



no memory memories

intro

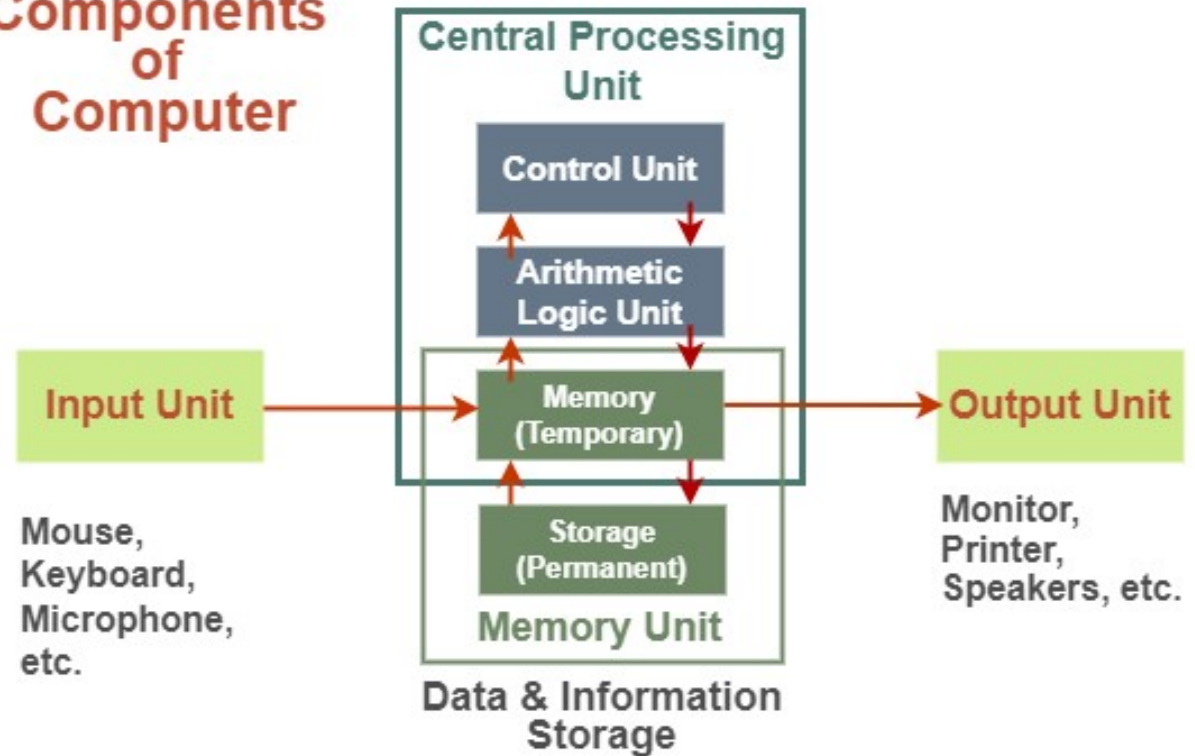
- may not be true.
- might be a big step forward.



computer system

most research is inspired by computer system, focusing on CPU only.

