

IMPERIAL LATES

TALK

Machine intelligence inspired by slime

Madalina Sas,
Department of Computing

Byte-sized talks: Women in AI
Hosted by Imperial's
Women in Computing Society



SWARM BEHAVIOUR NATURAL COMPUTING ARTIFICIAL INTELLIGENCE

Madalina Sas, PhD Candidate

Centre for Complexity Science & Department of Computing
Imperial College London

<https://mis.pm>



SWARM BEHAVIOUR

Local interactions between agents produce complex **emergent** behaviour at the system level.

"The whole is greater than the sum of the parts."





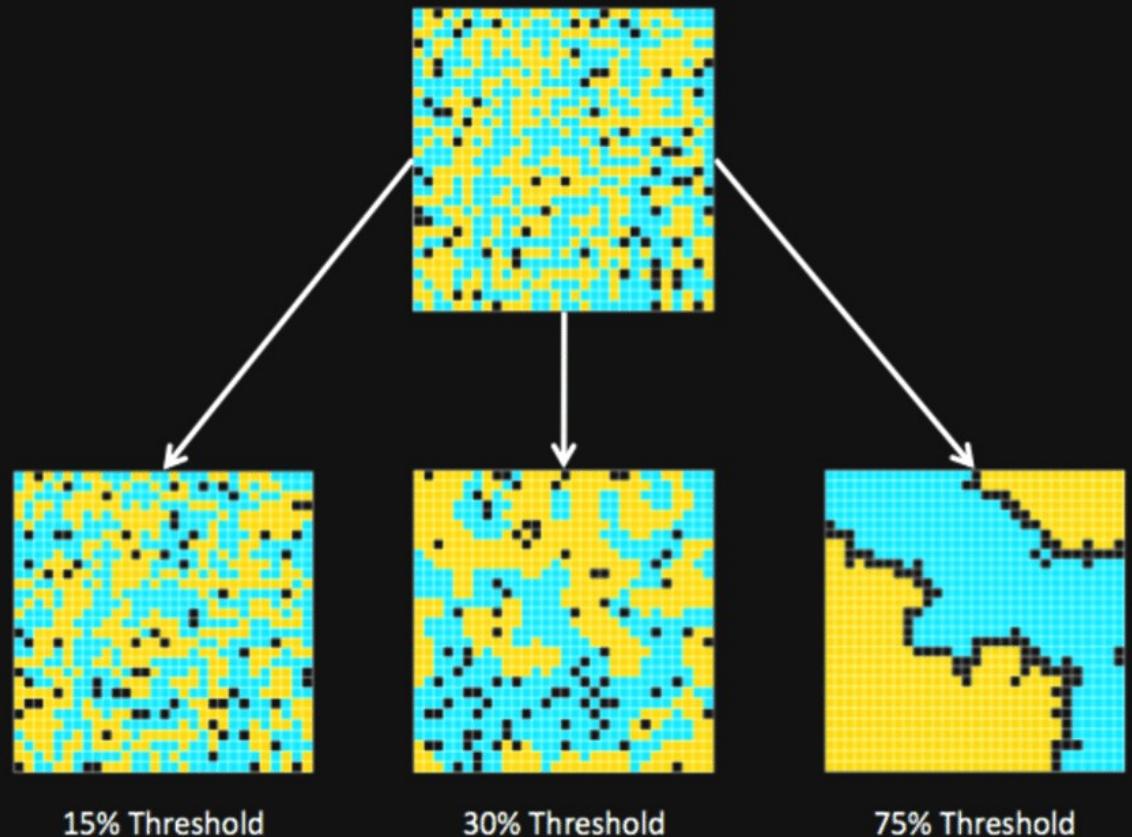


Our cities, our culture, our shared experience.

Unexpected macroscopic features emerge!

