



Artificial Intelligence for Everyone Week -1

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Syllabus

Week 1: Machine Learning - Reinforcement, AI impact on humanity.

Week 2: Machine Learning - Supervised & Unsupervised Learning,
AI in healthcare.

Week 3: Neural Network, Image processing, AI in education.

Week 4: Natural Language Processing, conversational AI.

Week 5: AI application and challenge.

Week 6: AI's potential & peril.

What is AI ?

ARTIFICIAL INTELLIGENCE

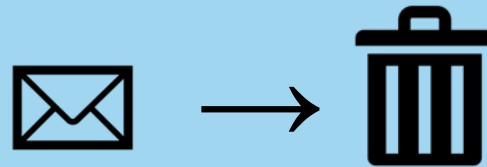
Any technique that enables computers to mimic human behavior



Mind Reading

MACHINE LEARNING

Ability to learn without explicitly being programmed



AI-bot

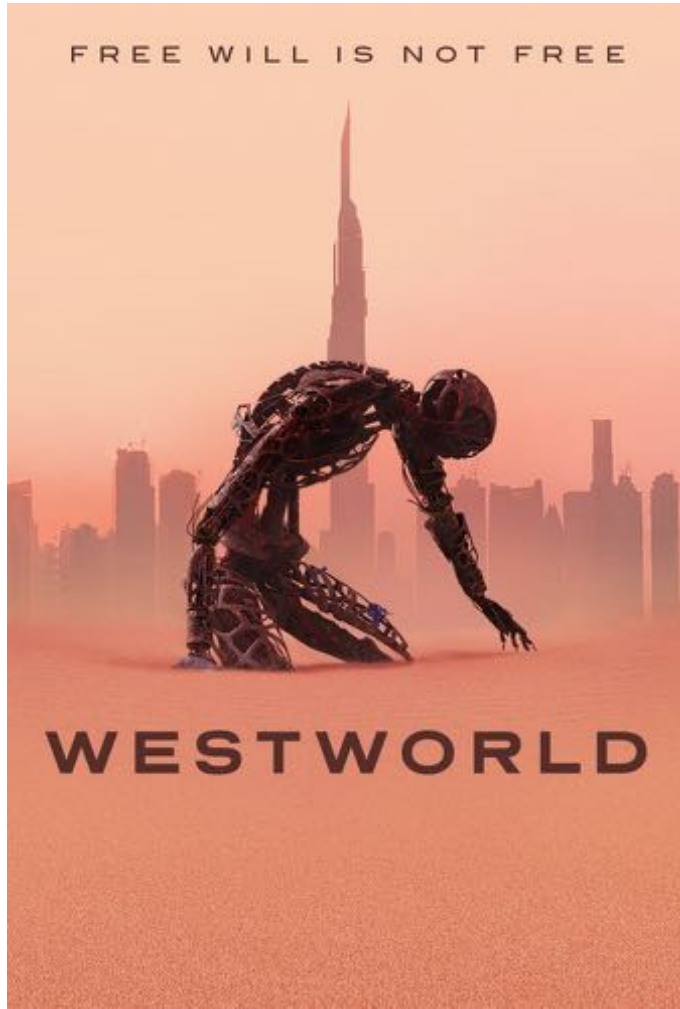
DEEP LEARNING

Ability to extract patterns from data using neural networks



Impact

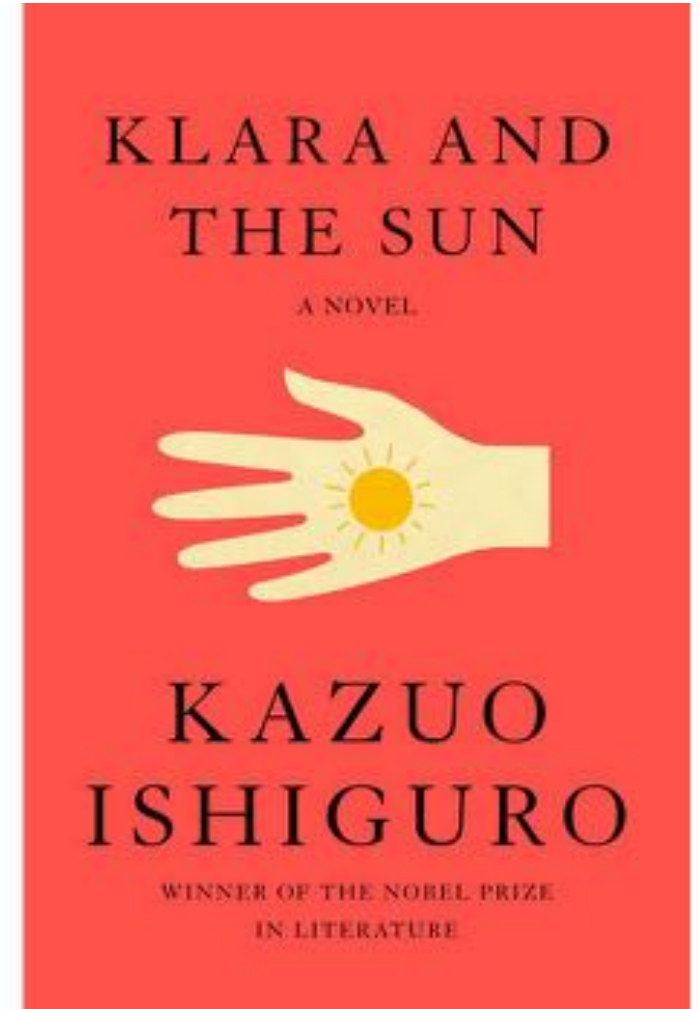
AI in Popular Culture



HBO Series, 2016



Short Film, 2019



March 2021

AI Triumph over Human



IBM DeepBlue beat Garry Kasparov in Chess, May 11, 1997



IBM Watson won Jeopardy Championship, February 17, 2011



CMU Liberatus won Poker Tournament Jan. 20, 2017

AI was programmed on human knowledge

Milestone – Machine Learning



DeepMind's AlphaGo beat Sedol Lee in Go, March 2016

AlphaGo **Zero**, through **self-learning**, beat reigning World Champion, Ke Jie, in 2017 and 60 top players

