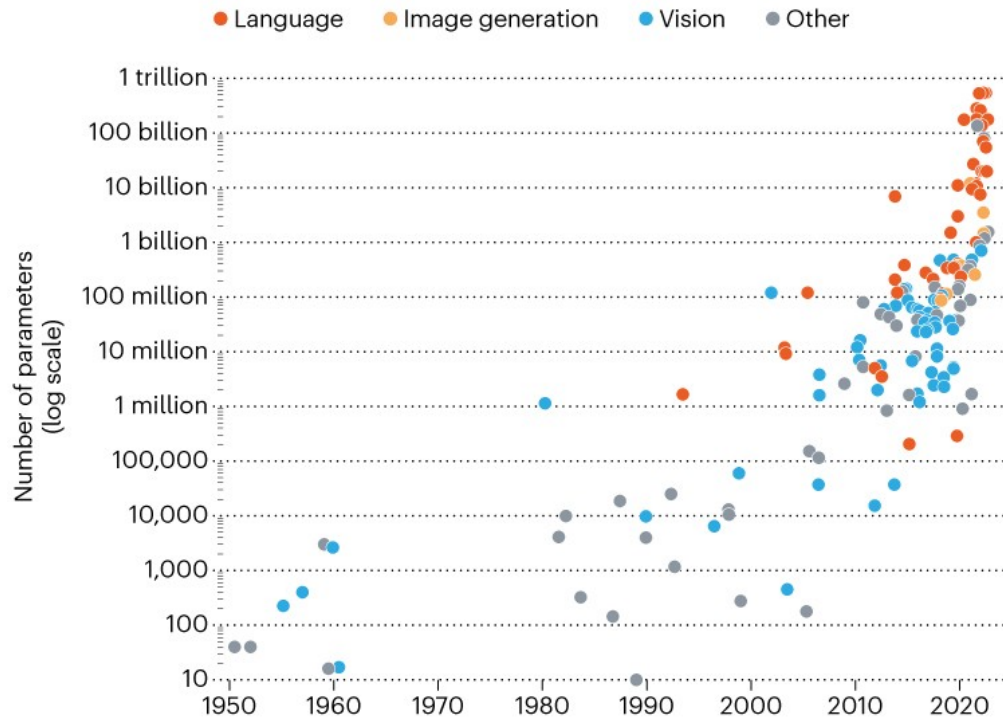
Next word prediction -> Zero-Shot Learning



Scale

THE DRIVE TO BIGGER AI MODELS

The scale of artificial-intelligence neural networks is growing exponentially, as measured by the models' parameters (roughly, the number of connections between their neurons)*.