Components of Computer



Two Core Problems

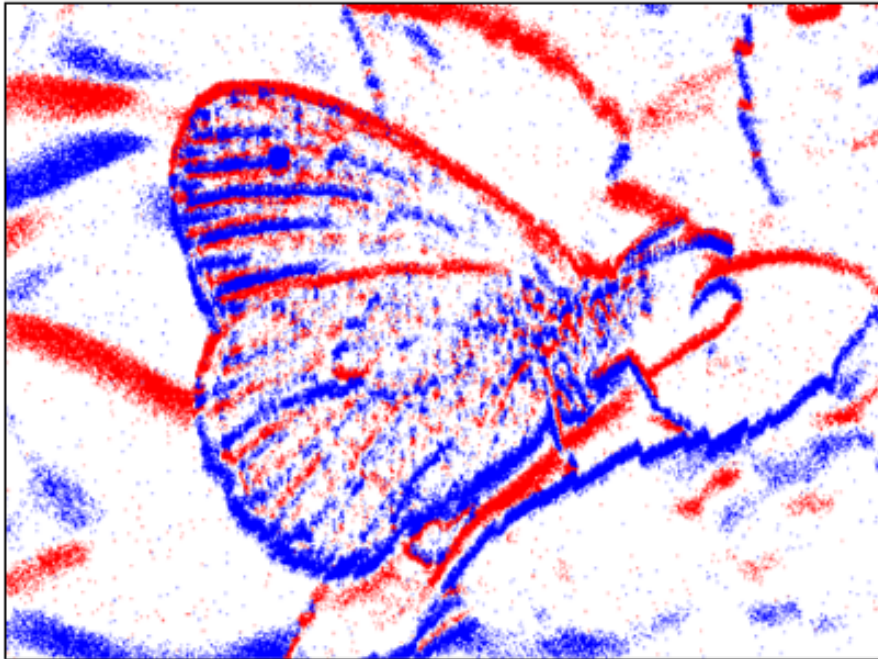
We would like to build artificial agents capable of innovating as humans do. We believe that theoretical and algorithmic frameworks such as decision theory and reinforcement learning (or RL) are relevant to this goal.

1. L. J. Savage illustrated the problem of Bayesian decision theory with a pair of proverbs. A small world is one where you can always “look before you leap”. A large world is one where you must sometimes “cross that bridge when you come to it”. Bayesian decision theory is **only valid in small worlds**. Yet the real world is large.

