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 convolutional neural network 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

- Input: We have transitionTables that stores the structures of the maps of the maze.

- Network: We used a tensorflow for our neural network, we used a network of 7 hidden layers (combination of convolutions, pooling and dense layers)

4 Results

We tried different configurations for the running.

- **CNN without pooling,** $discount = 0.99$: The loss had an average of 10^6 for nearly 20,000 iterations, then it started to vary between $10^5 - 10^6$ until nearly 300,000 iterations, then the average loss was between $10^4 - 10^5$ until nearly 700,000.

- **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.