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Forms of Distributed Curiosity in the Collaborative Exploration of Unknown Environments by Artificial Agents

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Abstract

We propose a multi-agent approach to the problem of exploring unknown environments. We use a master-slave architecture. Mapping and exploration are coordinated by two separate agents: the mapper and the broker. The slave agents, the explorers, are endowed with forms of curiosity, measured in terms of the decrease in uncertainty and novelty. The mapper is in charge of merging everyones maps and sending the global map back to each explorer, while the broker assigns next moves to every explorer, based on the interesting locations they spotted. The explorers analyse the environment they inhabit, send their local map to the mapper, pick points of interest based on their current knowledge of the area, send them to the broker, and finally move to the location assigned by the broker. The advantages of these forms of distributed curiosity, together with those of the collaborative multi-agent exploration strategy, are tested in several scenarios.