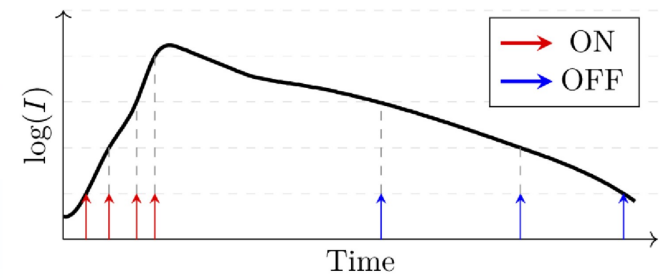
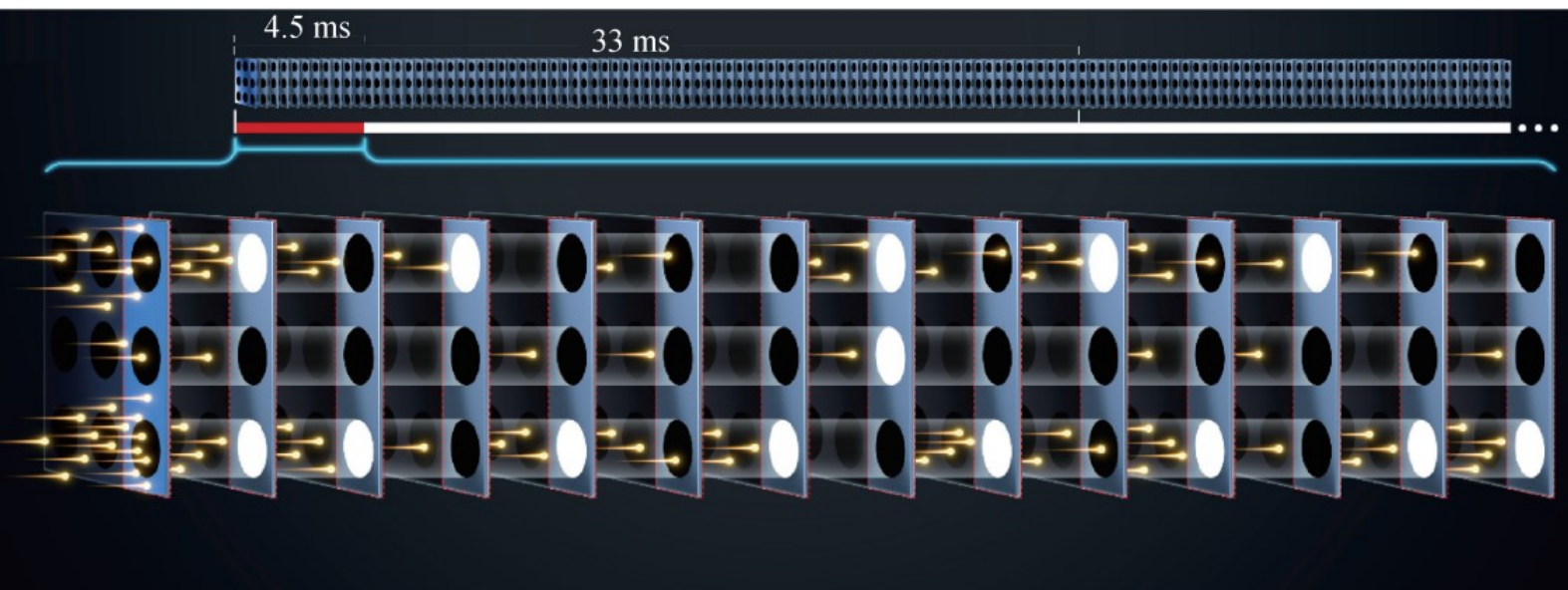
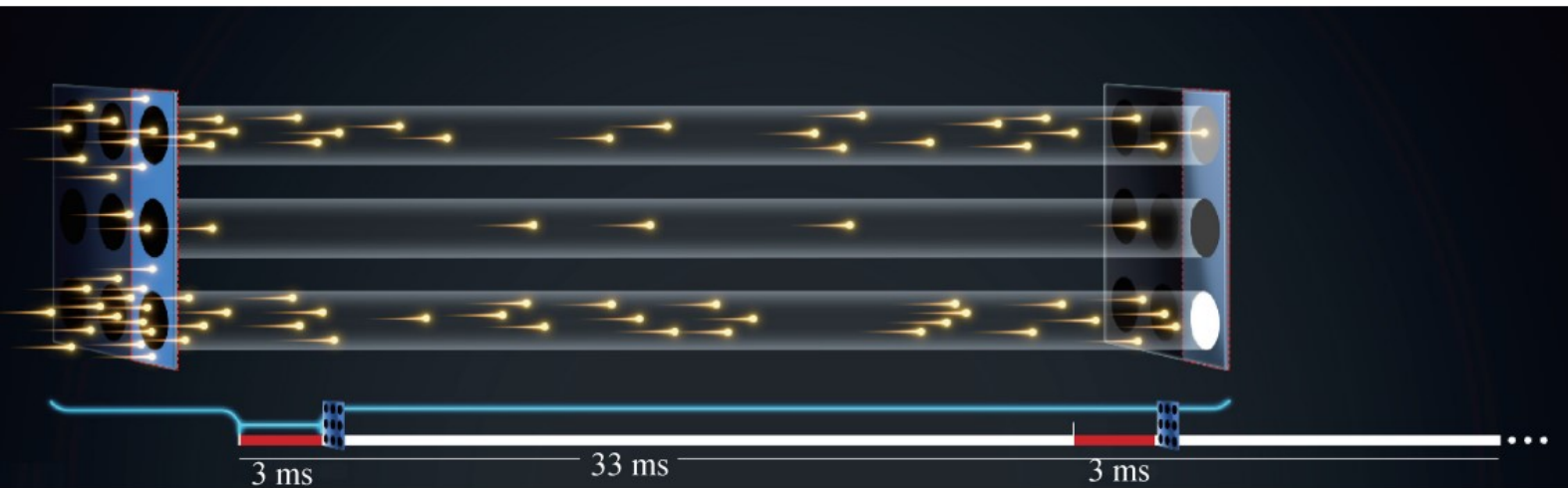
2. Classic (or model free) RL learns the value of states, or which actions are good in which states, and therefore requires no knowledge of how **states relate** to each other. traditional planning mechanisms (such as tree-search) are computationally costly. And **(x,y)-coordinates** state representations?



what's more



single neuron is powerful!