Machine Learning

Reinforcement Learning

Supervised Learning

Unsupervised Learning

Reinforcement Learning

given a set of feedback (reward or punishment), learn what actions to take in the future

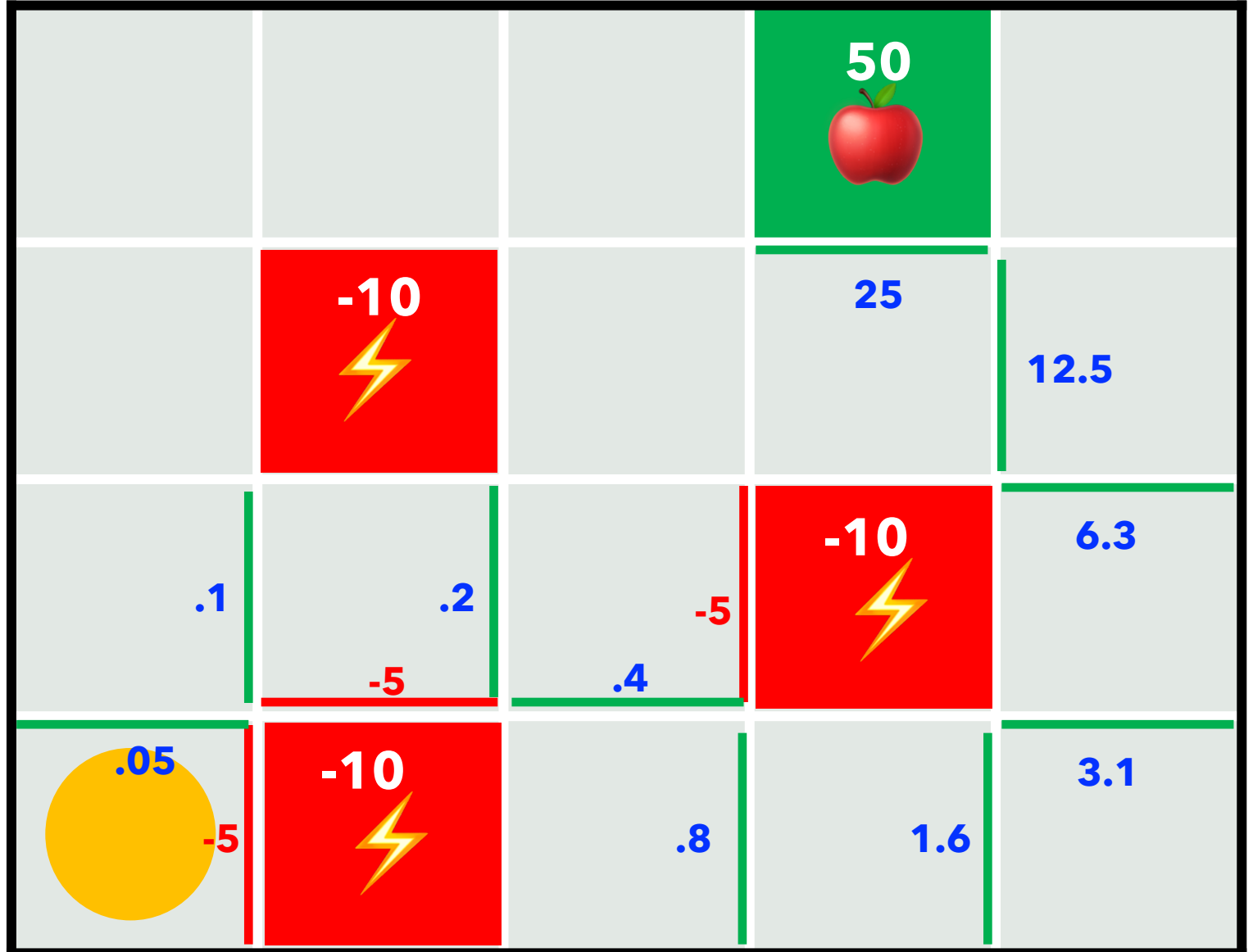


Q-Learning

given feedback, learn the quality of each action, or Q value

Greedy Move

Choose action with the highest quality, Q



Q-Learning

given feedback, learn the quality of each action, or Q value

Exploit vs Explore

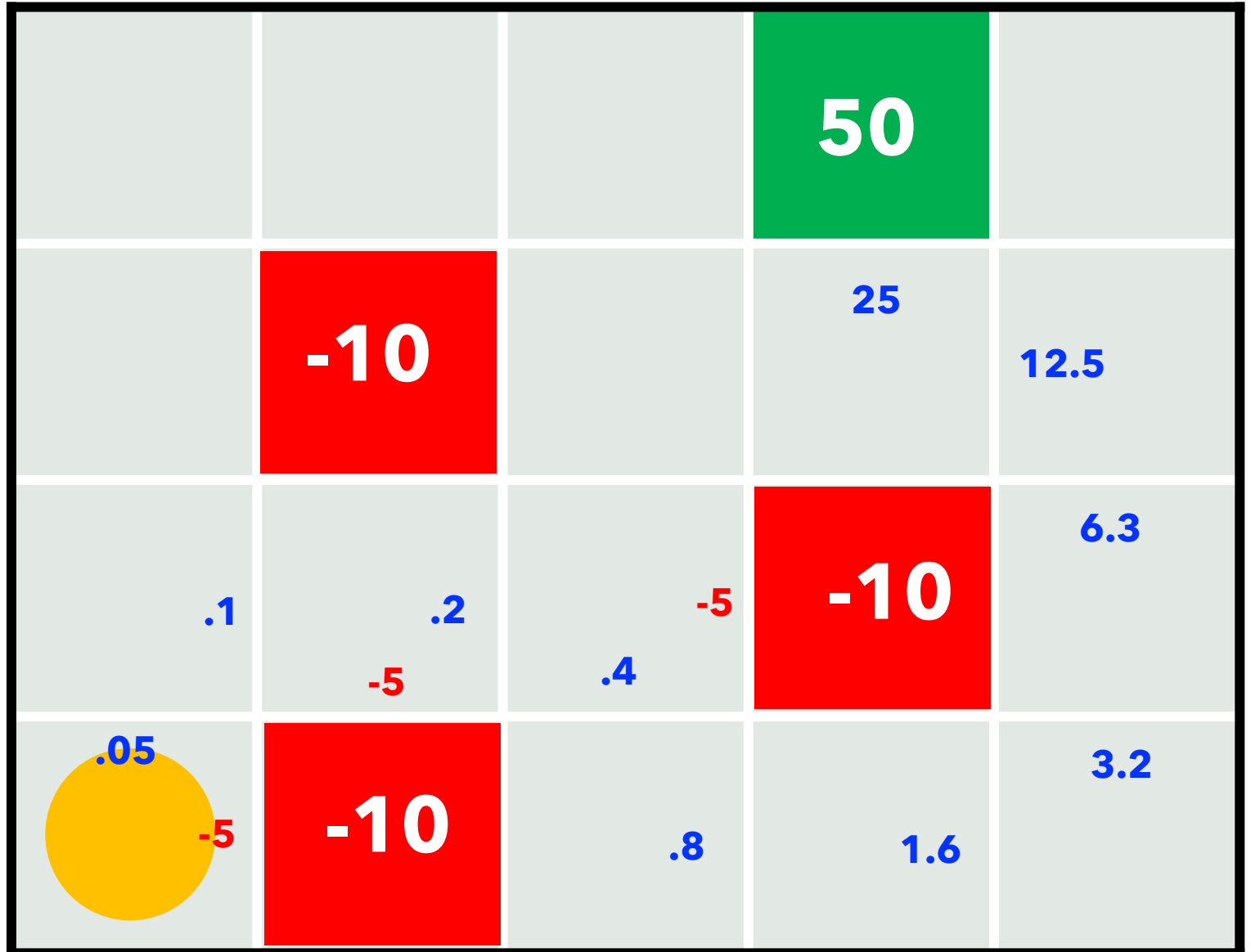
ϵ -greedy

Set ϵ for random move.

Generate a random number p ,

If $p < \epsilon$, choose a random move.

Otherwise, choose estimated best move, $\max_a Q(s', a)$



Q-Learning

given feedback, learn the quality of each action, or Q value

Exploit vs Explore

ϵ -greedy

Set ϵ for random move.

