Solving Complex Sparse Reinforcement Learning Environments

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# Objective

In this project, we will try to extend the current state-of-the-art systems to solve complex sparse reinforcement learning tasks. This sparse setting is very useful to avoid reward shaping; i.e. the agent overfitting to the rewards found in the environment. The idea behind these scenarios is that the reward is rare and usually found after a complex series of events. Therefore, discovering this reward by random exploration is unfeasible, especially for complex environments.

We will build on top of SAC-X, a technique proposed in [1] to solve these tasks by creating auxiliary policies that allow the agent to efficiently explore the environment. We will analyze potential shortcomings of this implementation and explore how it can be used for object manipulation; e.g. with a hand. Furthermore, we will try to implement temporal coherency using recurrent neural networks such as LSTM.

# Related Work

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1. M. Riedmiller, R. Hafner, T. Lampe, M. Neunert, J. Degrave, T. Van de Wiele, V. Mnih, N. Heess, T. Springenberg, “Learning by Playing – Solving Sparse Reward Tasks from Scratch”. Proceedings of the 35th International Conference on Machine Learning, in PMLR 80:4344-4353