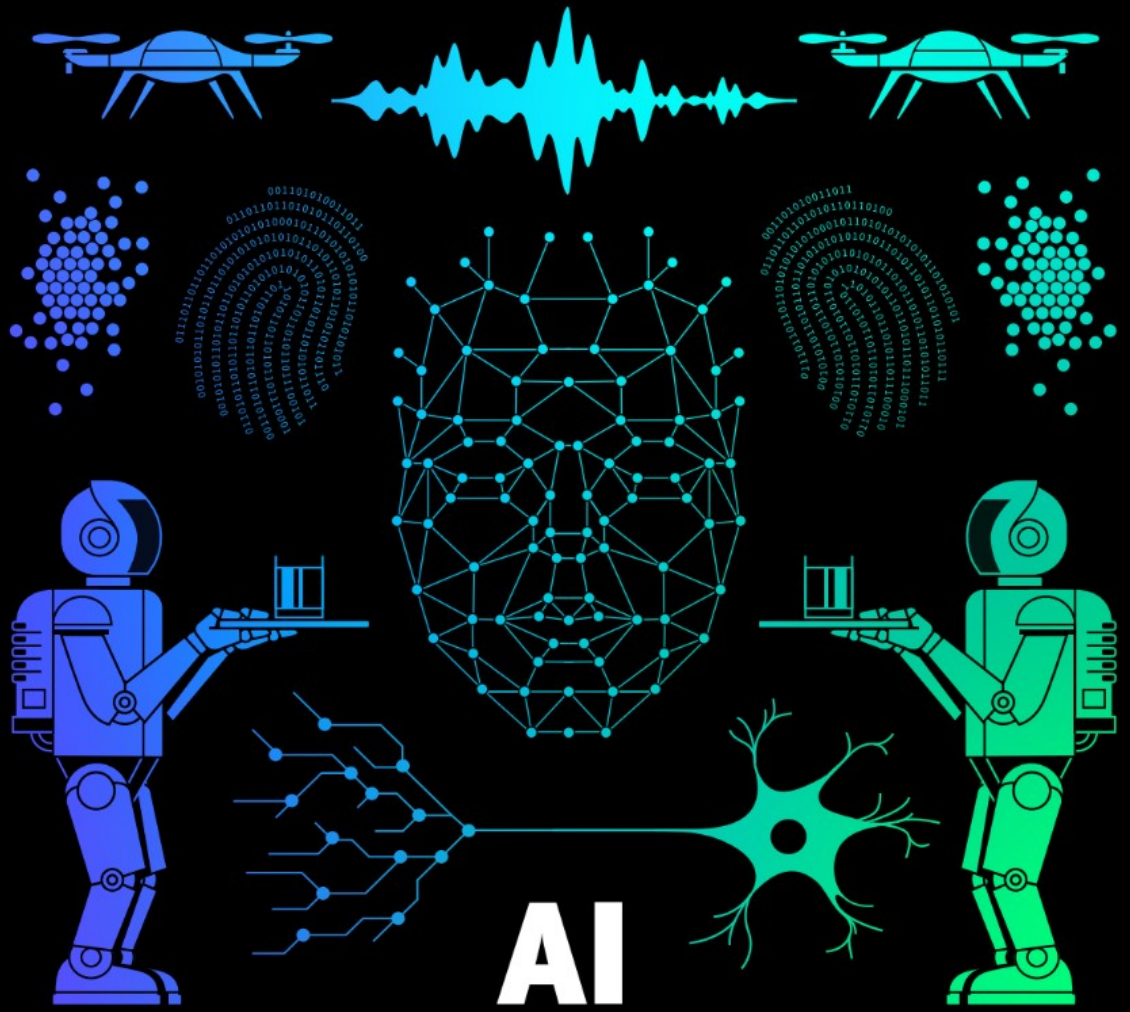
IMPERIAL LATES

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




SLIME

SWARM BEHAVIOUR
NATURAL COMPUTING
ARTIFICIAL INTELLIGENCE

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SWARM BEHAVIOUR