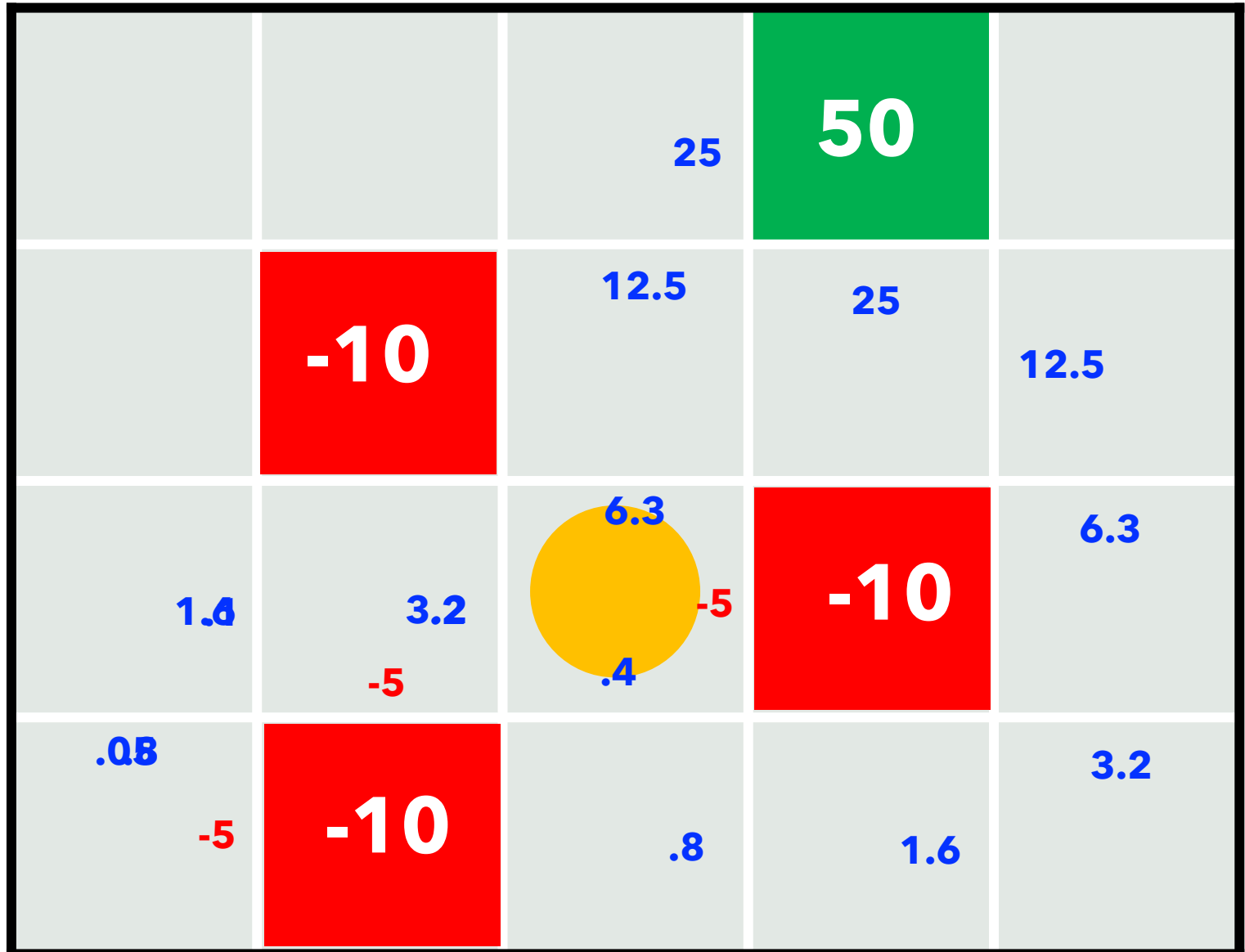
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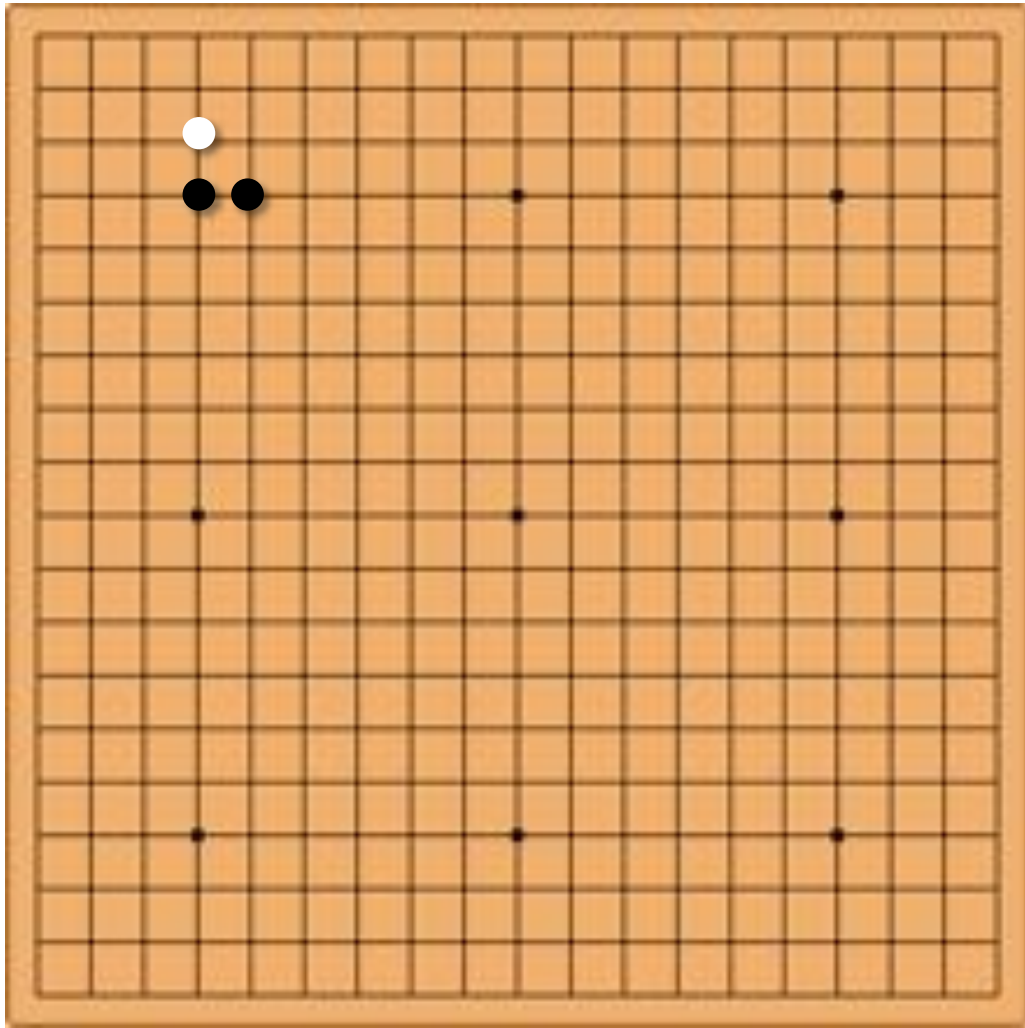
Otherwise, choose estimated best move, $\max_a Q(s', a)$

