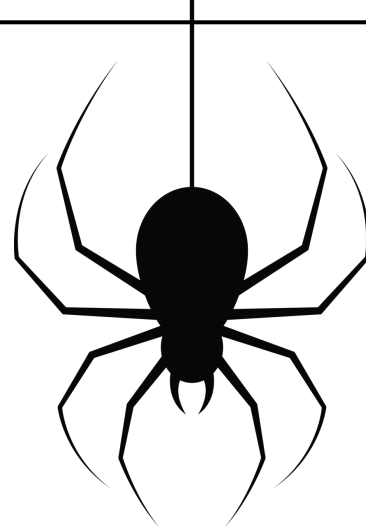


MINIMAL

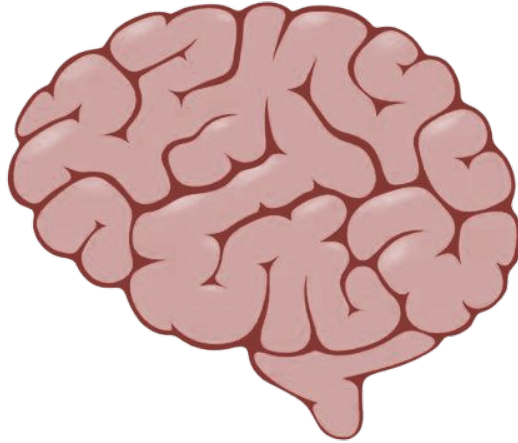


NEURAL NETWORKS

By Srinithin Ganesh, Sayor Singha, Pulkit
Chaudhary, and Amiya Harish



Human Brain



~86 Billion Neurons

Insect Brain

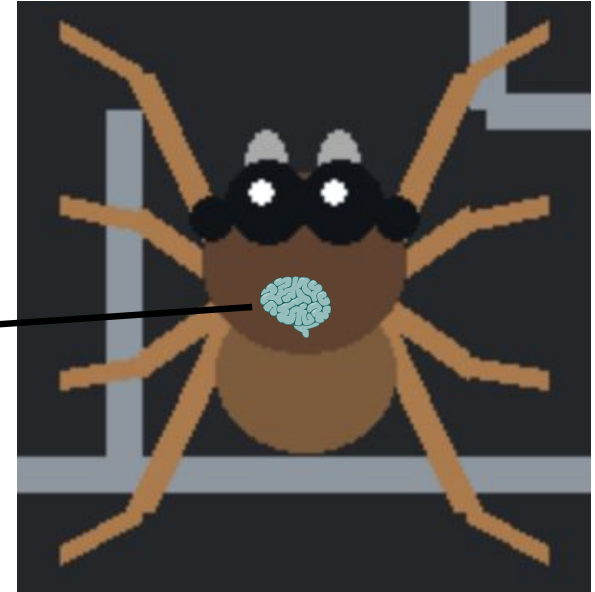
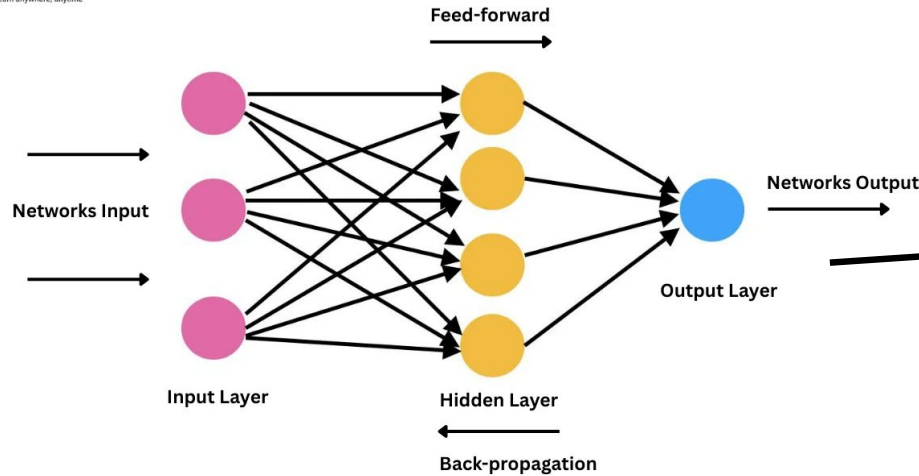