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

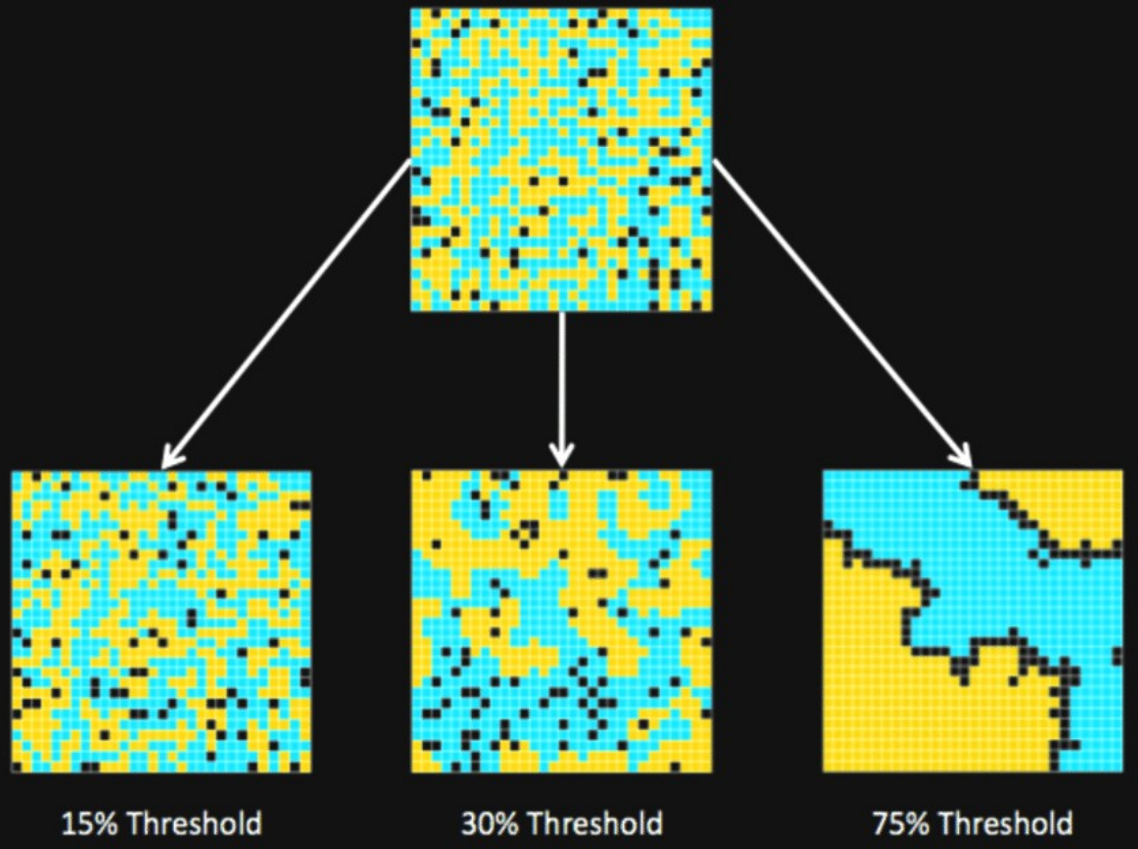
"**The whole is greater than the sum of the parts**."

Our cities, our culture, our shared experience.

Unexpected macroscopic features emerge!

