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#3



LEARN

How AI Learns

AI EXPLAINED · A FREE SERIES FOR STUDENTS AND DEVELOPERS



A MYWEBUNIVERSITY SERIES

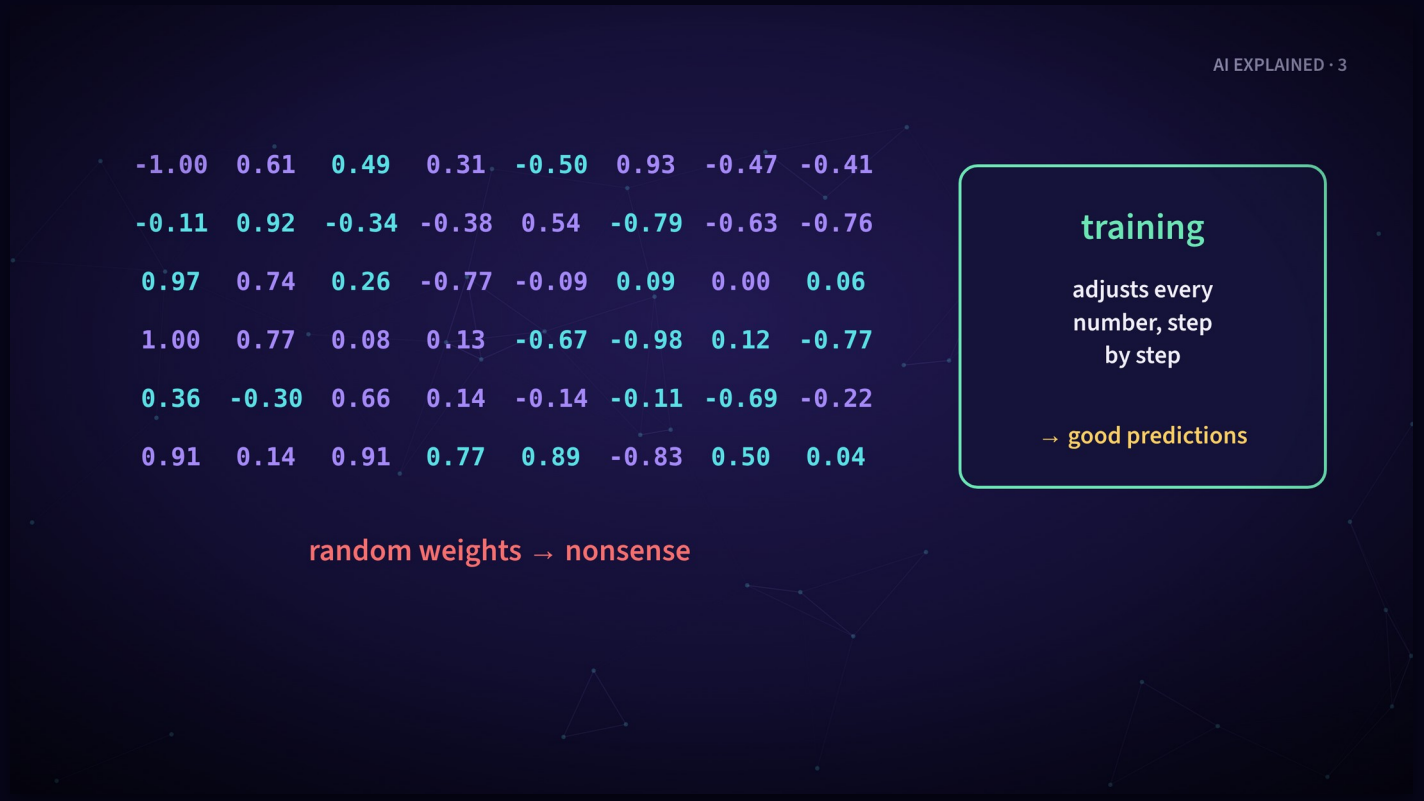
AI EXPLAINED