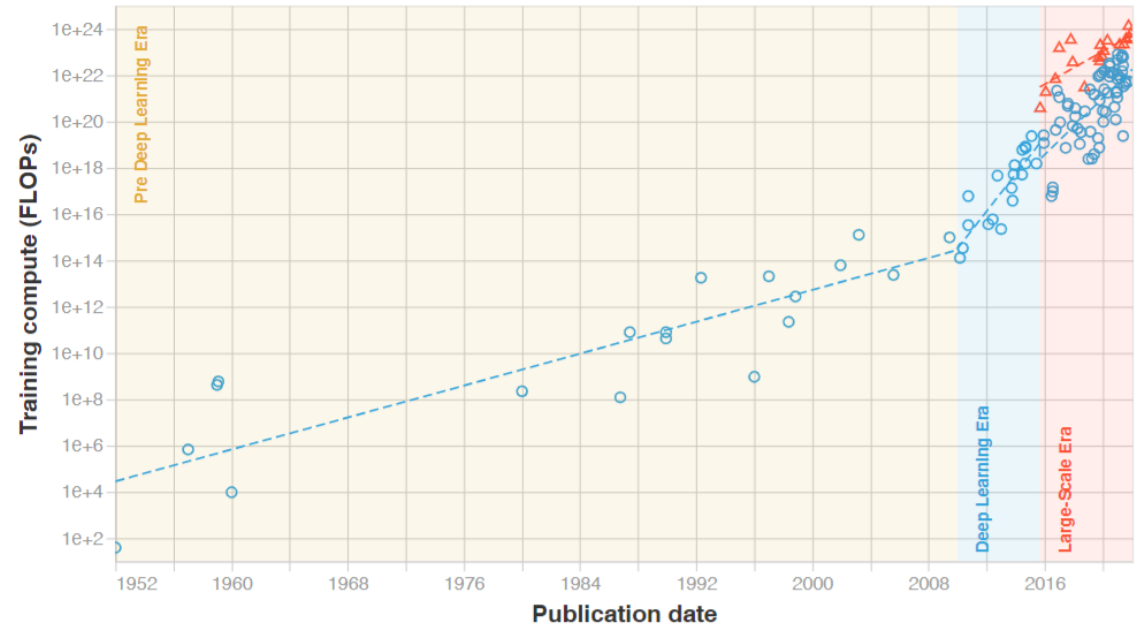


*'Sparse' models, which have more than one trillion parameters but use only a fraction of them in each computation, are not shown.

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Training compute (FLOPs) of milestone Machine Learning systems over time