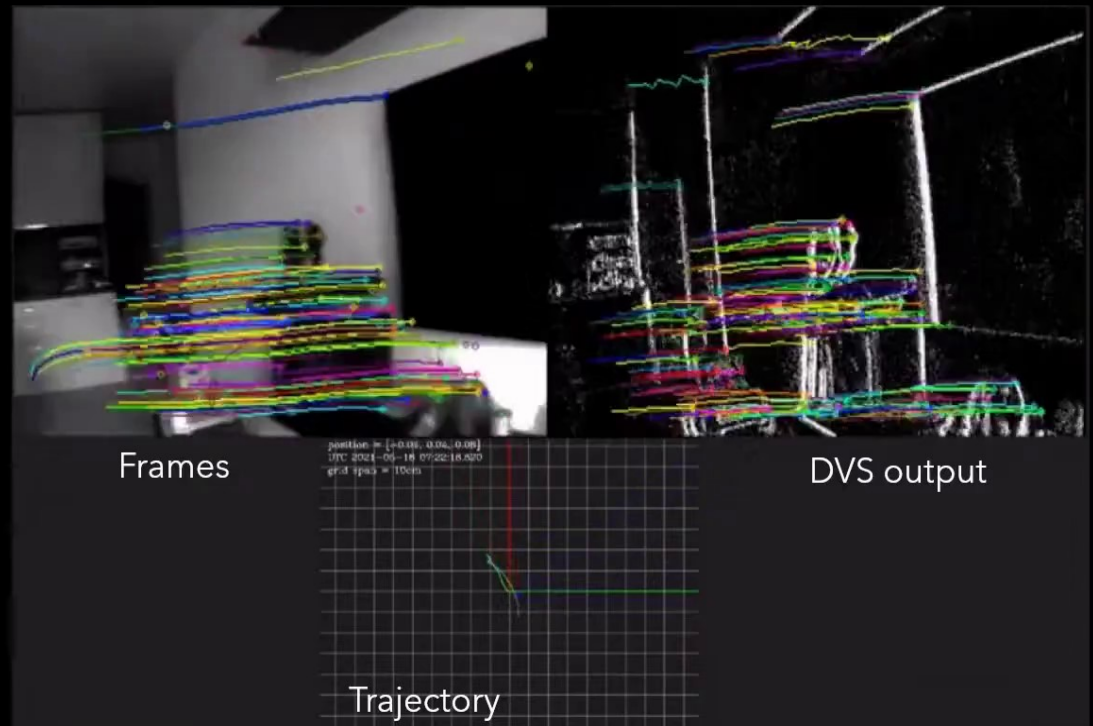
differential
integrator
circuit

single neuron is powerful!

Ultra-Fast HDR Visual Odometry



- Low latency
- Dynamic range up to 120 dB
 - Tunnels
 - Corridors
 - Underwater



no neuron cold storage!

an unique neuron for storing each information bits is terrible !



stable electric fields!

It is known that the exact neurons maintaining a given memory (the neural ensemble) change from trial to trial. This raises the question of how the brain achieves stability in the face of this representational drift. Here, we demonstrate that this stability emerges at the level of the electric fields that arise from neural activity. We show that electric fields carry information about working memory content. The electric fields, in turn, can act as “guard rails” that funnel higher dimensional variable neural activity along stable lower dimensional routes. We obtained the latent space associated with each memory. We then confirmed the stability of the electric field by mapping the latent space to different cortical patches (that comprise a neural ensemble) and reconstructing information flow between patches. Stable electric fields can allow latent states to be transferred between brain areas,

- high dimensional neural codes vs. low dimensional electric field
- call other neurons to participate in memory
- no storage, just Feelings!
- inherited knowledge transfer and generalization



structured memory system

- functional neurons grouping
- riemannian manifolds ?
- no cold storage
- memory is just Feelings!
- same neuron can represent different information
- same information can be represented by different neurons
- inherited knowledge transfer ;no need OT
- inherited information entanglement
- structured (computing graph?)