~200,000 Neurons

Insects have **smaller brains** than humans, but they can still **evolve, adapt, and navigate** their environment

Modern Machine Learning is incredibly wasteful

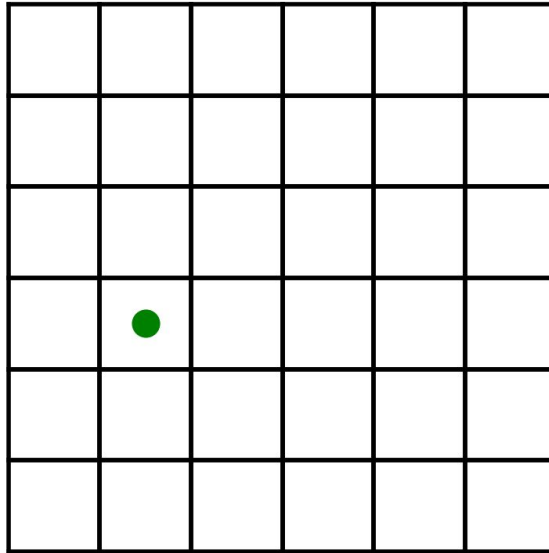
igmGuru
Learn anywhere, anytime



We built an agent using **neural networks** inspired by *Salticidae*: jumping spiders which have small brains

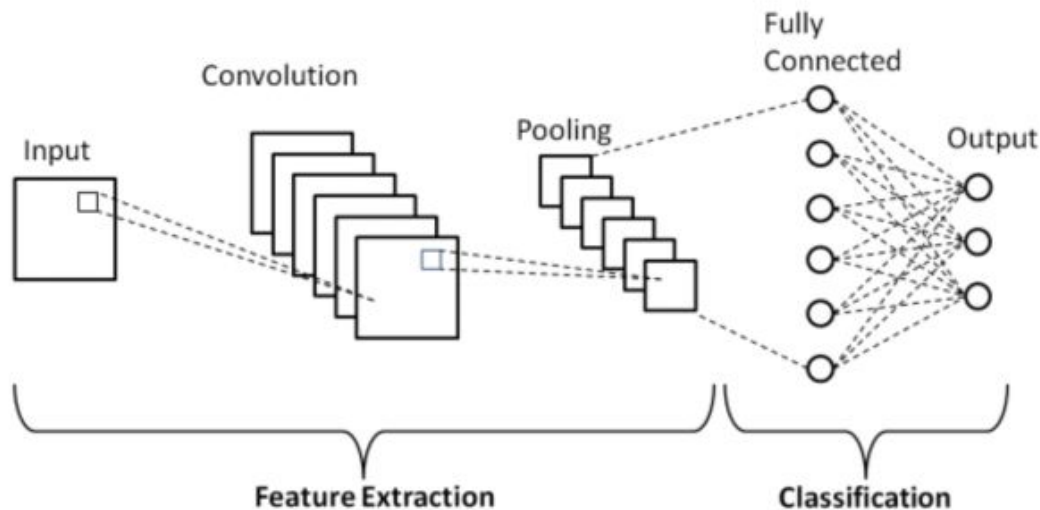
We built a maze generator, using **reverse-DFS**
& tested our spider agent against various
mazes to see if it could learn