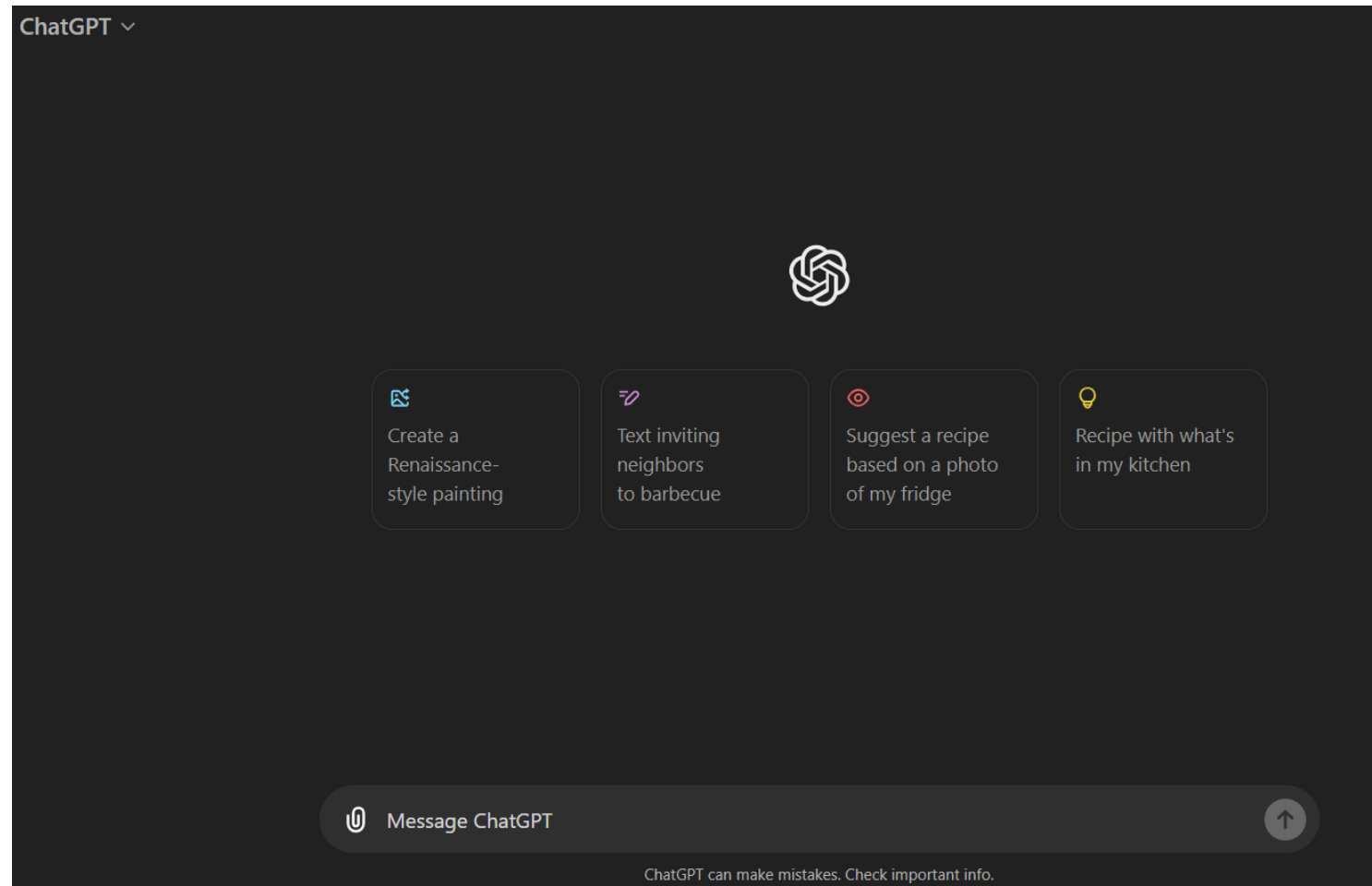
n = 121



Llama 3.1

- 405 billion parameters
- 15.6T tokens (rough 12 billion words)

“ChatGPT Moment”



What does this mean for healthcare?

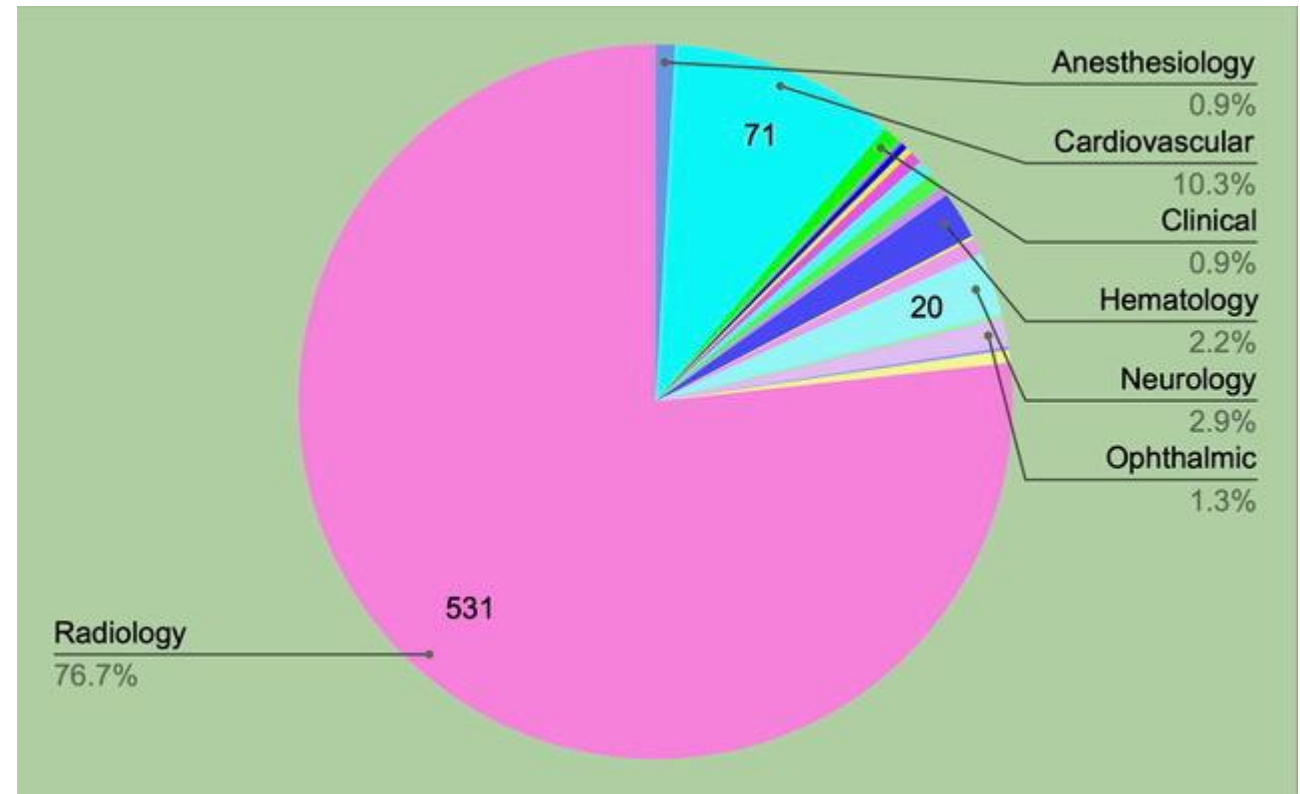
“People should stop training radiologists now. It's just completely obvious that within five years deep learning is going to do better than radiologists.”

