

Enhancing Collaboration in Multi-Agent Environments with Attention-Based Actor-Critic Policies

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Abstract

Collaboration is essential in solving complex real-world problems, as it enables tasks to be completed more efficiently and leverages the diverse perspectives of team members. Multi-Agent Reinforcement Learning (MARL) can be utilized to model environments where agents must collaborate to achieve a common goal. However, promoting collaboration in MARL is challenging due to the non-stationarity of the environment and the difficulty of learning an effective collaborative shared policy or individual policies. Previous work has been done to use an attention mechanism in the critic of the Actor-Critic architecture to improve the learning of collaborative policies [1]. This attention mechanism allows the critic to select the relevant information from the other agents' observations promoting for better learning of the value function. In this paper, we propose a new actor-critic architecture that additionally incorporates an attention mechanism in the actor to bring the same benefits to the policy learning. To evaluate this architecture, the environment will be using is a simulation of a soccer game where agents must collaborate to outsmart the opposing team and score goals. The results of this work will be compared to the current state-of-the-art in MARL as well as classical reinforcement learning algorithms to determine the effectiveness of the proposed architecture.

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1 References

[1] Shariq Iqbal and Fei Sha, "Actor-Attention-Critic for Multi-Agent Reinforcement Learning," CoRR, vol. abs/1810.02912, 2018. Available: <http://arxiv.org/abs/1810.02912>