Generating a 6 x 6 Maze

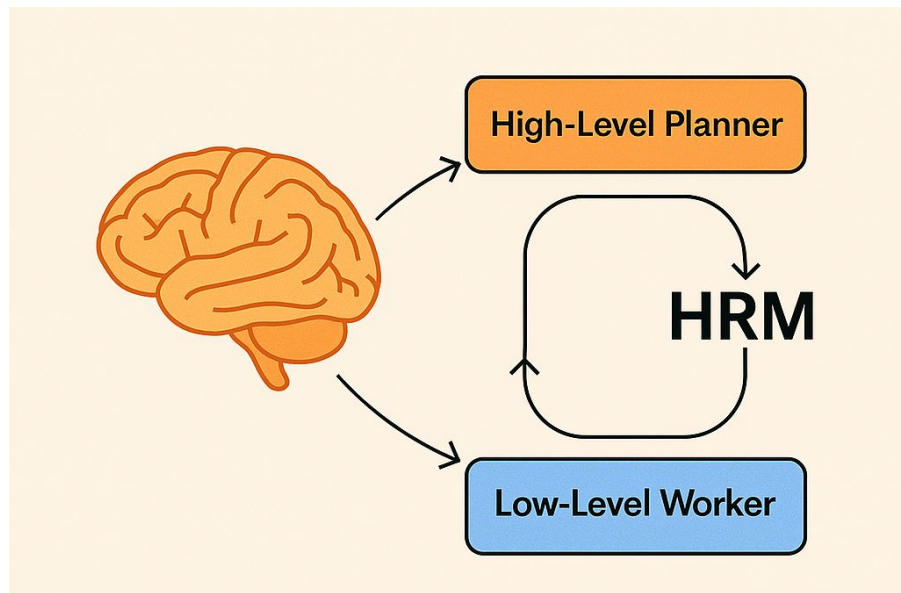


01 Sees

The Convolutional Neural Network (CNN): Analyzes the mazes we generate, and identifies features



