

Holistic Optimization through Reinforced Unified Synergy: A Novel Approach for Agent-based Modeling

Inga Lisnic, Sergiu Scrob,

Technical University of Moldova, inga.lisnic@ati.utm.md, sergiu.scrob@ati.utm.md,
ORCID: 0000-0001-5818-3581, 0000-0001-6955-0607

Keywords: agent-based modeling, reinforcement learning, reinforced unified synergy, holistic optimization, decision-making approach

Abstract. The paper proposes a new approach for agent-based modeling and reinforcement learning, using a coordinated system of four specialized neural networks – Imagination, Stimulation, Strategy and Intuition. These models act as individual agents, each performing a specific subtask while collectively contributing to a broader and more complex decision-making process. By decomposing complex problems into smaller and manageable components, this approach enables faster generalization and more efficient problem-solving, unlike traditional reinforcement learning methods that require extensive iterations and large amount of data with large number of trials. Each neural model focuses on its specific domain, allowing for more efficient reflection and insight generation. By leveraging the synergy between these models, the proposed approach achieves holistic optimization and optimal results with fewer steps while improving decision-making accuracy. This approach demonstrates a significant advancement in agent-based modeling for complex tasks and the potential for enhanced performance across diverse scenarios, providing a more efficient path to optimization in agent-based environments.