Parking

Ping Pong



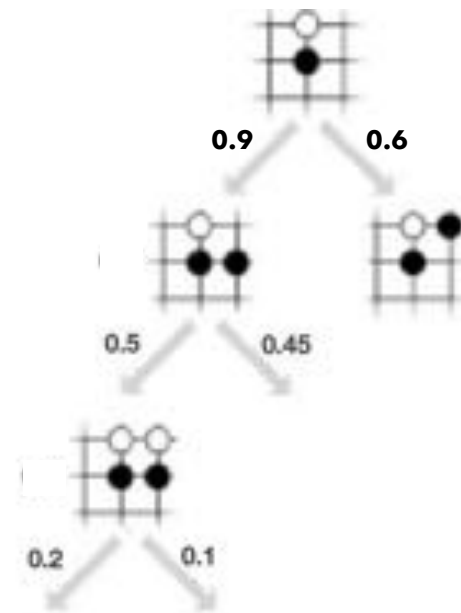
Go 10^{170} legal moves



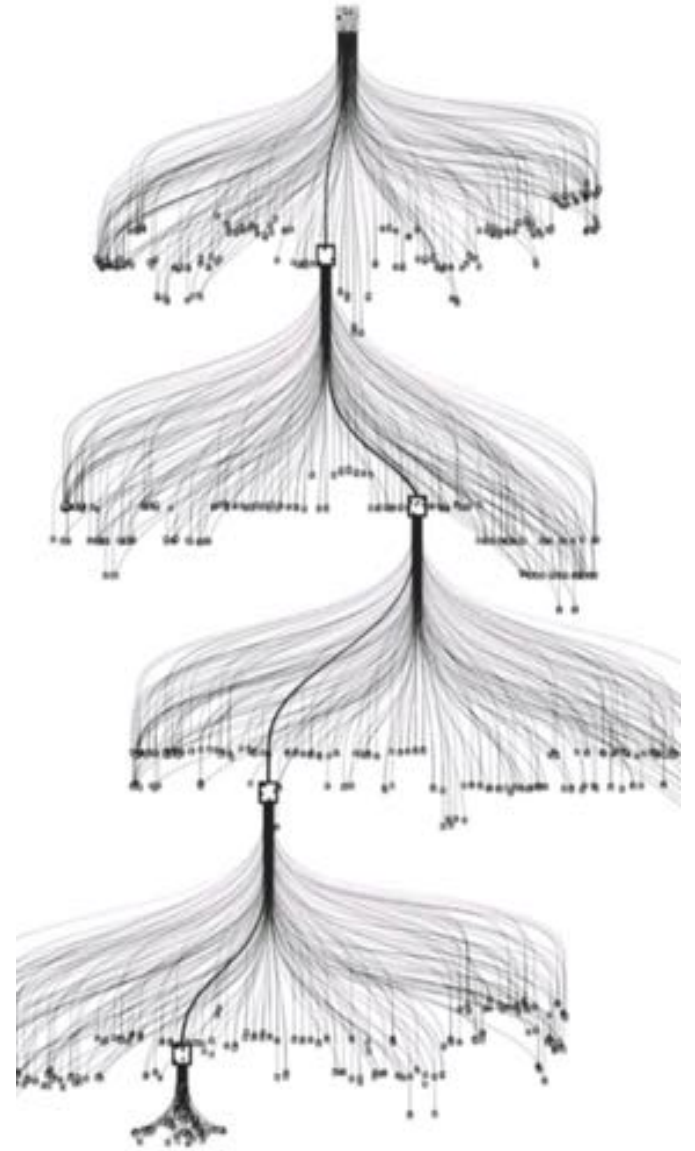
$19 \times 19 = 361$ positions

RL: $Q=1$ for win
 $Q=0$ for loss