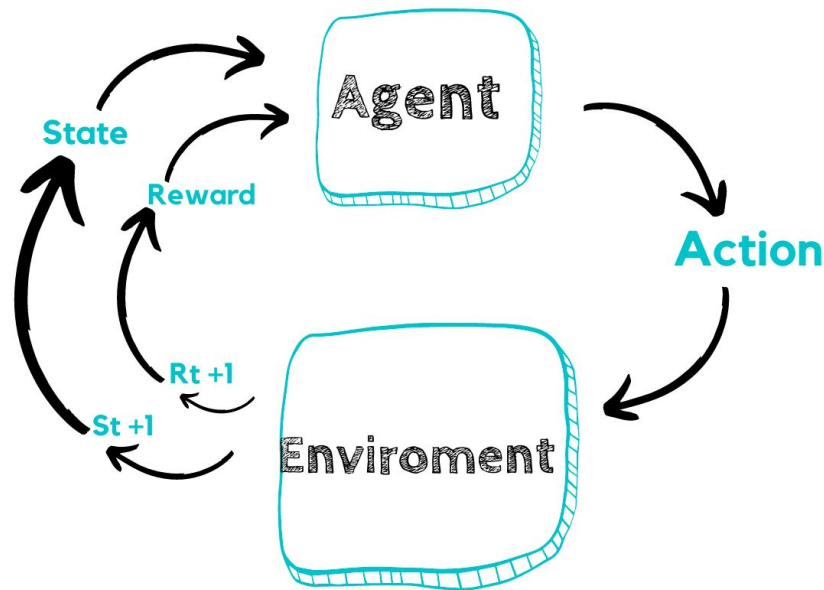
02 Thinks



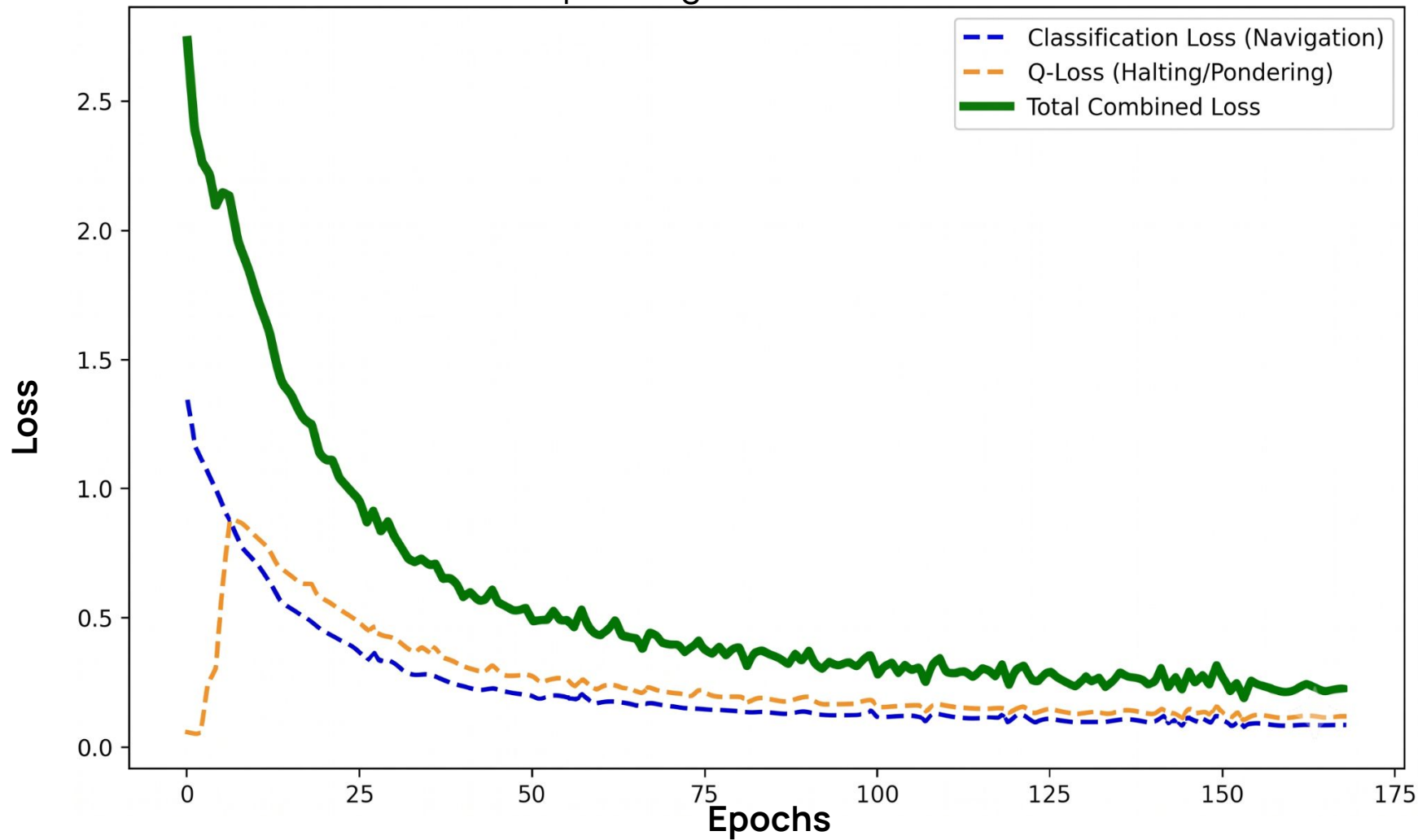
The Hierarchical Reasoning Model (HRM): Gives our spider a memory, and the ability to 'think' and explore the maze