EPISODE 3

How AI Learns

loss · gradient descent · feedback

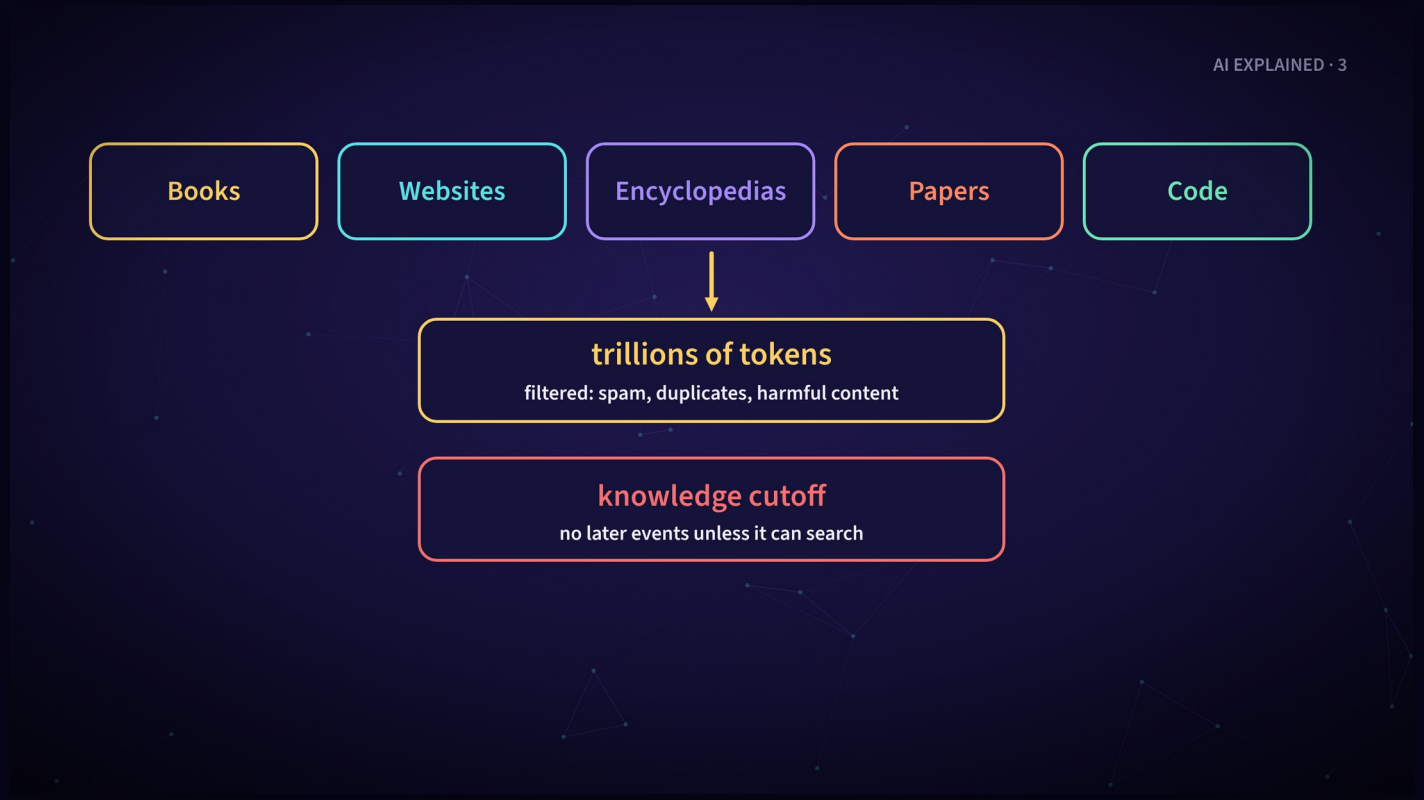
It Starts With Random Numbers



- Weights start as random numbers
- Training adjusts them step by step

01

