Report on Machine Learning Lab, Ex 4

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1 Introduction

This is a report about the deep learning lab, exercise 4. The general task of this assignment was to use Tensorflow to implement a CNN to train it on solving a search problem and enhancing our results using QLearning. As well as trying different configurations and architectures of the neural networks.

2 Search problem

The given problem was find a target position in a given maze. and we need to solve it using an approximation of Q-Learning using neural networks.

3 Architecture

- Network: We used a tensorflow for our neural network, we used a network of 7 hidden layers (combination of convolutions, pooling and dense layers), and sometimes we remove the pooling layers (so only 3 remaining hidden layers)
- We used an epsilon (for choosing random actions) to be 0.8 and drops down to 0.05 after 10,000 iterations.

4 Results

We tried different configurations for the running.

- **CNN with pooling,***discount* = 0.99: When we first introduced pooling the average loss instantaneously decreased by a factor of 100, the average loss was around $10^4 - 2 \cdot 10^4$ until 50,000 iterations, but we decided to try different discount value
- **CNN with pooling,** *discount* = 0.5: The values we tried here had a beginning average loss of 3000 and it decreased gradually until it reached an average of 300 in 200,000 iterations.
- **CNN without pooling,** *discount* = 0.5: After setting a lower standard deviation for the weights 10^{-4} instead of 0.1, the loss dropped down to 1.5 which shows a huge significance, reaching 0.01 after 30,000 iterations, and consistently remaining less than 0.01 after 50,000 iterations