03 Stops/Continues

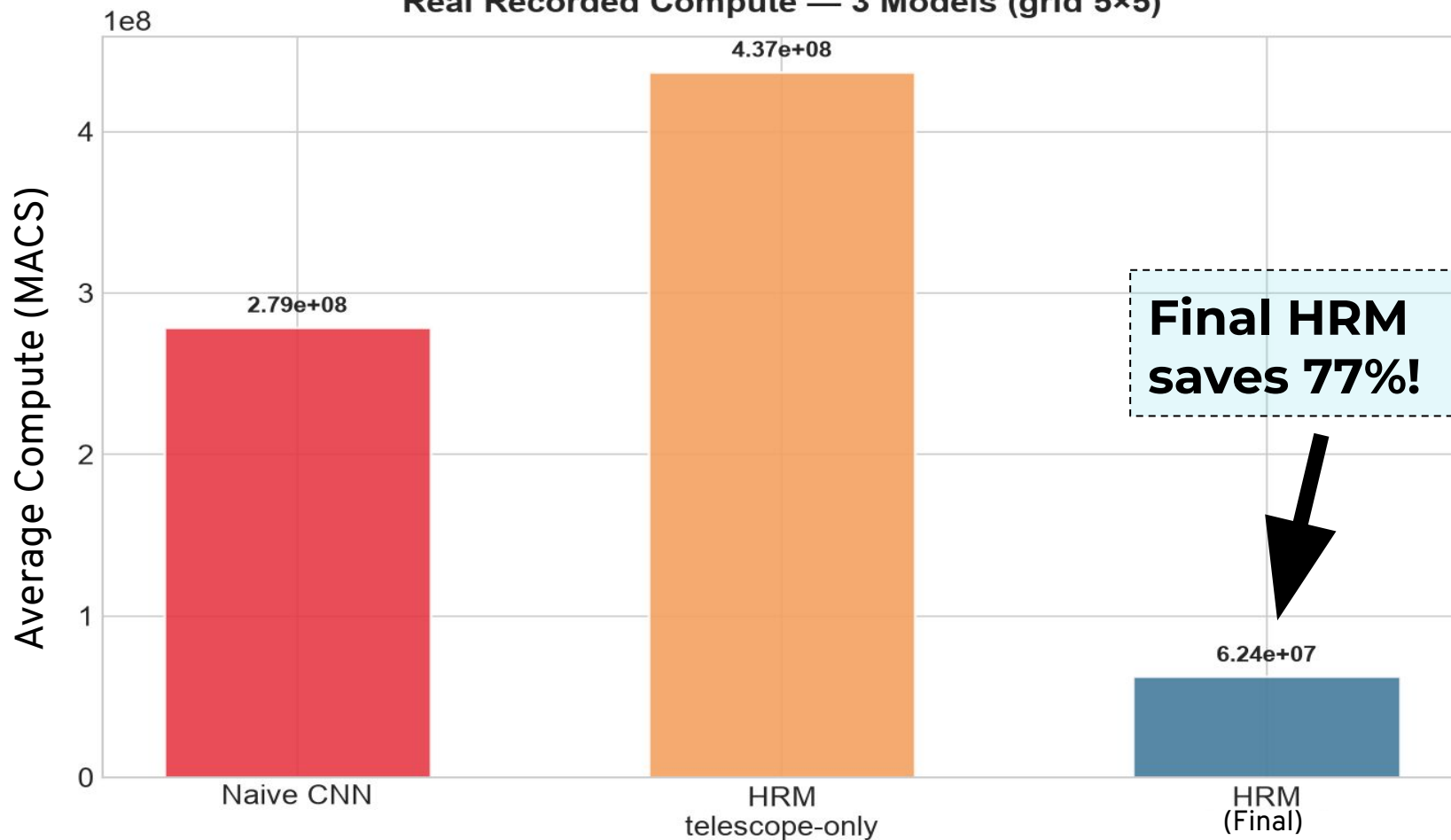
Q-learning: Tells our spider how long to think for.



Spider Agent Loss Curve



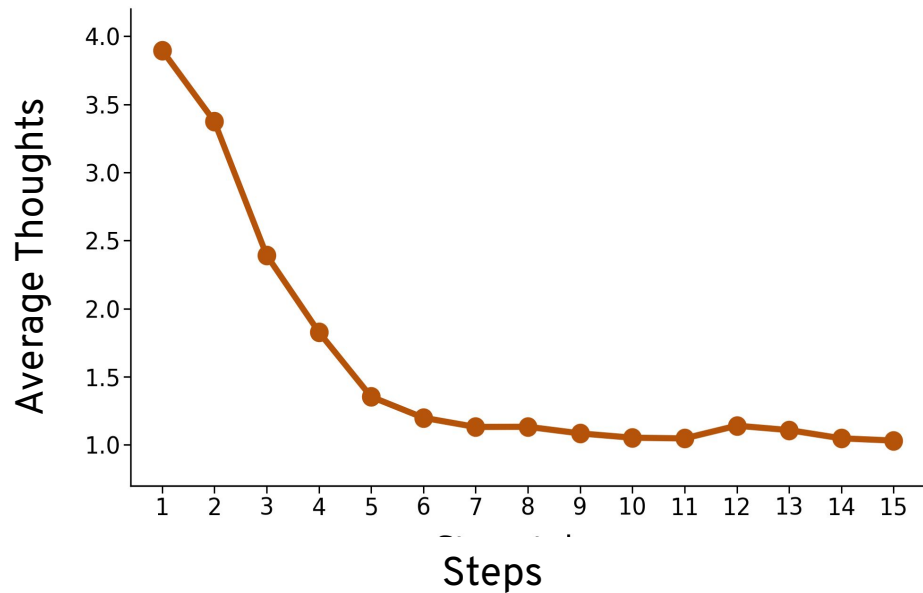
Real Recorded Compute — 3 Models (grid 5×5)