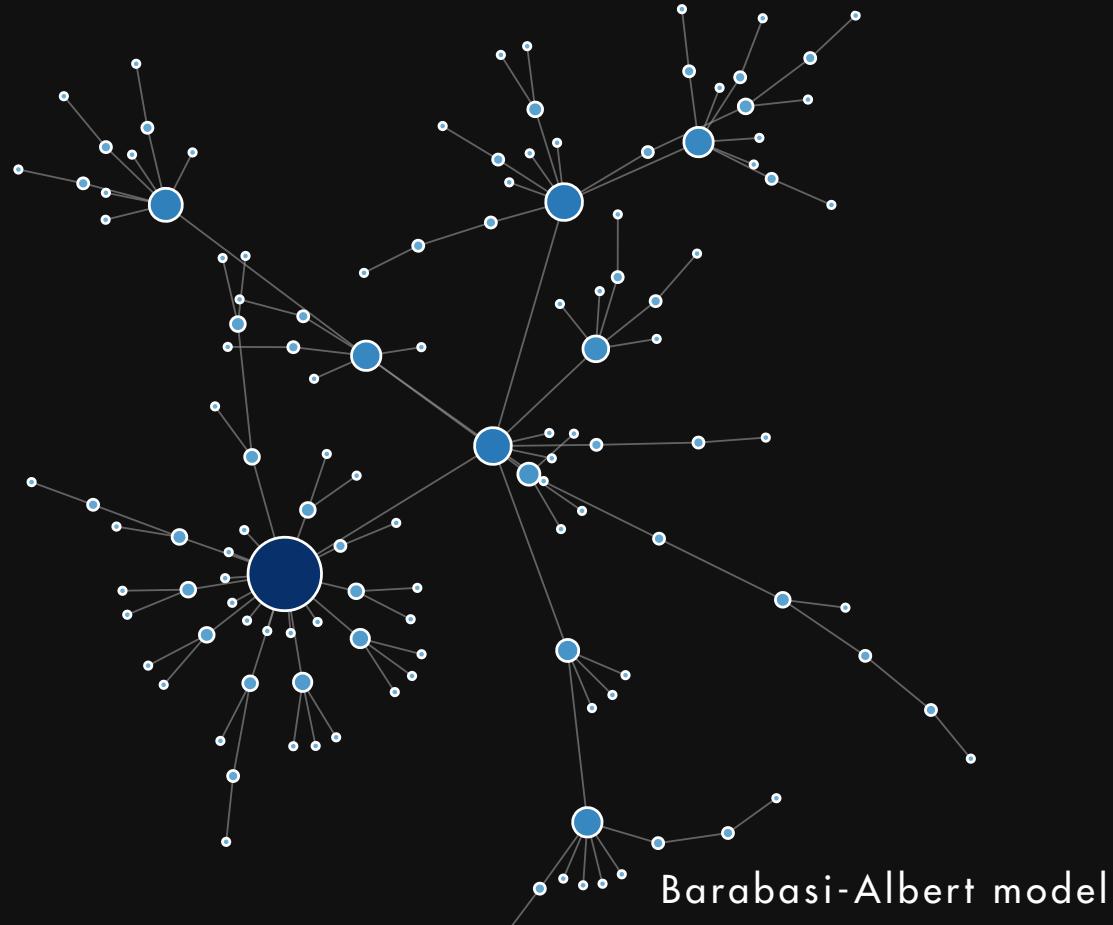
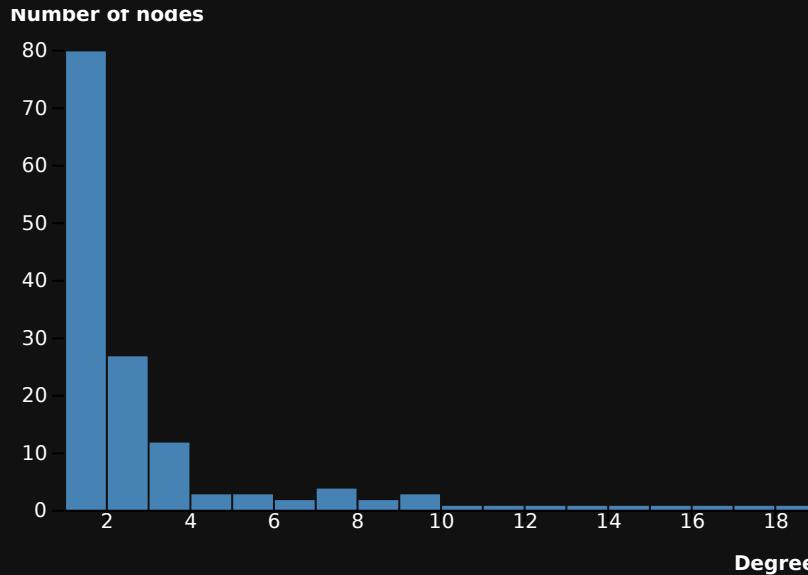
Segregation: Schelling model

Move to a different neighbourhood if more than x% of your neighbours are different than you.



