



# Artificial Intelligence discovers how worms regenerate body parts

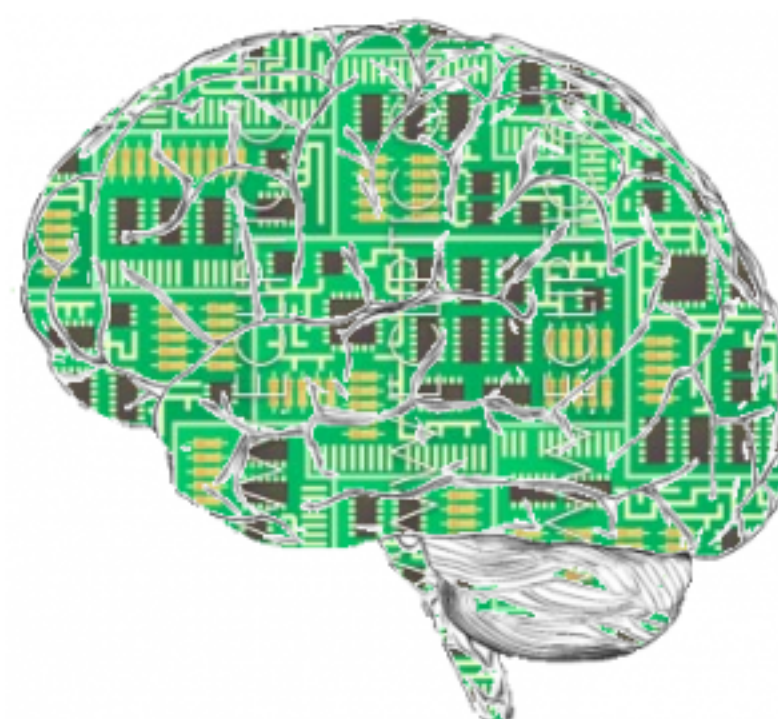
Many dream of the day when medicine finds a way to regenerate organs. But to successfully recreate complex body parts, we must first understand how organisms are able to develop and regenerate organs with a specific shape. Ideally, we would have a recipe that tells us the exact ingredients – genes, molecules – and dynamics between ingredients that lead to a particular shape. Yet even for simple organisms like planarian flatworms, which have been studied for over a century, this recipe has eluded scientists. Up until now. Researchers at Tufts University were able to reverse engineer the regeneration mechanisms of planaria, using an artificial intelligence system.

The scientists developed an evolutionary algorithm to find regulatory networks that would predict the results of several regeneration experiments in the planaria literature. Initially, networks were randomly generated. New networks arose by a process akin to mutation and recombination, randomly changing parts of the network, and combining previous networks. Each network was tested in a virtual planaria, under simulated experiments that mimicked the in vivo experiments reported in the literature. The algorithm compared the outcomes of simulated and actual experiments. As networks evolved, they became better at predicting experimental outcomes. The algorithm was ultimately applied to a combined dataset of 16 experiments. The obtained network correctly predicted the results of all 16 experiments and is considered the most comprehensive model of planarian regeneration found so far.

This result highlights the central role of artificial intelligence in tackling complex biological problems. Not only is this the first regenerative model discovered by artificial intelligence, but it also shows that AI can be used for more than just crunching numbers. In the opinion of the authors, AI can help in proposing theories and understanding the meaning of data, which is one of the most creative aspects of science.

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The network correctly predicted the results of all 16 experiments

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