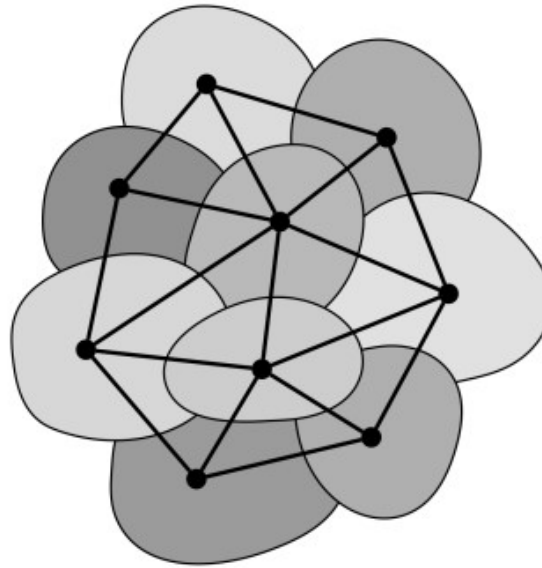
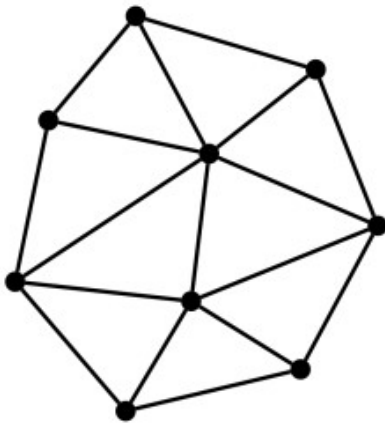


Claim: Superposition Information Theory

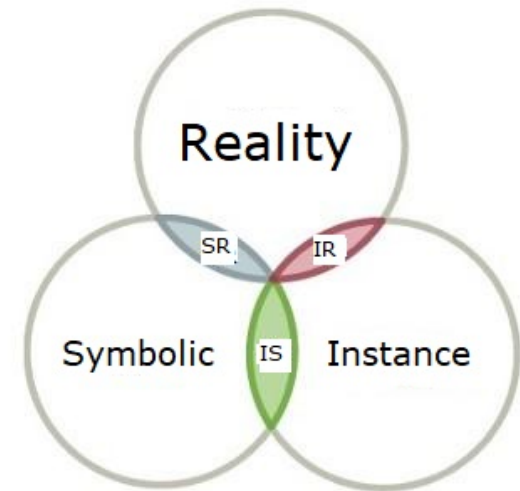
- focusing on Agents, not bits, and computing graph
- cognitive concepts are represented as non-euclidean distance between activated Agents in a situational context.
- superposition and entanglement

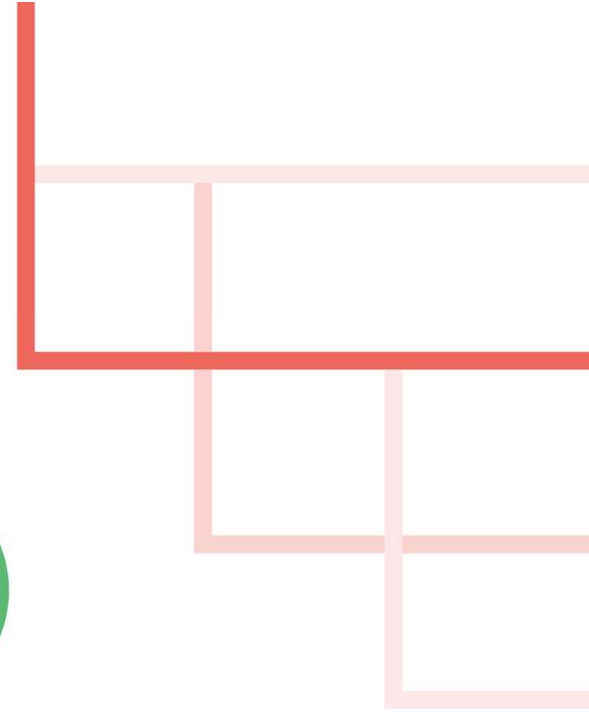
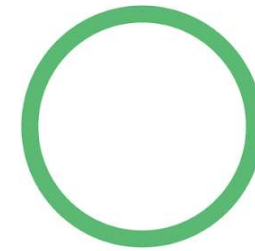