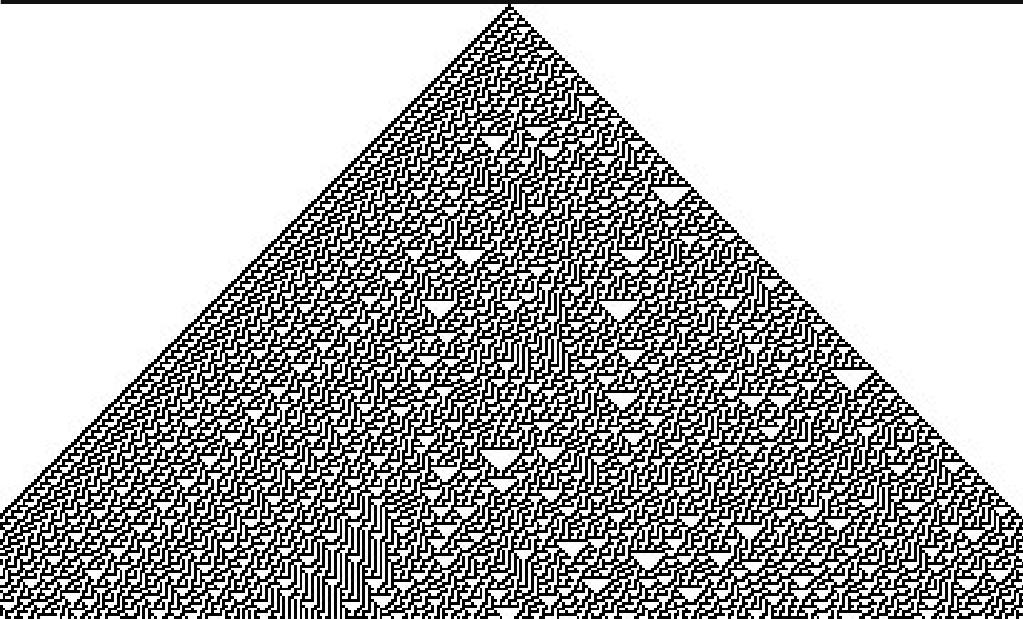
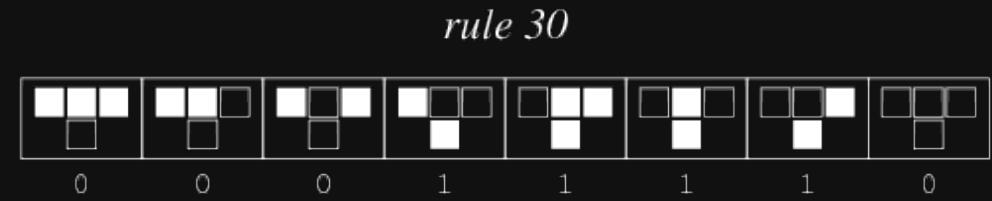
Rich get richer: Pareto principle

When you join a network, you connect to existing members proportional to how popular they are.