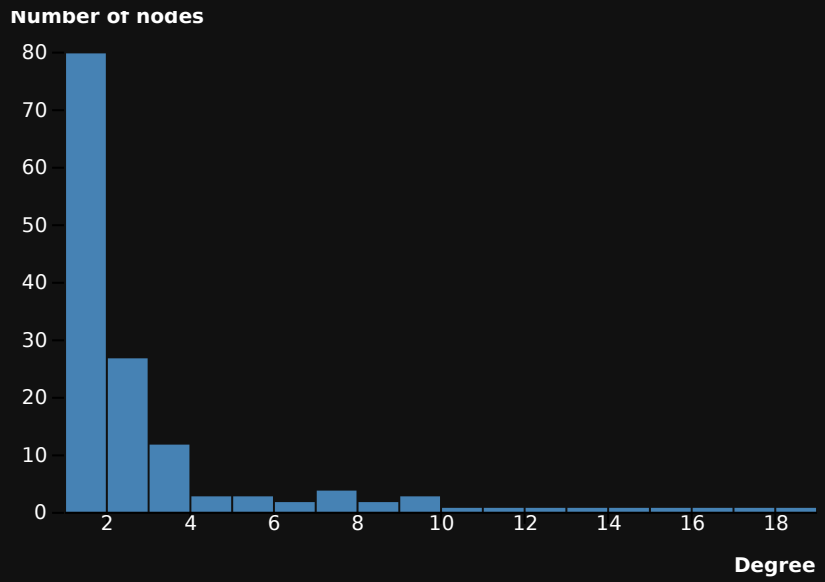
Segregation: Schelling model

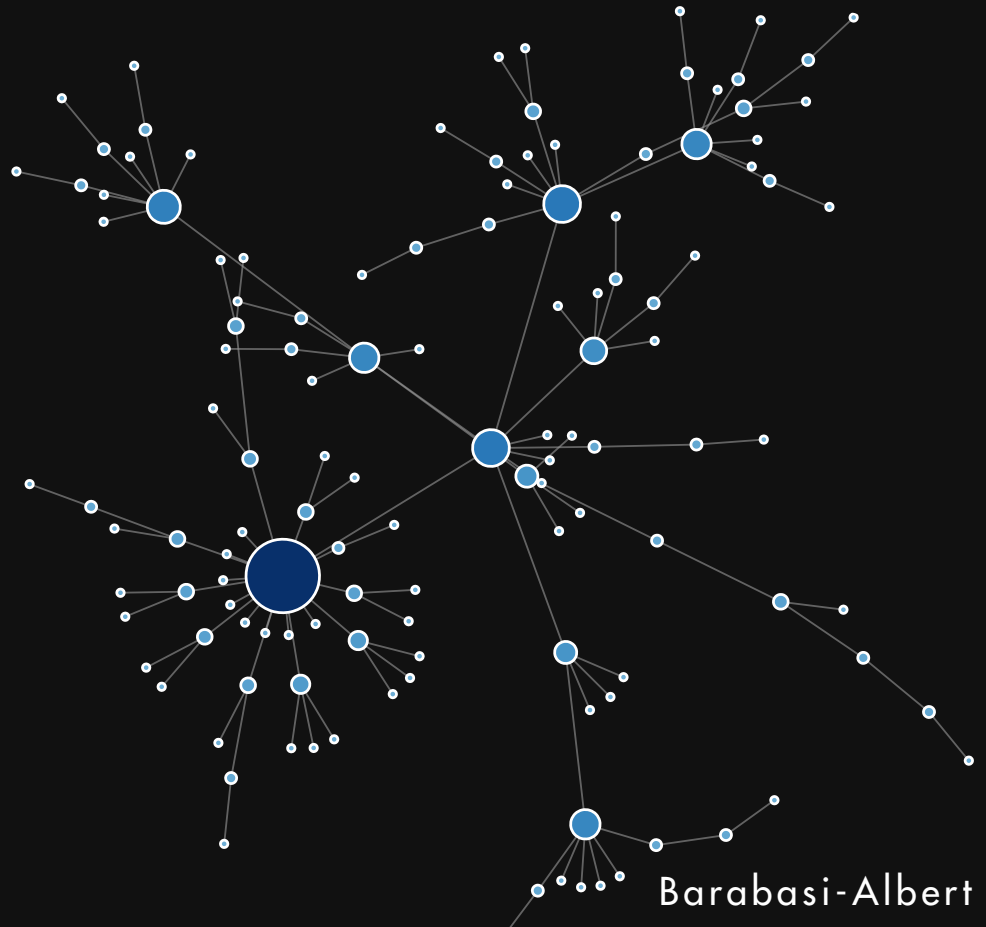
Move to a different neighbourhood if more than x% of your neighbours are different than you.



