Augmented Work: Evaluation of reinforcement learning environments for the analysis of cooperation between humans and artificial intelligence

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The broad use of multi-agent reinforcement learning environments in research could lead to transformative advancements, but various concerns persist that hinder their widespread adoption. Specifically, many people are skeptical and fearful about AI applications due to misconceptions and high-profile failures, such as accidents involving autonomous vehicles. This skepticism limits the collaborative potential of AI systems and humans working together, curtailing positive outcomes.

What key factors govern effective collaboration between humans and AI agents in multi-agent reinforcement learning environments? This guiding question frames the analysis in this thesis, which explores a research paper on human psychological behavior and the design of human-centered AI. By conducting further research into multi-agent reinforcement learning (MARL) environments, I tested frameworks that support rapid development for research applications on platforms such as Gymnasium and DeepMind Lab 2D. These investigations yielded insights into the behavioral patterns of agents interacting with these environments. The evaluation emphasized the interpretation of human input and the effectiveness of cooperative features. As a primary outcome, prototypes of a Team-Readiness-Score for MARL environments were developed to assess the extent to which agents collaborating with humans can demonstrate an understanding of decision-making.

Developing models that enhance agents' teamwork abilities remains essential. The implementation of the Team-Readiness-Score metric gave an initial framework for measuring team competence among agents in the tested environments.

Further analysis and refinement of the Team-Readiness metric could provide broader insights into agent behavior and team dynamics. An application could be in disaster response scenarios, where drones equipped with improved Team-Readiness metrics can give guidance to human operators. Future studies should prioritize the application of advanced metrics and the use of visually sophisticated test environments to further advance the field.