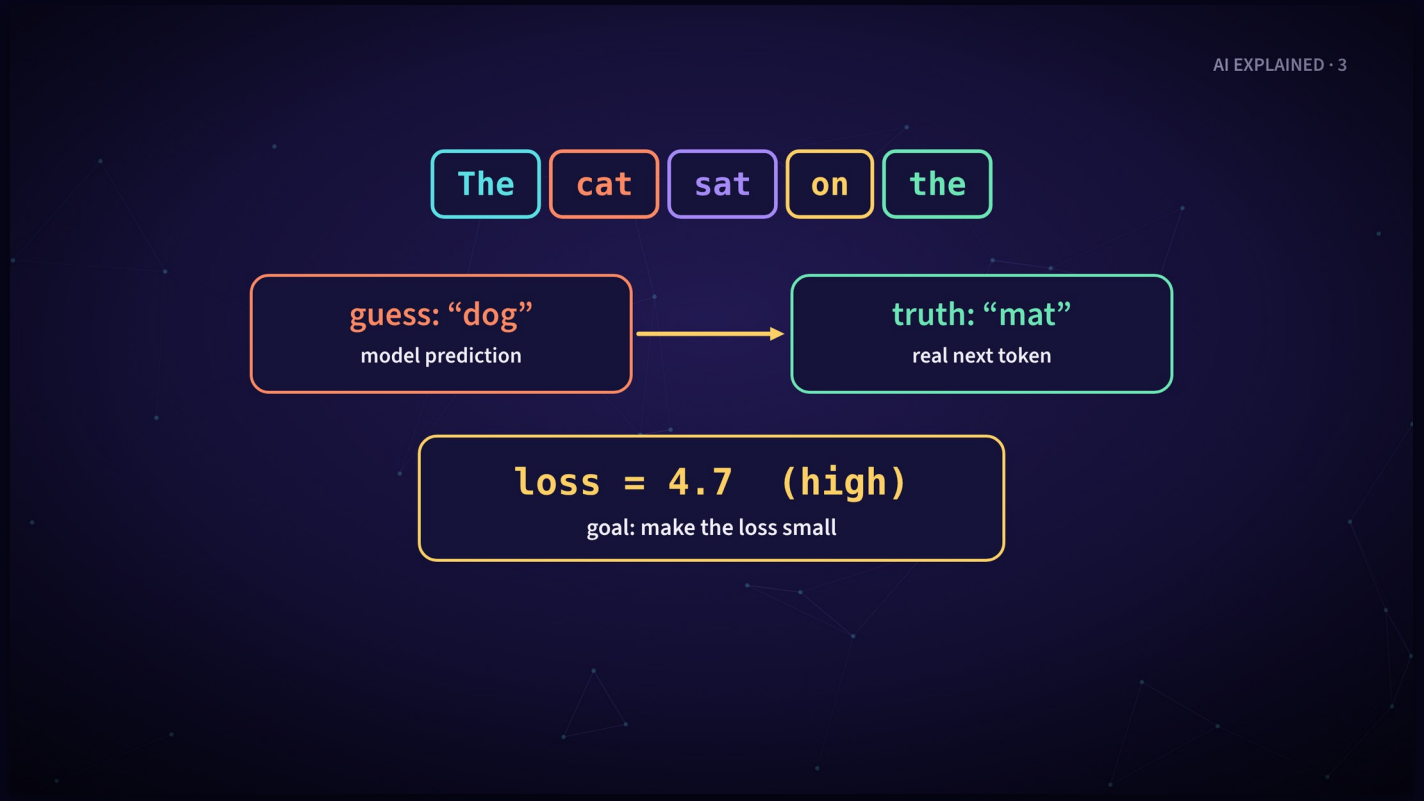
Training Data



- Books, web, papers, code
- Trillions of tokens, filtered
- Knowledge cutoff

02

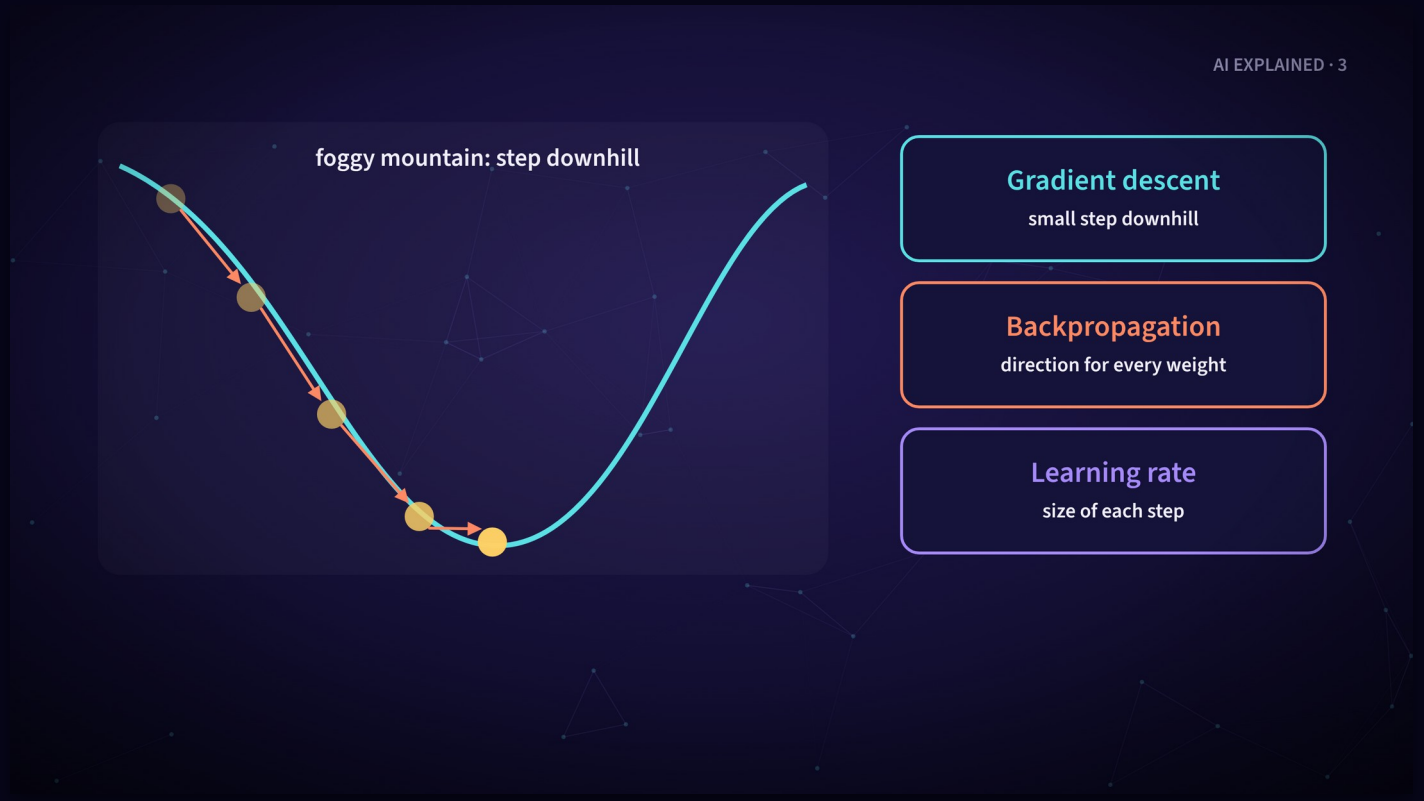
Loss: Measuring the Mistake



- Predict next token, compare with truth
- Loss = size of the mistake
- Goal: minimize loss

03

Gradient Descent and Backpropagation



- Gradient descent: step downhill
- Backpropagation: direction for every weight
- Learning rate = step size