Rich get richer: Pareto principle

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

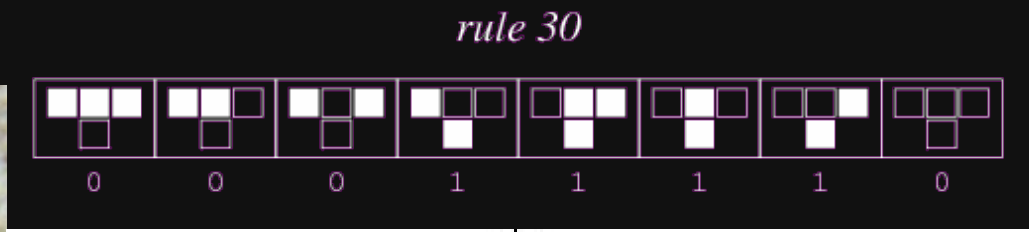


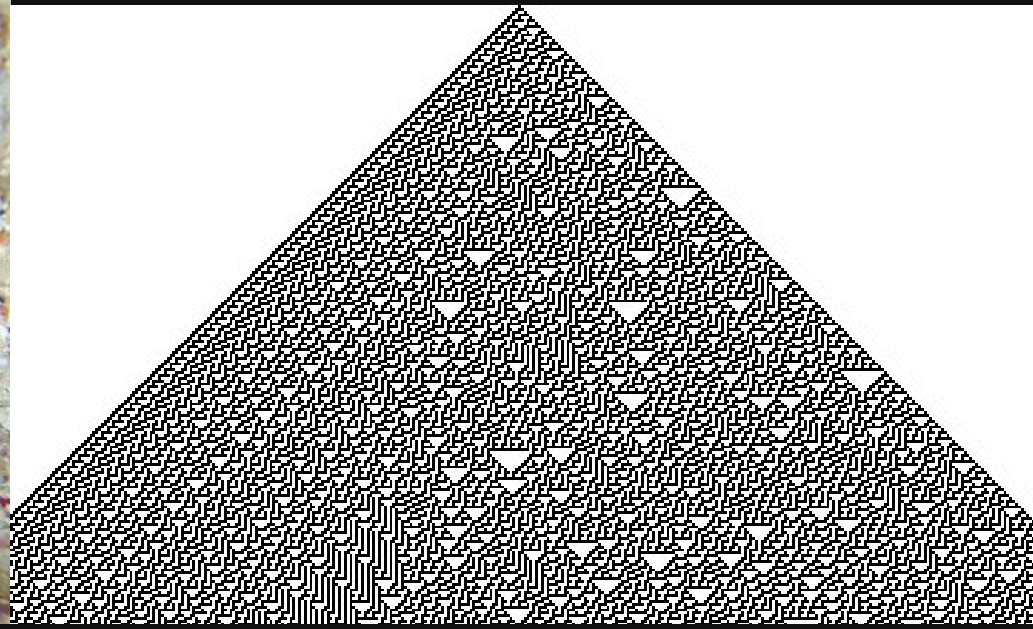


Barabasi-Albert model

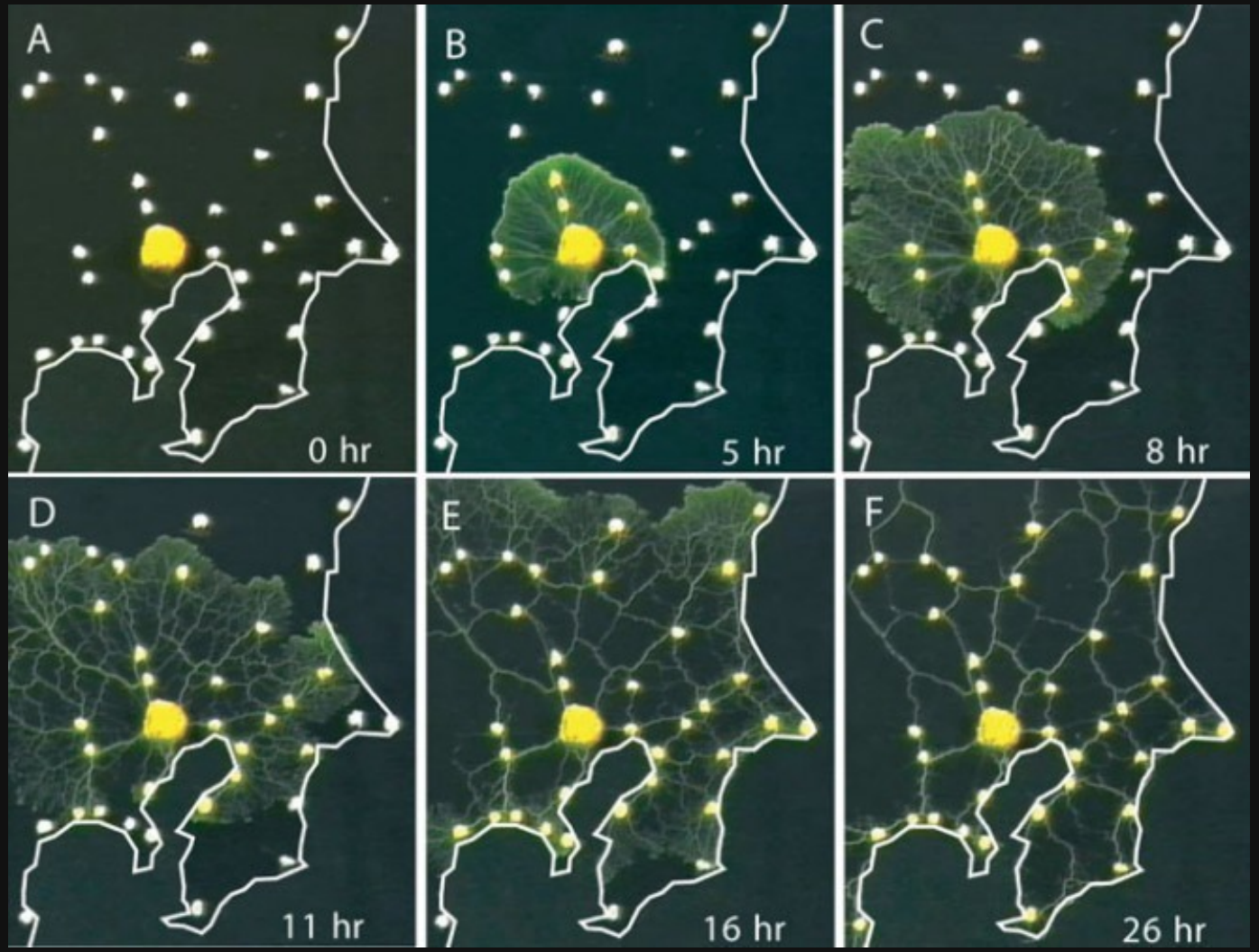