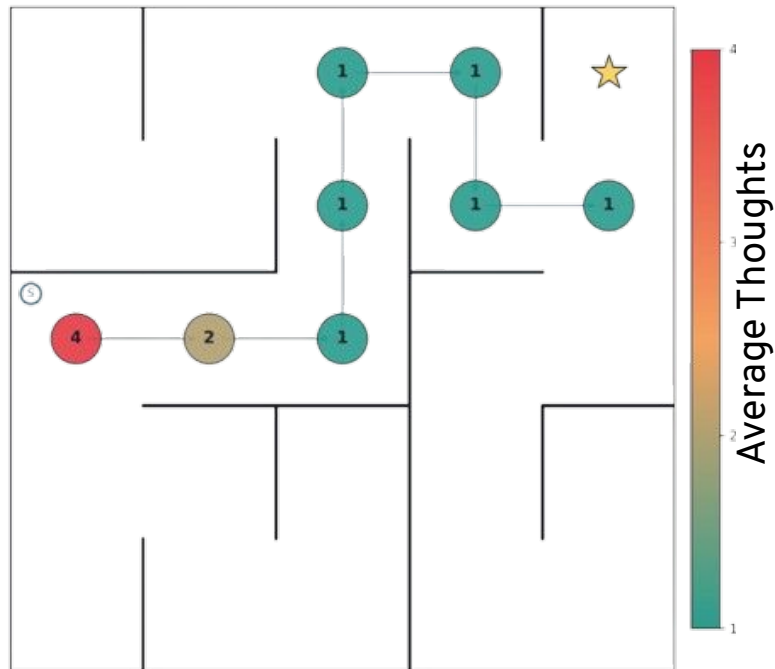
From the actual 1000-maze eval runs (all attempts, including failures).

SPIDER THOUGHT PROCESS

Average Thoughts per Step



Thought Heat Map

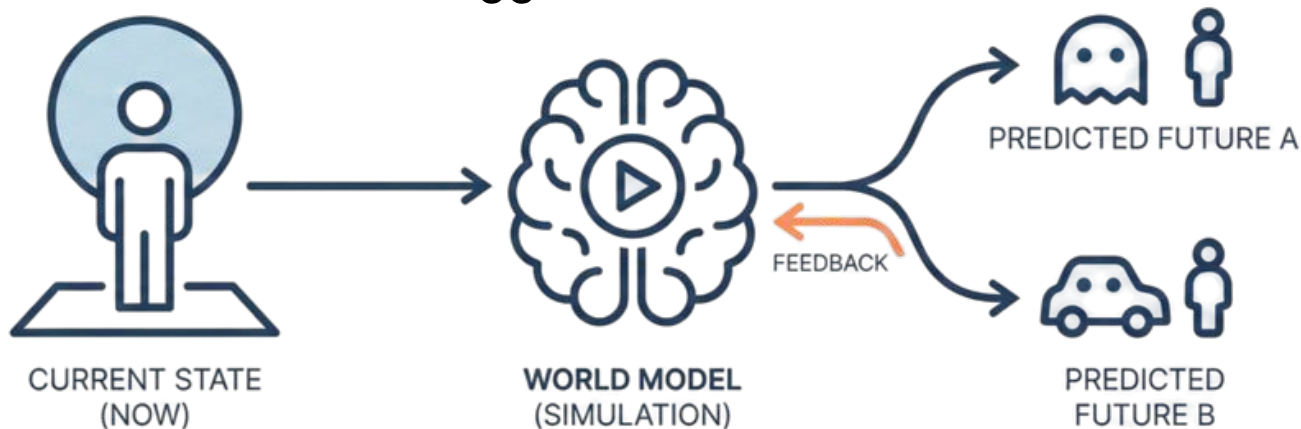


Telescope
View



FUTURE OF THIS PROJECT

- Implementing a World Model
- Trying to achieve success on bigger mazes



QUESTIONS?