Decision Tree

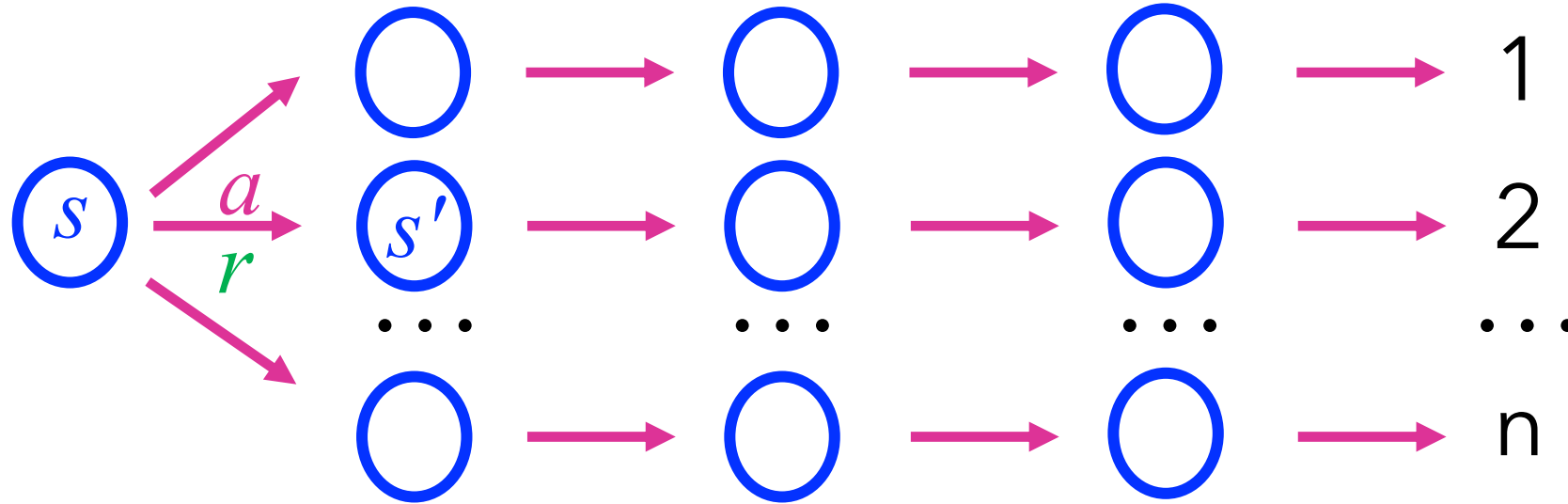


$N = 361 \times 360 \times 359 \times \dots \times 2 \times 1$

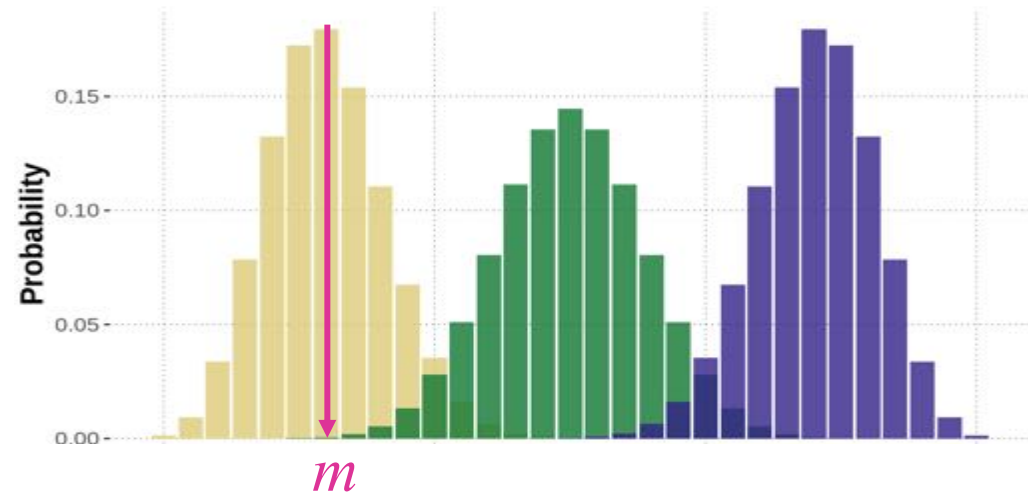


Markov Decision Process