Superposition Information Theory



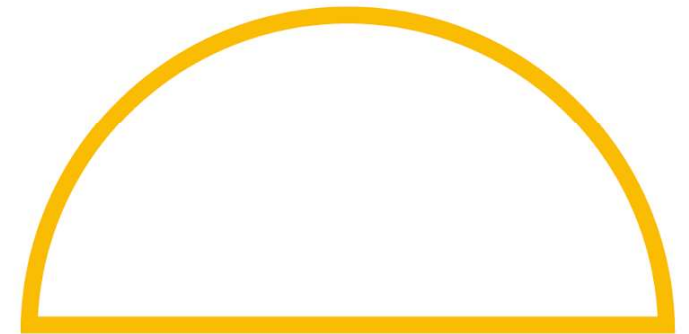
- Phase transitions and critical phenomena





What are we seeking?

breaking rules!
not just “no memory memories”



No Learning No Search

- no learning ,new concept is new (x,y) -coordinates!
- no search just same feeling!
- computing graph?



No Space No Time

- no space no time ,just boundary and segment



No Consciousness

- no consciousness just memory system!
- consciousness as a critical part of the memory system:
In consciousness, memories can be flexibly and creatively combined and rearranged to allow anticipation, future planning, and intentional action.



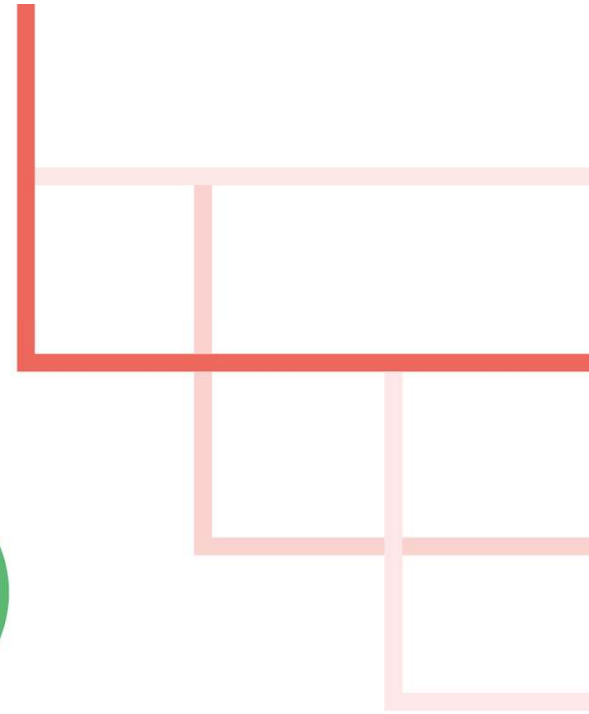
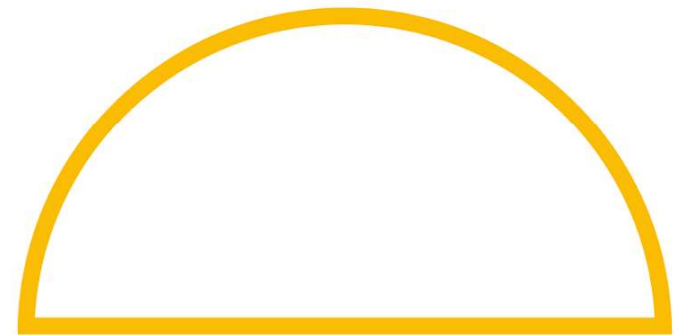
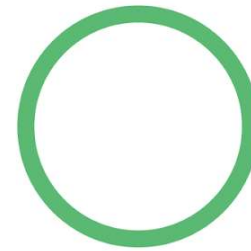
No CPU

- no cpu just memory!
- the original purpose of CPU was (and maybe a major purpose still is for human) to facilitate the encoding, storage, retrieval, and flexible recombination of prior events using memory systems.





What are we still seeking?



breaking Bayes Rules

- P: memory system breaking Bayes Rules
- Q: How to break Bayes Rules?

