Title: Genetically-regulated Neuromodulation Facilitates Multi-Task Learning

Tracks:

1/ Evolutionary Machine Learning

2/ Generative and Developmental Systems

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Abstract (200 words max)

In this paper, we use a gene regulatory network (GRN) to regulate the learning parameters of State-Action-Reward-State-Action (SARSA) algorithm. The GRN modulates the SARSA parameters: learning rate, discount factor, and memory depth. We have optimized GRNs with a genetic algorithm to regulate these parameters on specific problems but with no knowledge of problem structure. We show that GRN-regulated SARSA performs equally or better than the SARSA with fixed parameters. We then extend the GRN-regulated SARSA algorithm to multi-domain problem generalization, and show that GRNs trained on multiple problem domains can generalize to previously unknown problems with no further optimization.