04

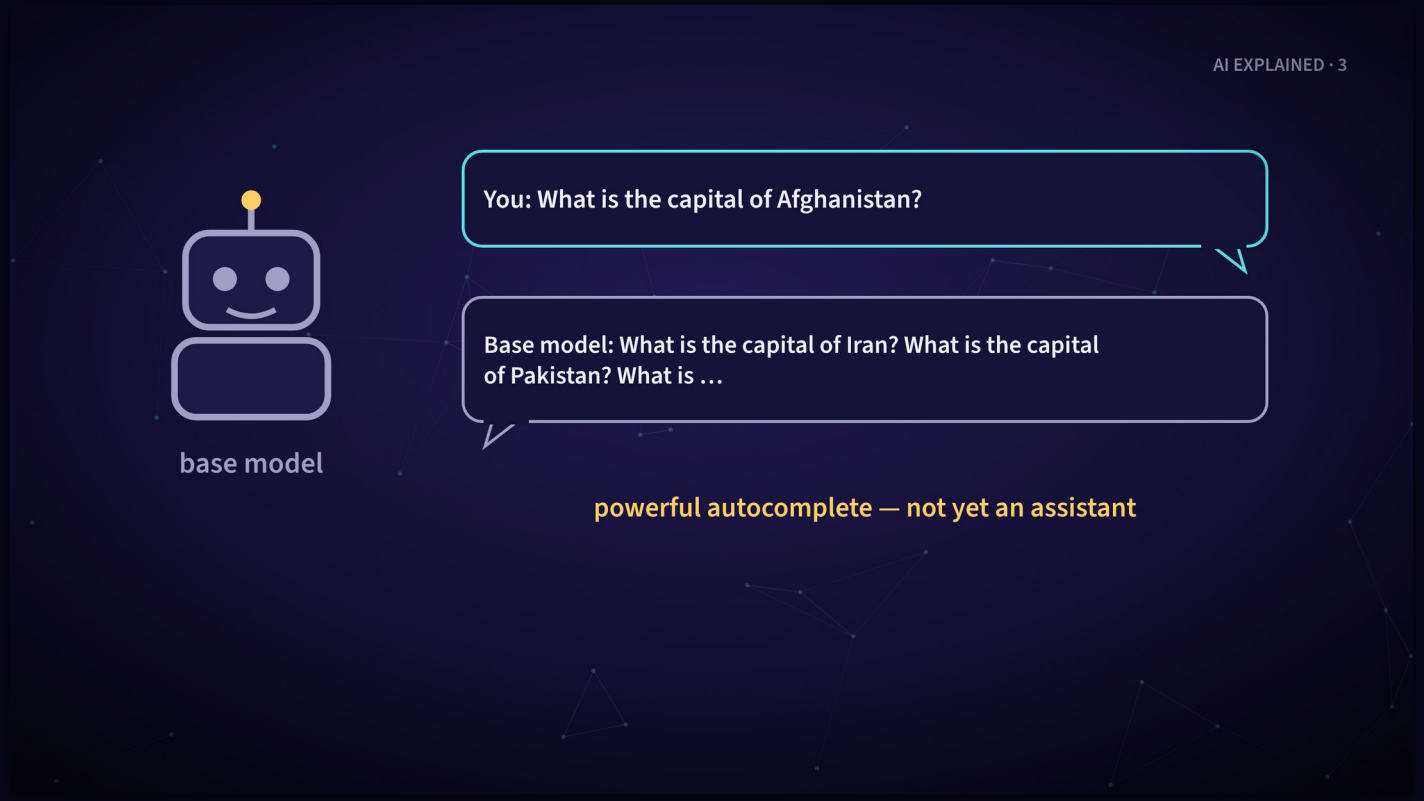
Massive Compute



- Thousands of GPUs for weeks or months
- Tens to hundreds of millions of dollars
- DeepSeek V3: ~$5.6M final run (reported)