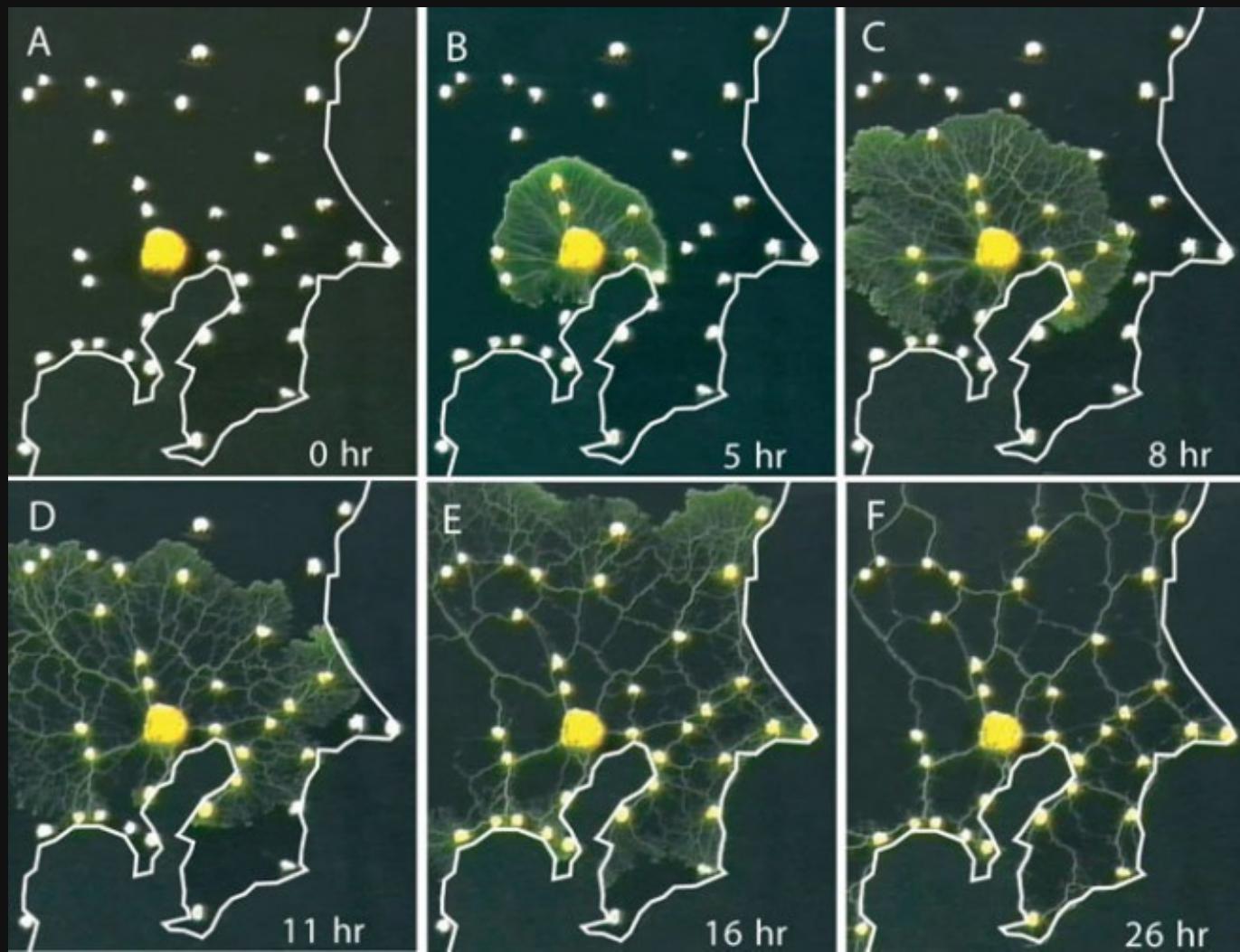


NATURAL COMPUTING

- 1) take inspiration from nature for the development of problem-solving techniques
- 2) methods using computers to synthesize natural phenomena
- 3) methods that employ natural materials to compute.



