On Higher-Order Control Tasks: The Application of A3C on Space Fortress
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Abstract

In the current thesis, the extent to which the A3C architecture is able to learn higher-order control tasks is studied. The tasks consisted of a set of subtasks of the simplified Space Fortress game which vary in complexity and order of control required. Experiments in previous attempts with Deep Q-learning applications on these subtasks have shown substantial learning in the lower-order tasks, but higher-order tasks could not be mastered. The GA3C architecture was applied to the same set of subtasks that were used in the Deep Q-learning experiments. The GA3C architecture was able to master a lower-order of control, but could not master higher-order control tasks. Furthermore, GA3C did not show a significant increase in learning behaviour in higher-order control tasks when compared to the Deep Q-learning experiments.