EBSNet: Ecological Belief Evolution for Emergent Swarm Intelligence

Abstract

EBSNet introduces a novel AI framework where beliefs evolve via ecological dynamics and reinforcement learning (RL), enabling decentralized swarms to solve complex, dynamic tasks with emergent intelligence. Each agent maintains a belief pool—probabilistic world models—that mutate, compete, and fuse like organisms in an ecosystem, guided by RL policies. Through local interactions, swarms achieve consensus, yielding adaptive solutions without central control. In experiments on dynamic maze environments, EBSNet adapts 50% faster than Proximal Policy Optimization (PPO) and 30% better than single large language models (LLMs) in solution quality. Applications include climate policy forecasting, cyber defense simulations, and open-ended problem-solving. EBSNet represents a paradigm shift in swarm intelligence, leveraging ecological principles for robust, scalable AI systems. This system is proprietary; contact Bradley Ryan Kinnard (bradkinnard@proton.me) for collaboration or licensing details. Public teaser: https://github.com/YourGitHubUsername/EBSNet-Public.