Geoffrey Hinton, 2016

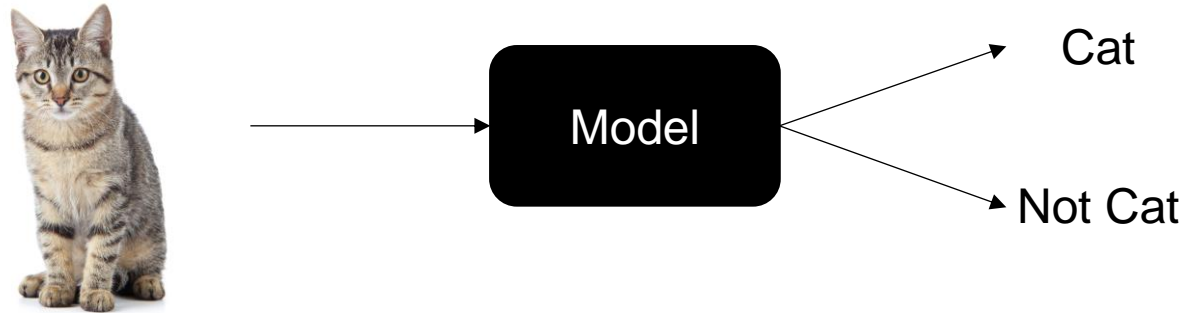


FDA Approved AI Medical Devices 2023

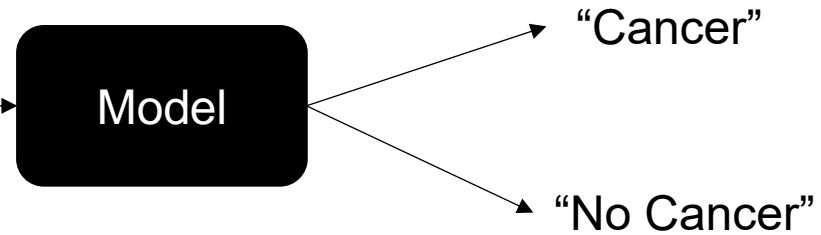
- 692 regulated devices
- 171 added in 2023



AI Progress -> AI in Healthcare Progress



AI Progress -> AI in Healthcare Progress



Optimizing a Hospital


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Machine learning for real-time aggregated prediction of hospital admission for emergency patients

[Zella King](#) , [Joseph Farrington](#), [Martin Utley](#), [Enoch Kung](#), [Samer Elkhodair](#), [Steve Harris](#), [Richard Sekula](#), [Jonathan Gillham](#), [Kezhi Li](#) & [Sonya Crowe](#)

