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Dynamic Agent Allocation with Reinforcement Learning for Applying Behavior Trees in Games

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Abstract

Behavior Trees are widely used in many games, however, they are normally designed in a static way which is hard to deal with dynamic environments. One of the factors that restrict the performance of BTs is the optimization of resources used among subtasks, which has not been paid much attention. In this paper, we concentrate on the problem of dynamic allocation of agents for BTs, i.e., an important resource in games. We design a novel hierarchical learning framework, including the allocation learning module and the action learning module, to find strategies for agent allocation and action selection. Each agent is associated with a network for encoding observations, which is then assigned to a subtask by the allocation learning network. Each subtask uses a network to compute action for the corresponding agent. We design how the losses are computed for the two modules respectively and present the whole training procedure.