model for decision-making, representing states, actions, and their rewards

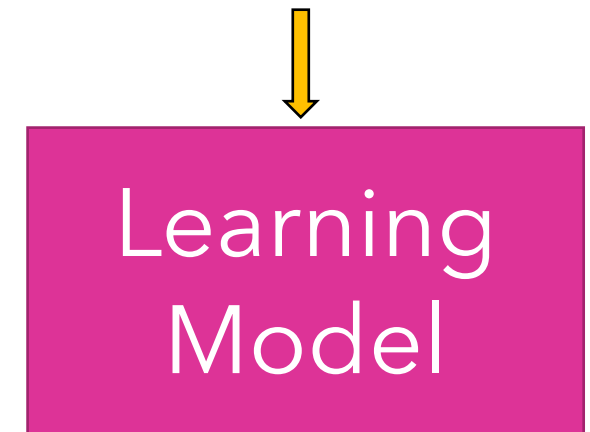
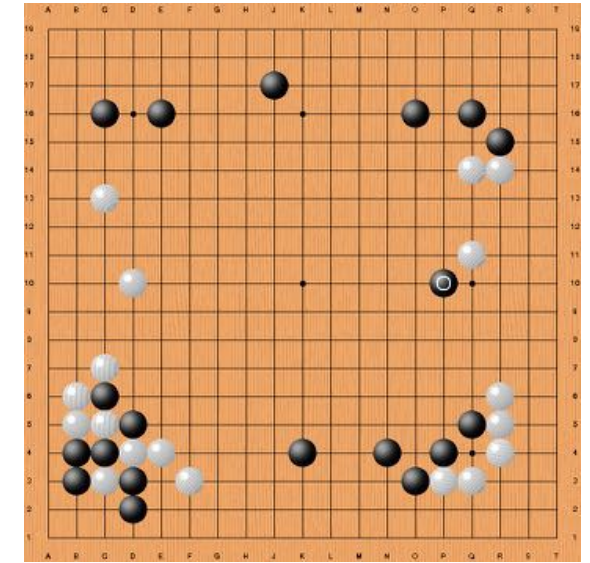
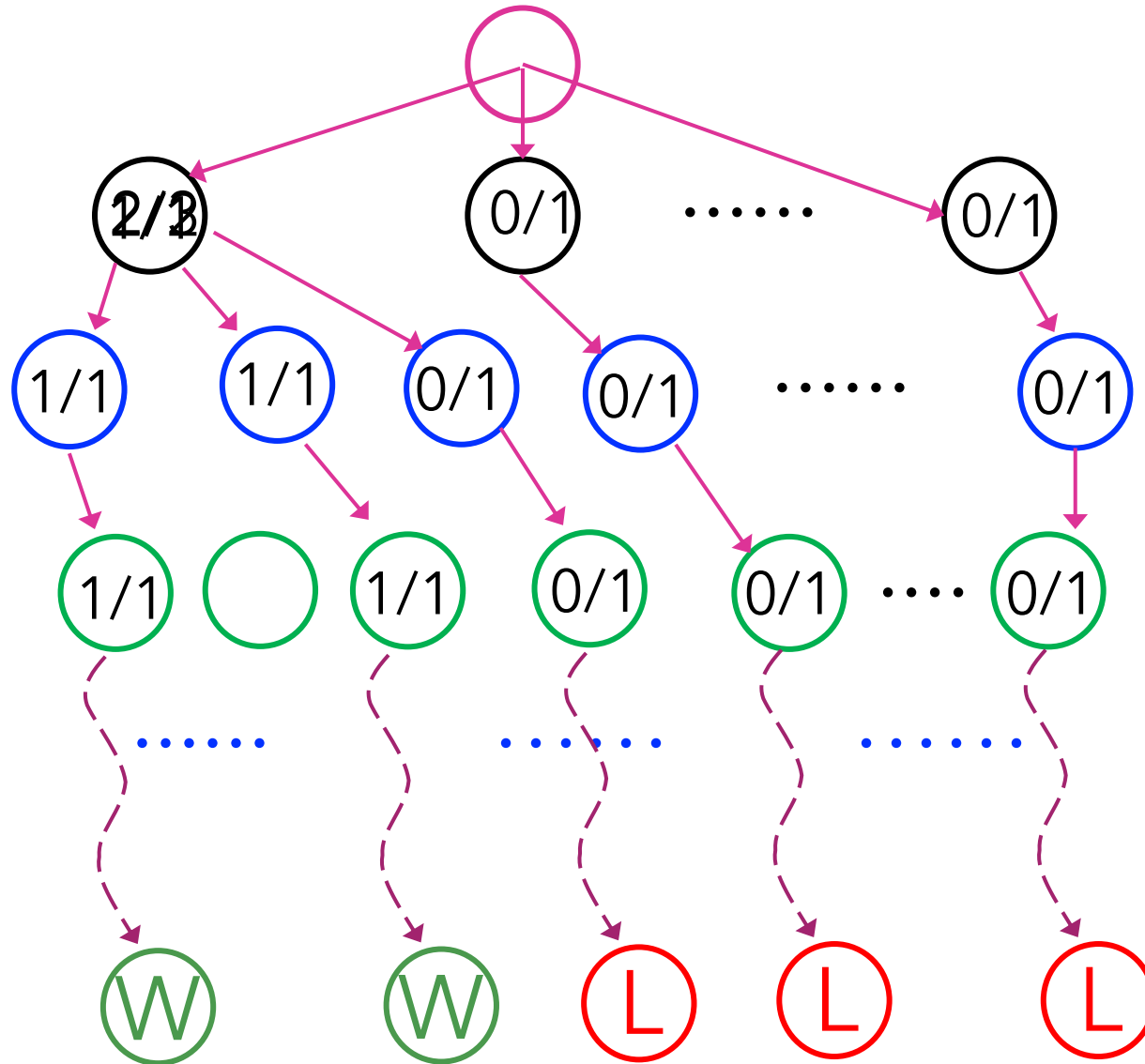