05

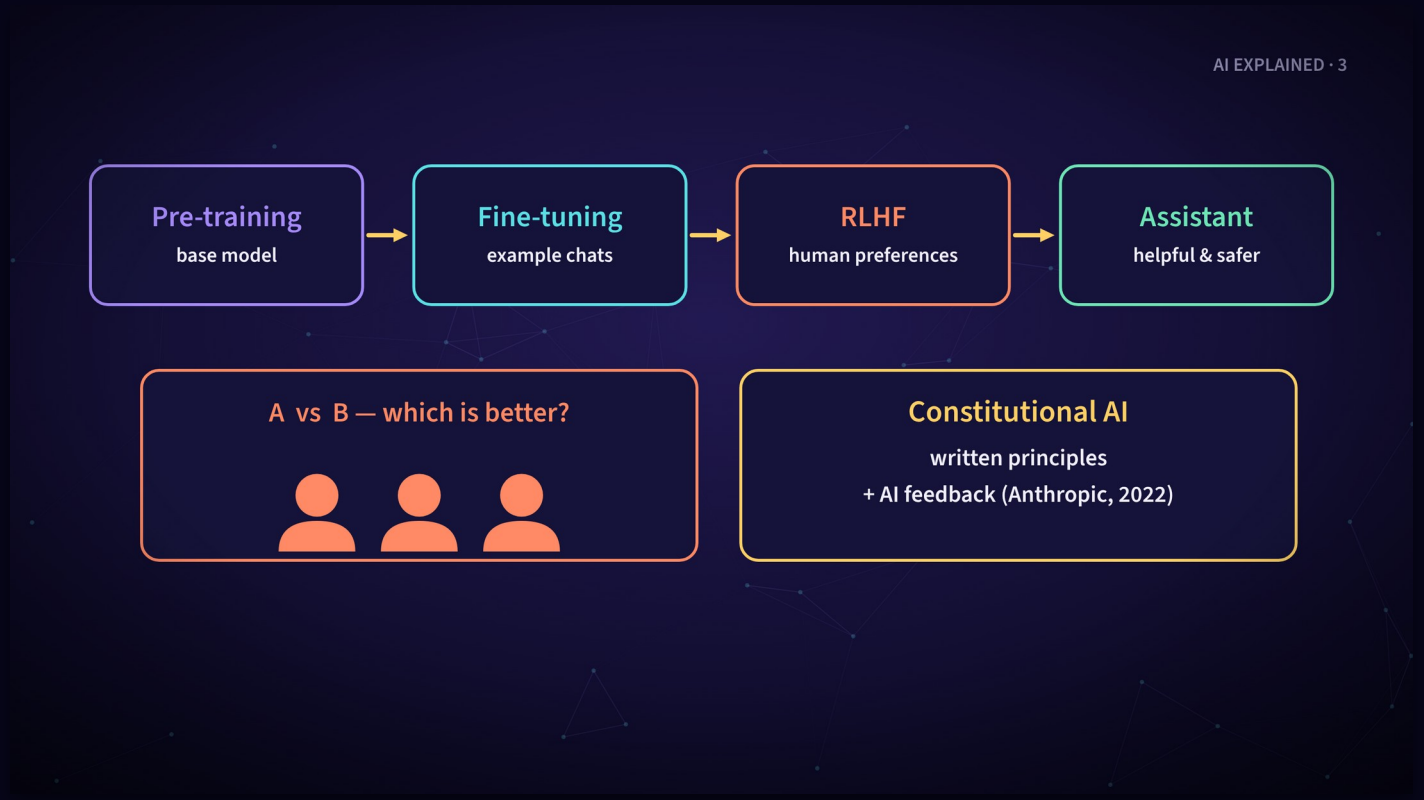
The Base Model



- Pre-training → base model
- Powerful autocomplete, not yet an assistant

06

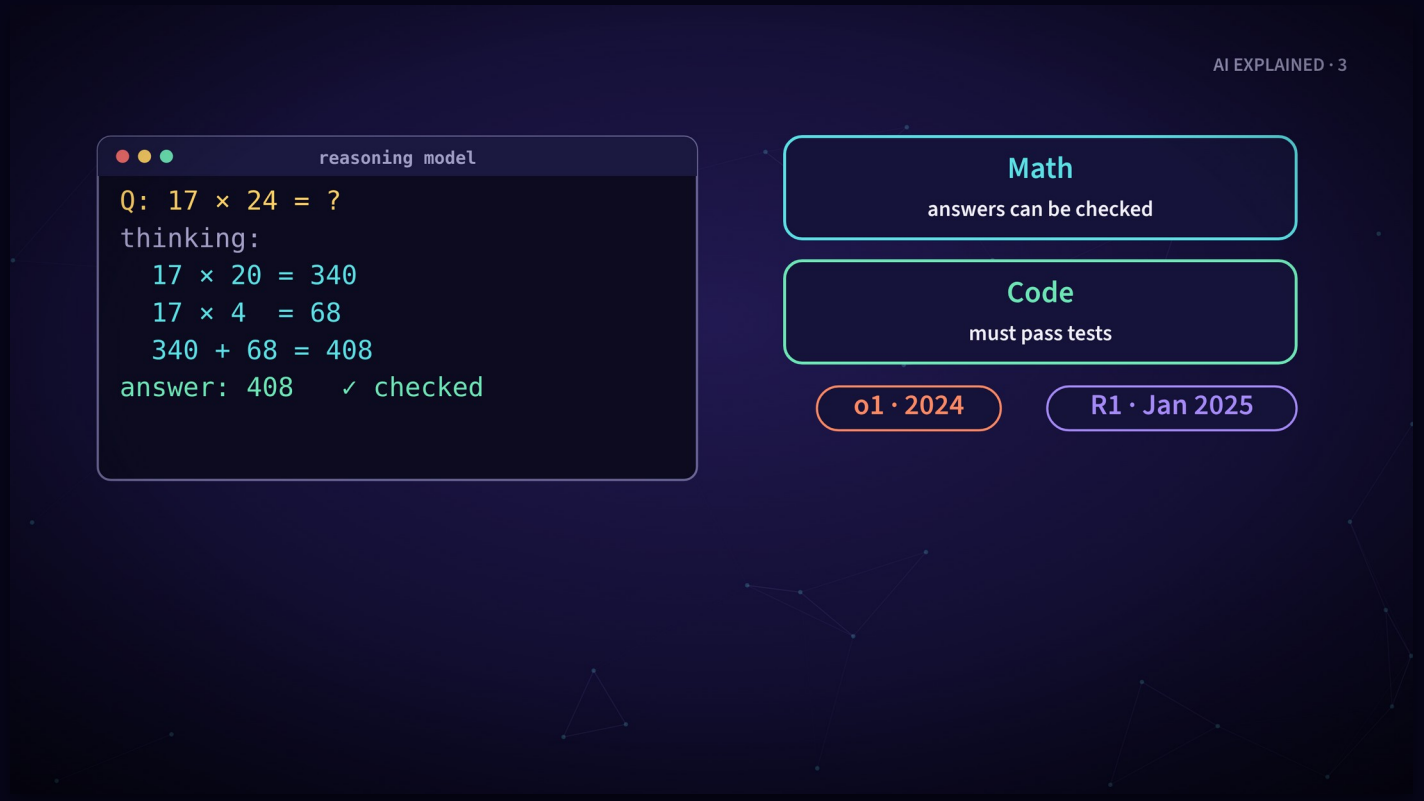
Fine-Tuning and Human Feedback



- Supervised fine-tuning on example chats
- RLHF: human preferences → reward model
- Constitutional AI: written principles

07

Reinforcement Learning and Reasoning



- RL on checkable tasks: math, code
- Step-by-step thinking
- o1 (2024) · DeepSeek R1 (Jan 2025)

08

Training Versus Inference



- Training: once, expensive
- Inference: every prompt, fixed weights
- Improvements arrive as new versions