Conus Textile shell & Wolfram cellular automaton



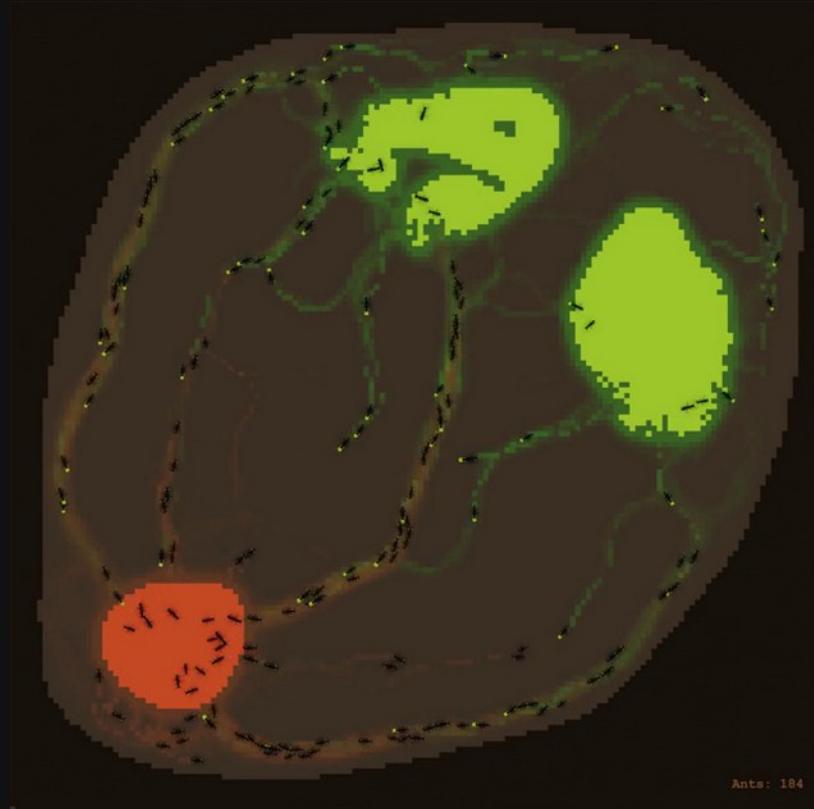
Physarum polycepharum on a map of Tokyo

ARTIFICIAL INTELLIGENCE

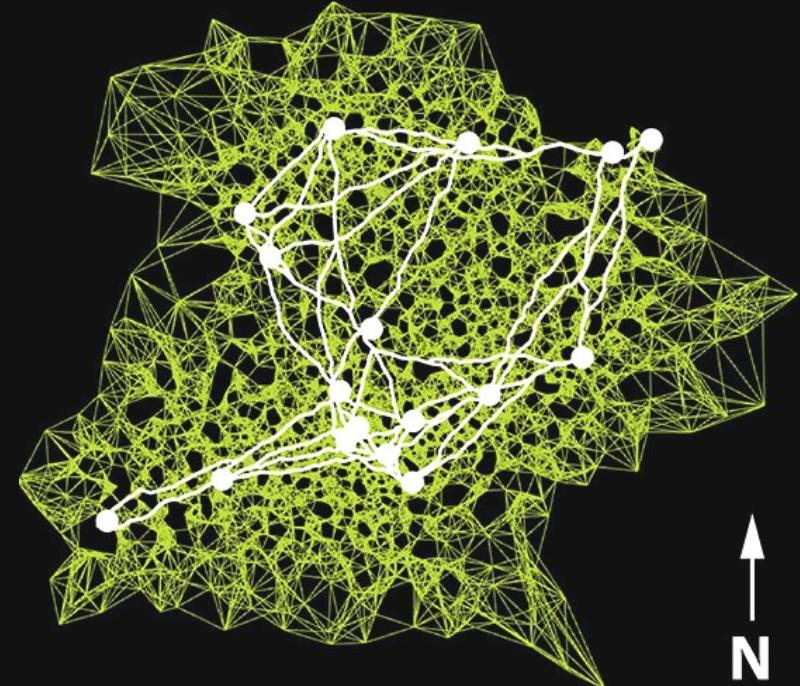
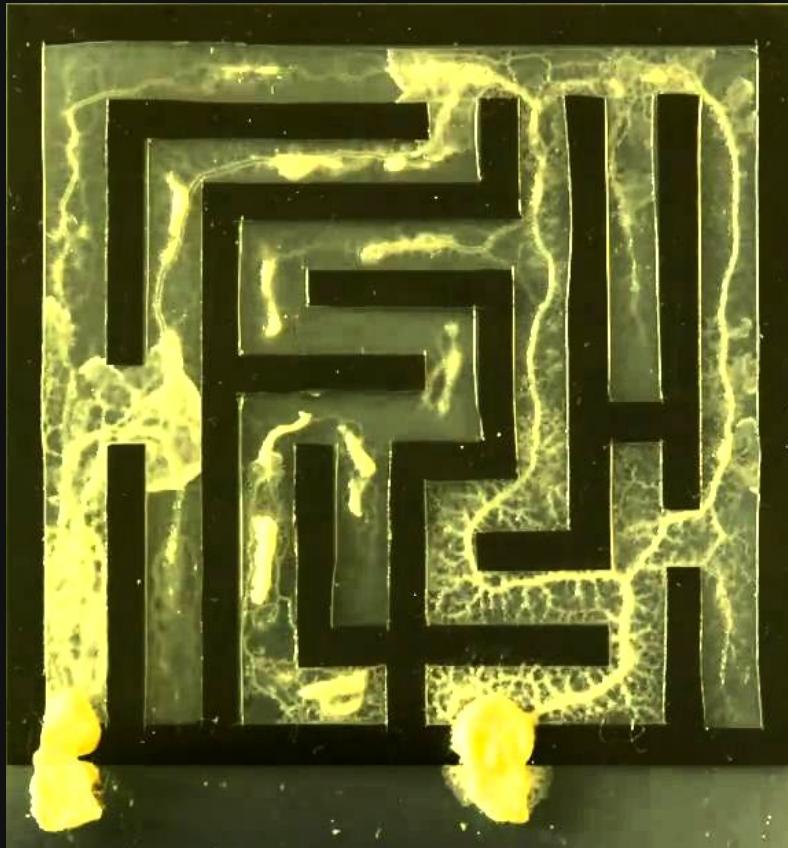
We have seen how groups of individuals can create something greater than their individual contributions.