- Set of states s
- Set of actions $a(s)$
- Transition model $p(s' | s, a)$
- Reward function $r(s, a, s')$



Monte Carlo Tree Search

Select
Expand
Simulated
Update



Next Move

AlphaGo Zero

Autonomous Learning

Day 0: No knowledge of Go game

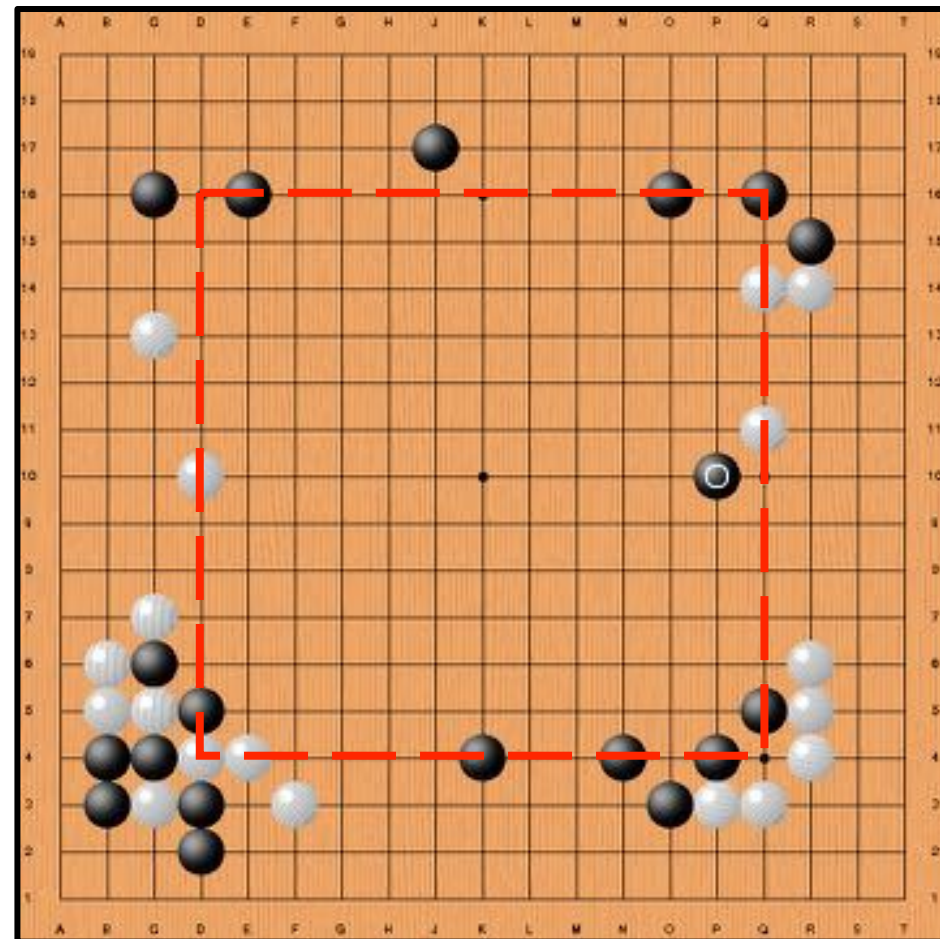
Day 3: Beat AlphaGo Lee version 100-0

Day 21: Beat world champion, Ke Jie
and other 60 top players after
30 million self-playing games.