NATURAL COMPUTING

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

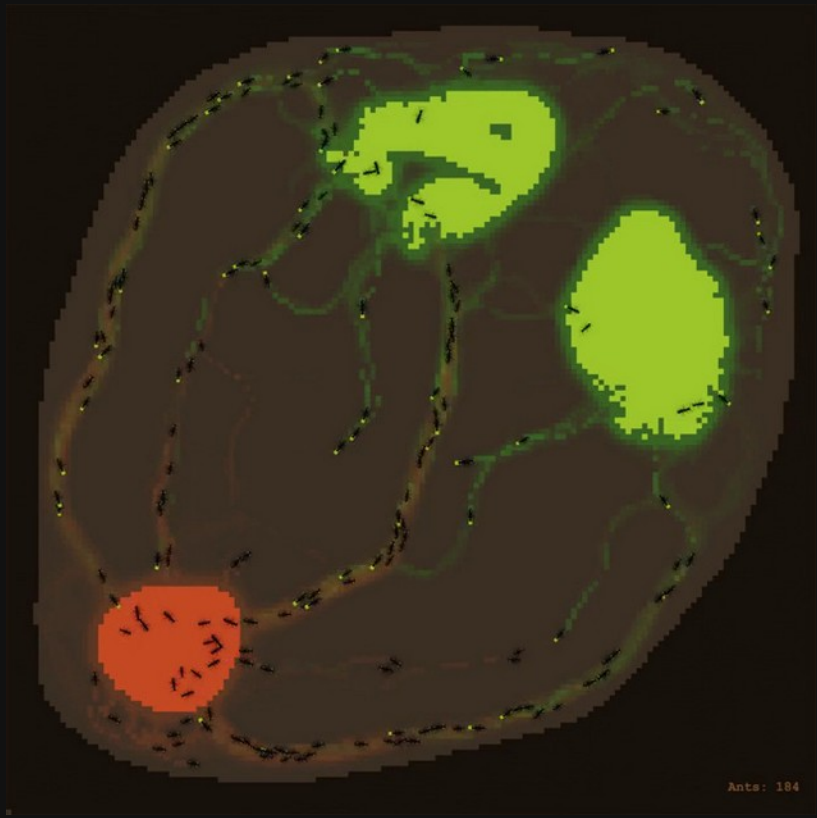


Physarum polycepharum on a map of Tokyo

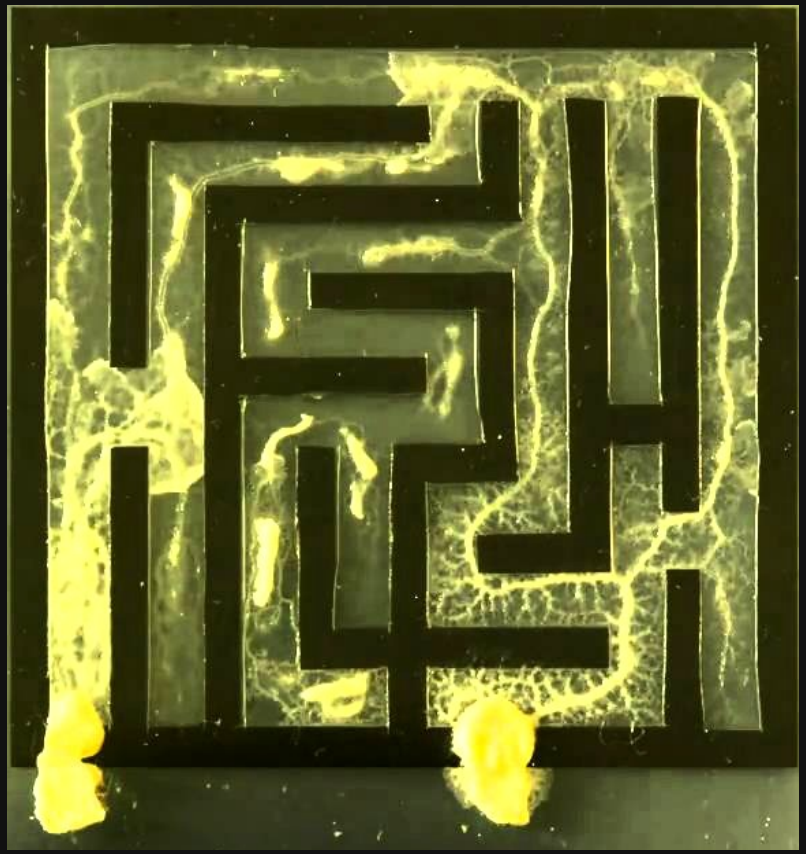
ARTIFICIAL INTELLIGENCE

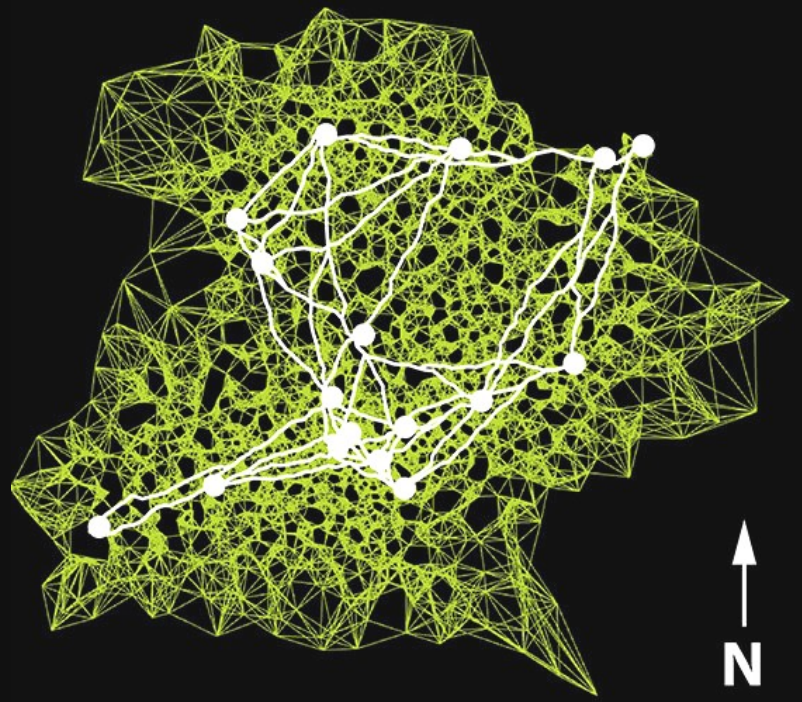
We have seen how groups of individuals can create something greater than their individual contributions.
Groups of simple artificial agents can also solve problems with their collective intelligence – like in a **neural network**