Groups of simple artificial agents can also solve problems with their collective intelligence – like in a **neural network**

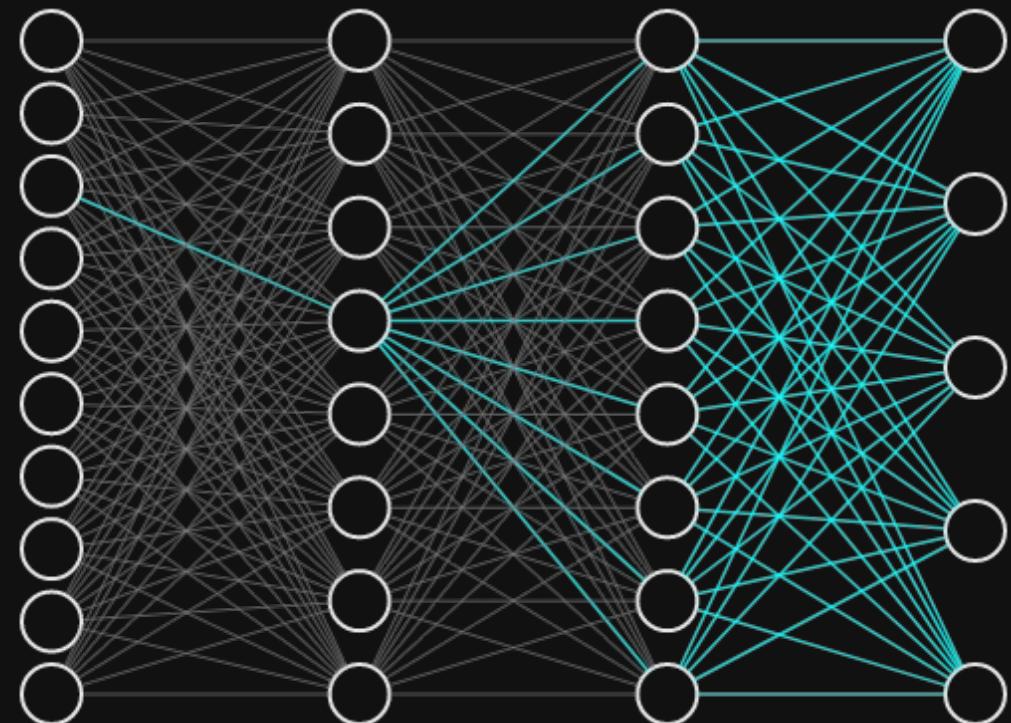
Ant colony optimisation



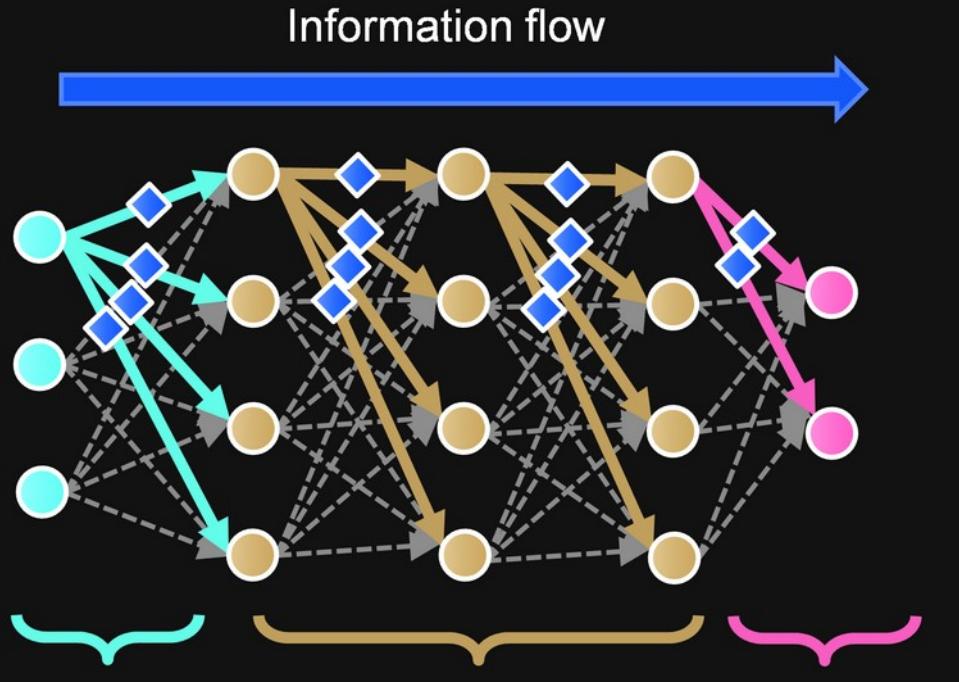
Slime mould transportation



Neural networks

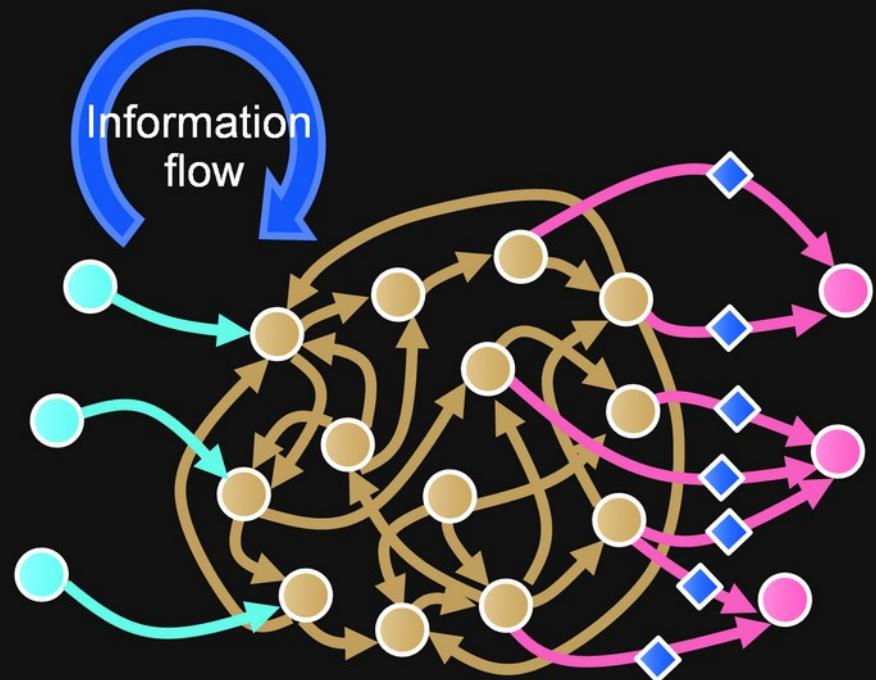


Feedforward neural network



◆ Synaptic weight

Reservoir computing



Not only artificially intelligent algorithms,
but intelligent robots too!



The interaction of parts can produce emergent systemic effects.

Synergetic outcomes from the combination of unique information.

Complex systems thinking can help avoid unwanted outcomes.

Just like slime all become one to share information, we must see the big data we all generate as a common-pool, collective resource.

AI that requires training on user-generated data is the result of all our contributions, of our collective intelligence.

IMPERIAL LATES

AI

#ImperialLates



THANK YOU FOR ATTENDING

Let us know what you thought! Please scan
the QR code to complete our short survey