Discovery of New Knowledge

Original moves and novel strategy

Is AI creative? 0:46



A young boy in a green shirt is hiding behind a large tree trunk. In the background, two other children, one in a red shirt and one in a white tank top, are running away from him in a grassy field. The scene is outdoors with trees and greenery.

Hide & Seek

Can AI use tools & strategize?
Can AI gain consciousness?
Can AI create?

Multi-agent system

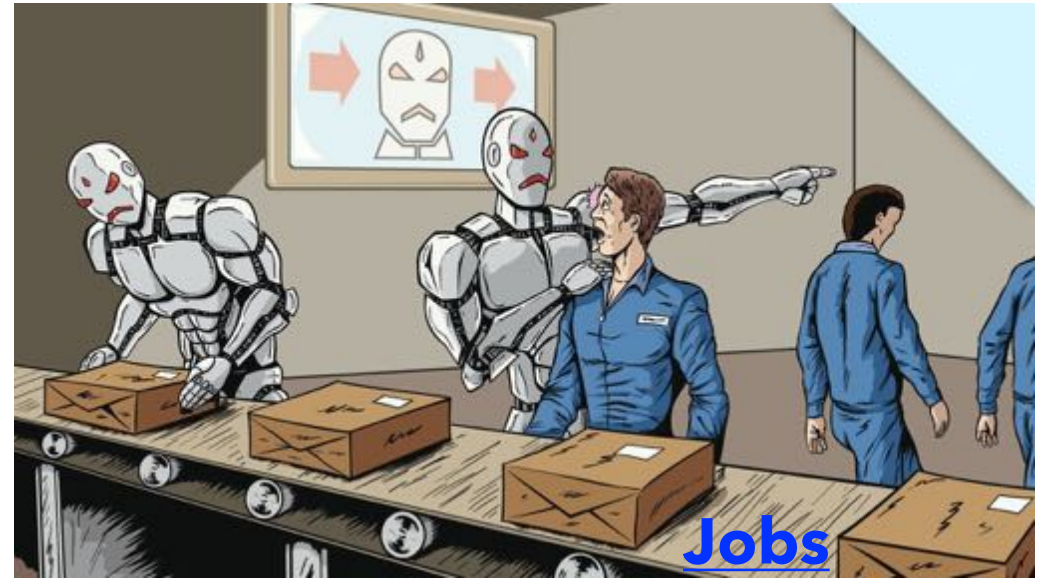
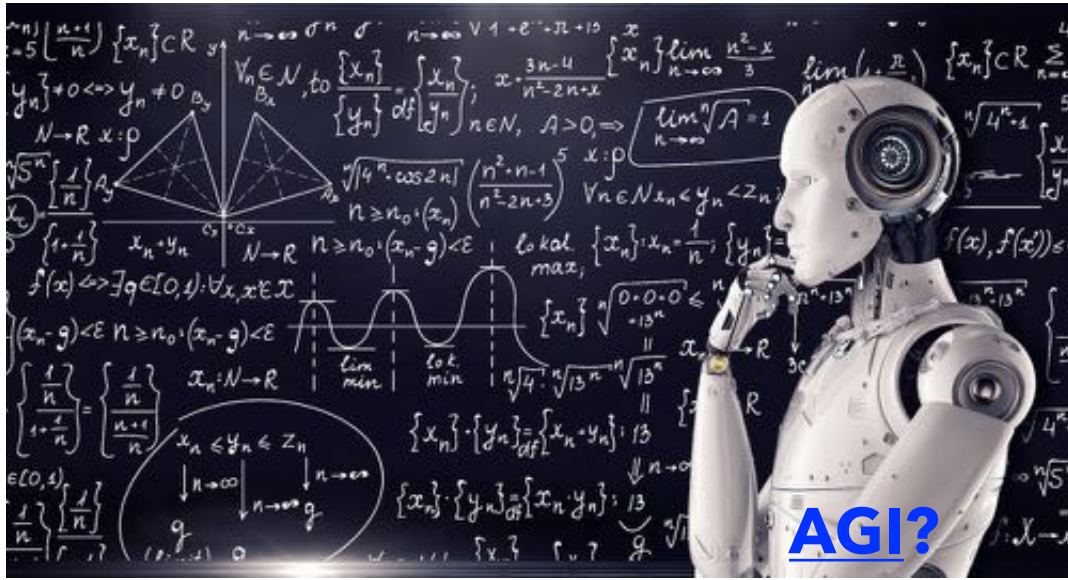


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Can AI gain consciousness?



Concerns on AI





“The development of full artificial intelligence could spell the end of the human race. It would take off on its own, and re-design itself at an ever increasing rate. Humans, who are limited by slow biological evolution, couldn't compete and would be superseded.”

~ Stephen Hawking

UPRISE

"Mark my words — AI is far more dangerous than nukes." Elon Musk