09

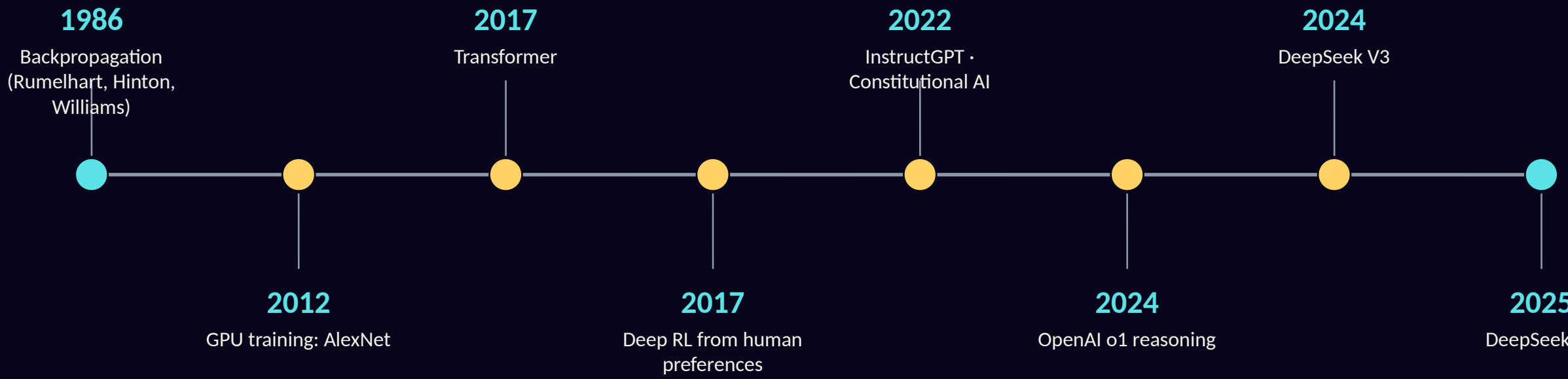
Try It Yourself in Python



- Keras demo: learn y = 2x − 1
- Same loop: weights, loss, gradient steps

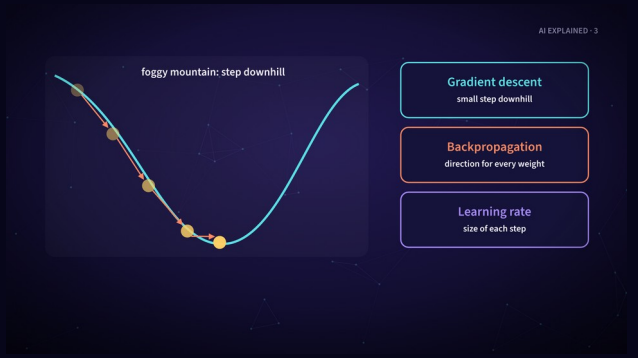
10

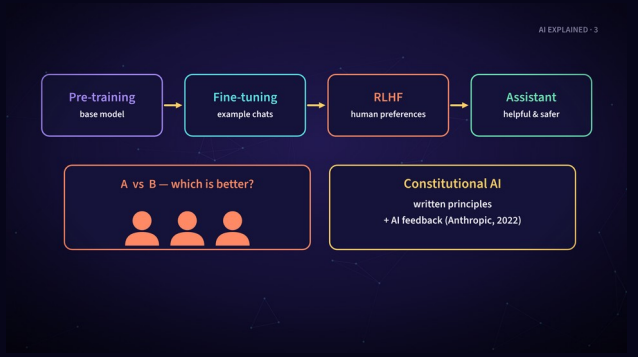
Timeline: 1986 to 2025



Sources and Further Reading

1. Rumelhart, Hinton, Williams, “Learning representations by back-propagating errors,” Nature, 1986
2. Ouyang et al., “Training language models to follow instructions with human feedback” (InstructGPT), 2022
3. Bai et al. (Anthropic), “Constitutional AI: Harmlessness from AI Feedback,” 2022
4. DeepSeek-AI, DeepSeek-V3 Technical Report, 2024; DeepSeek-R1, 2025
5. MyWebUniversity — Python Modules Full Course (TensorFlow lesson)





Thank you for watching

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