

Exercise 3: Visual Planning with CNNs

Badhreesh, David-Elias Künstle

18/12/2017

1 Introduction

The most famous use of convolutional neural networks (CNNs) is in image classification. In contrast here we describe their application for a planning task from visual input. An agent has to find a target in a two dimensional maze of Figure 1 from a random starting position. The agent receives only partial observations (pob) of the environment.

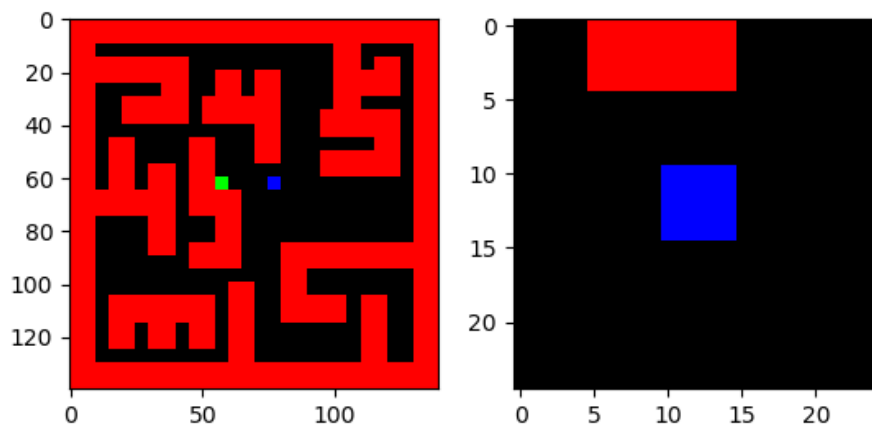


Figure 1: The agent (blue) has to find the target (green) in the maze (left, walls in red). It is only provided a history of partial observations (right).

At each time step the agent has to decide the direction (up, right, down, left) for the following discrete move by the current and some preceding pob. Pob and optimal directions for training and validation are generated via A-Star-Algorithm. For testing the agent has to maximize the number of successful runs. A run is only successful if the agent finds the target in a limited number of time. In section 3 we investigate the influence of changing target position, map, history and pob on the test performance.

2 Implementation

TODO: How well does your agent perform from the local view ? **TODO:** What happens if you increase the history length for the views or make the view larger ?

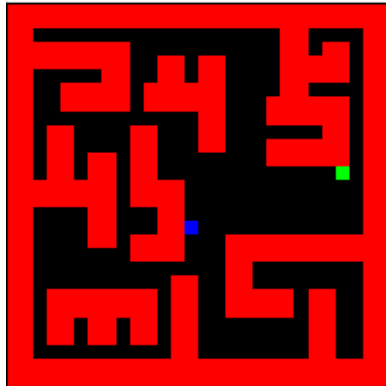
3 Generalization

3.1 Target location

TODO: What happens if you change the target location after training (you can change it in `utils.py`) ?

3.2 Map

TODO: What happens if you change the map after training (how well does your agent generalize) ?



(a) randomized target position

(b) slightly modified maze

Figure 2: The agent tries using the way it learned while training to a fixed position where it expects the target. Any changes there results in the agent to only move back and forth.

3.3 Proposal

TODO: Can you think of ways to make the agent generalize across target locations different maps?

TODO: For bonus points: test one of these ideas.