Ant colony optimisation

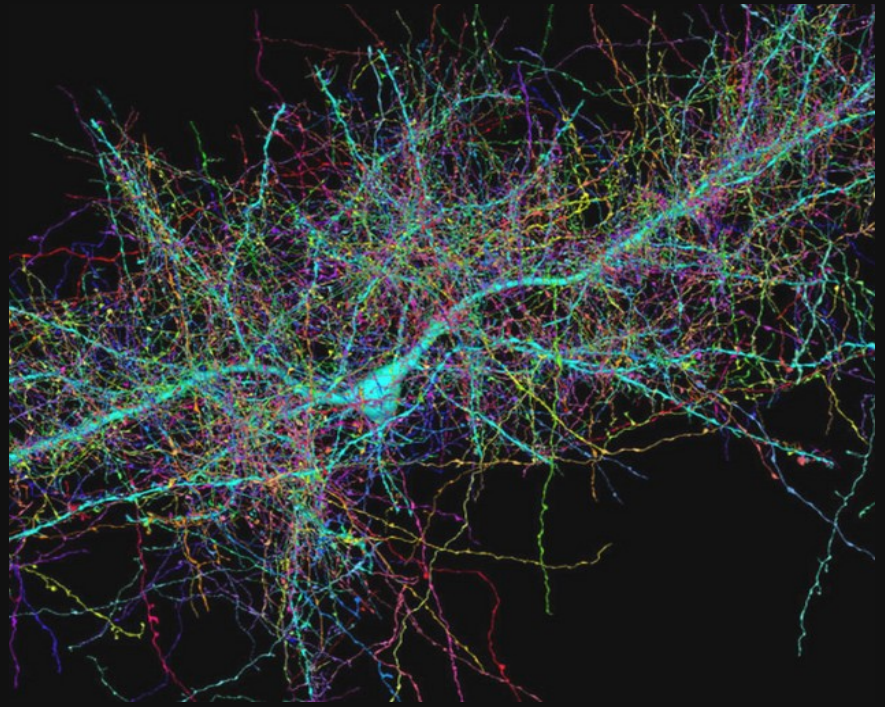


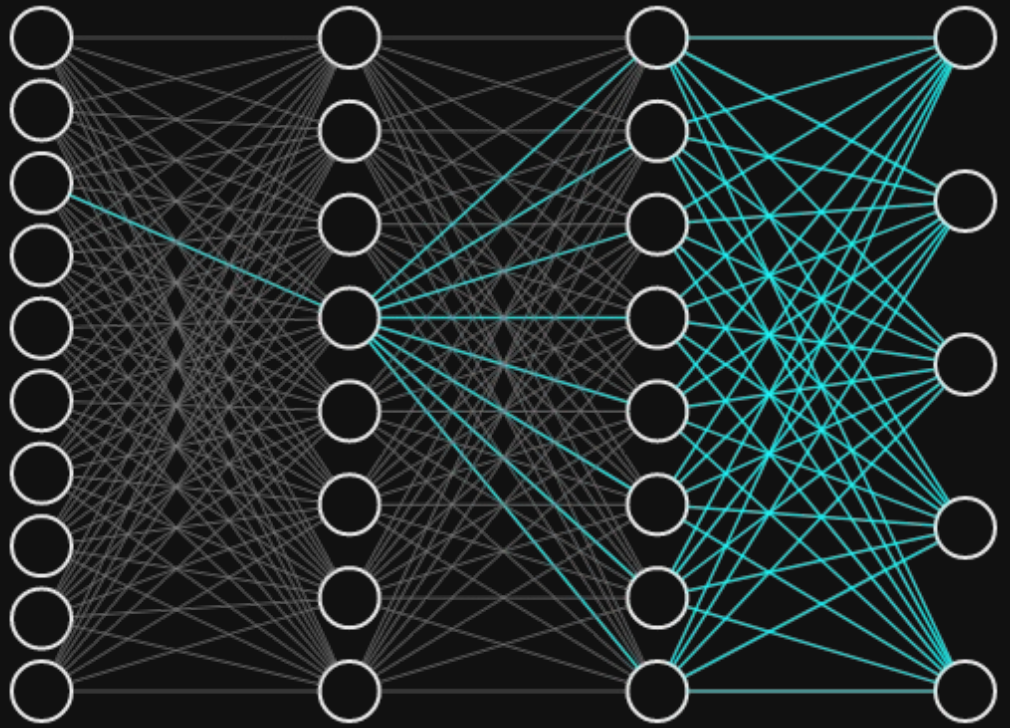
Slime mould transportation

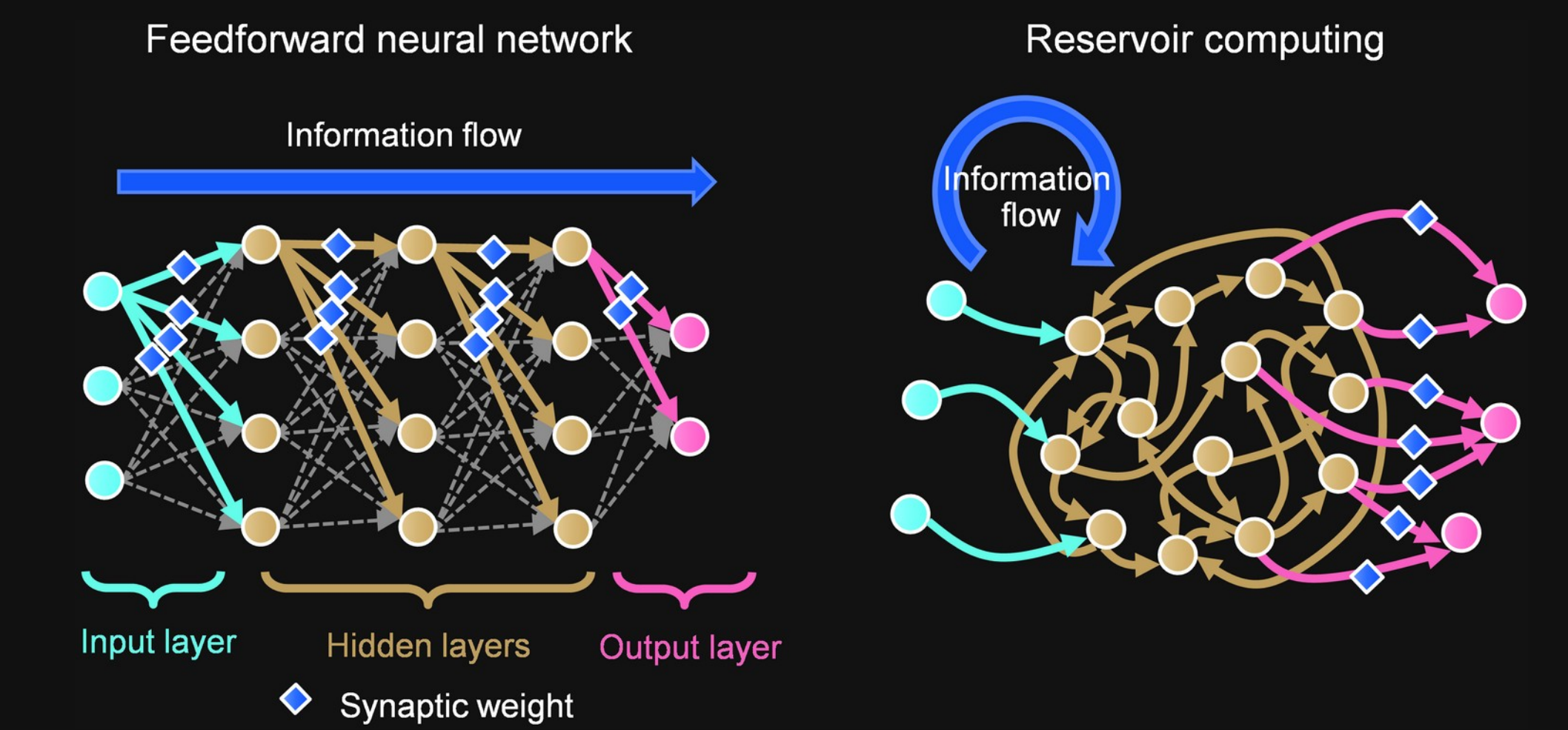




Neural networks






Feedforward neural network
Information flow
Input layer
Hidden layers
Output layer
Synaptic weight
Reservoir computing
Information flow

Not only artificially intelligent algorithms,
but intelligent robots too!

The interaction of parts can produces 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.

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AI

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THANK YOU FOR ATTENDING

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