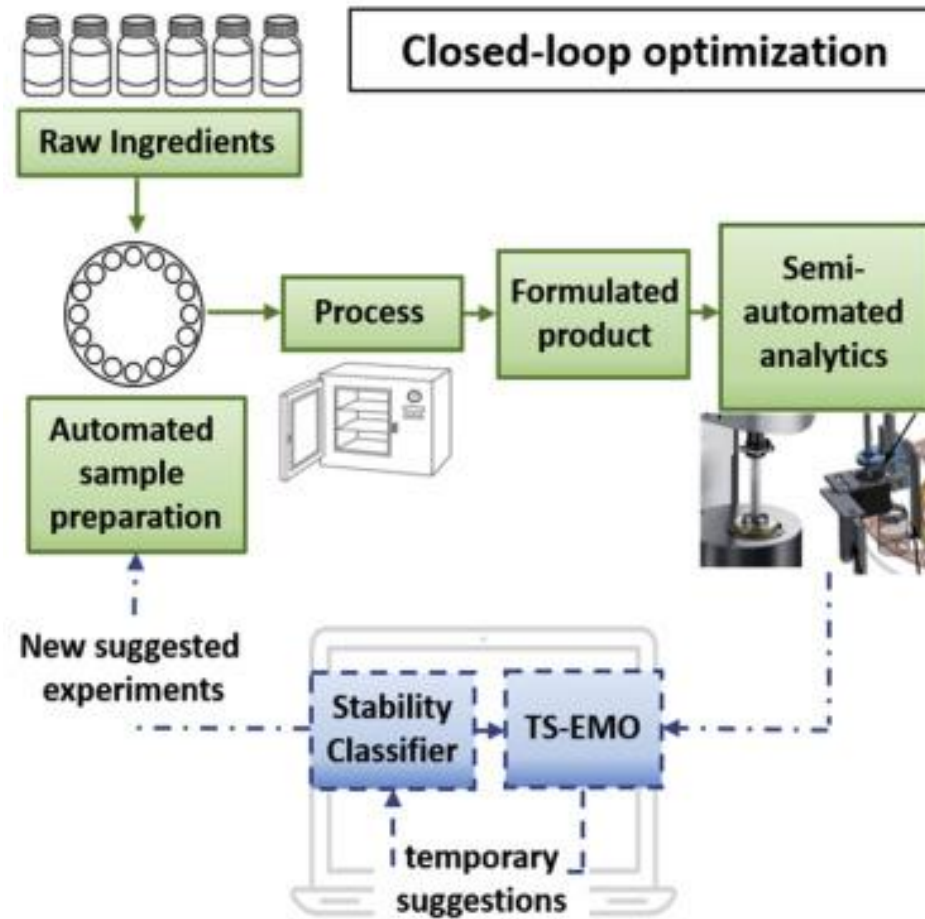
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AI Drug Discovery



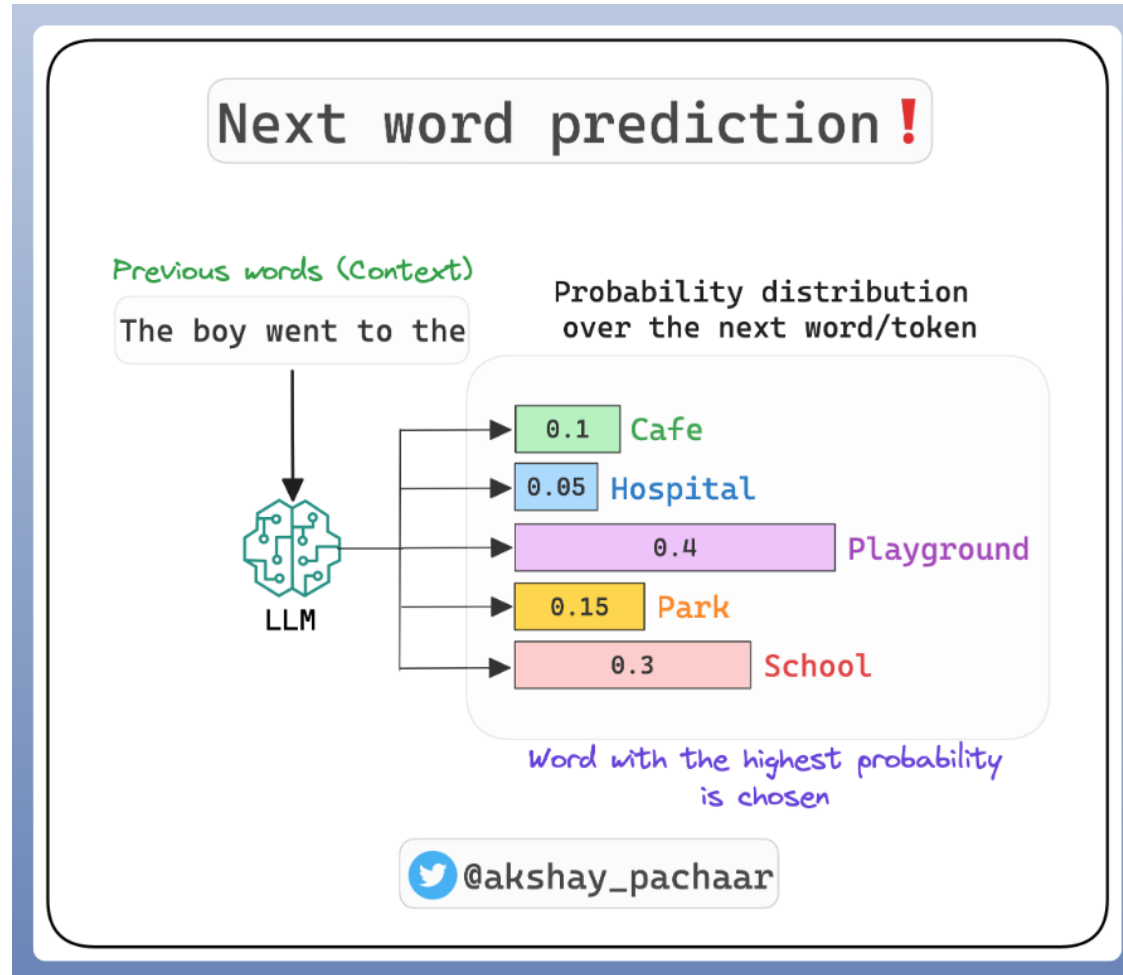
AI Drug Discovery



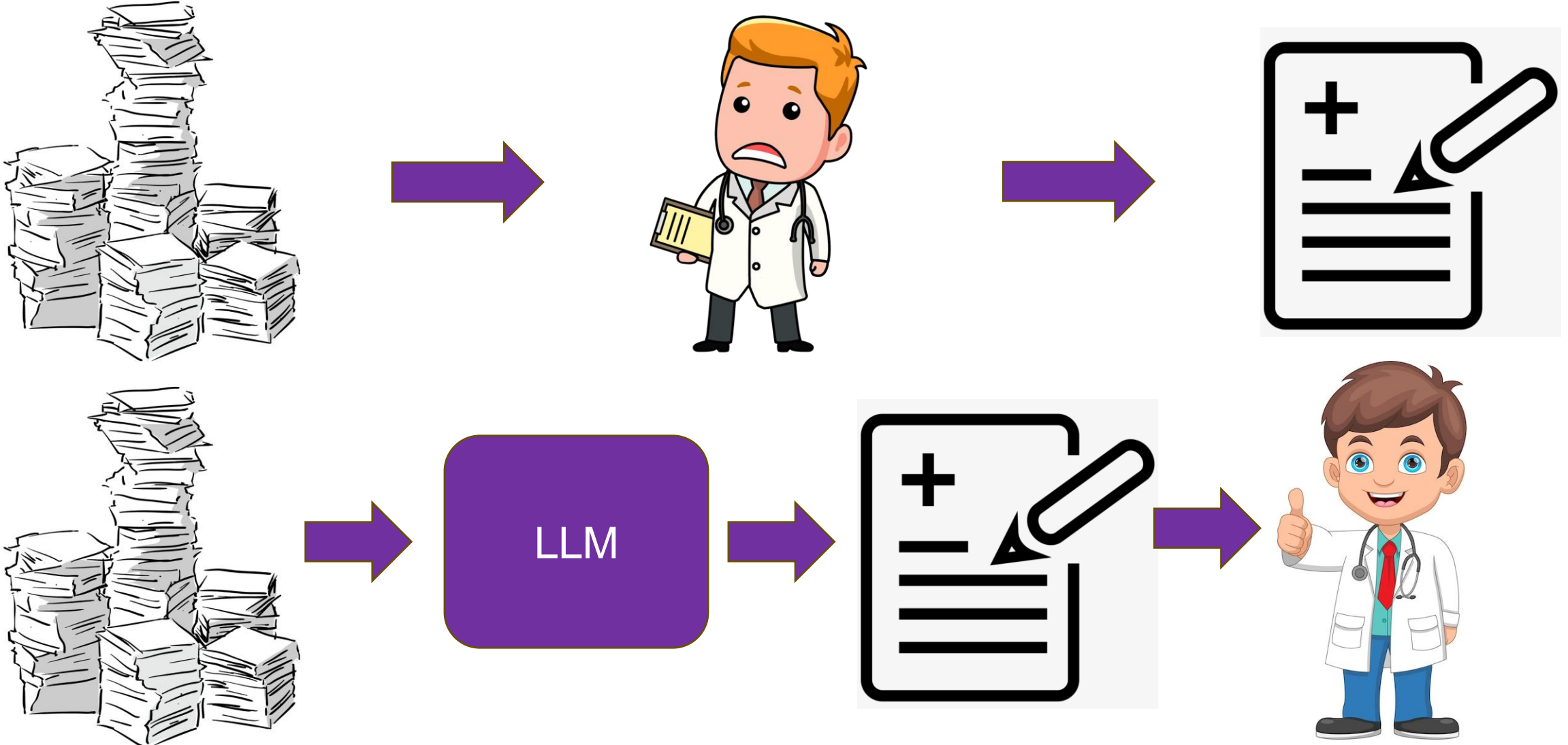
LLMs



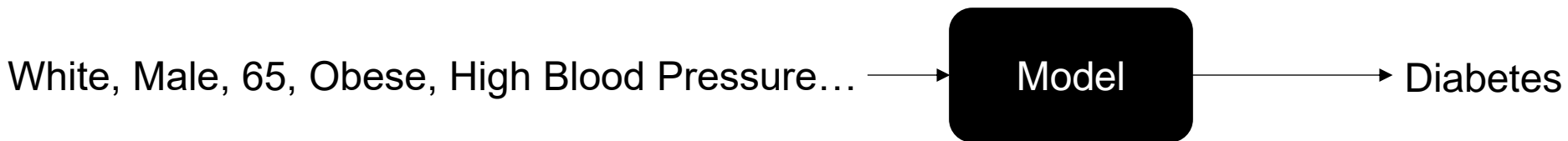
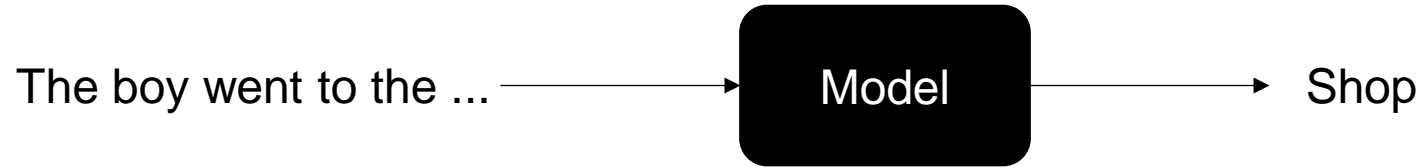
LLMs



LLMs as Admin Assistants



What is the Next Word Prediction of Healthcare?



Challenges of AI in Healthcare

- Need for big datasets
- Robust evaluation -> Regulation?
- Deployment

Is it all hype?

- Fundamentally, huge scientific progress has been made in AI over the last decade
- Will take time to trickle into healthcare
- But clinical workflows are going to be increasingly impacted
- It's up to us to define that impact!