

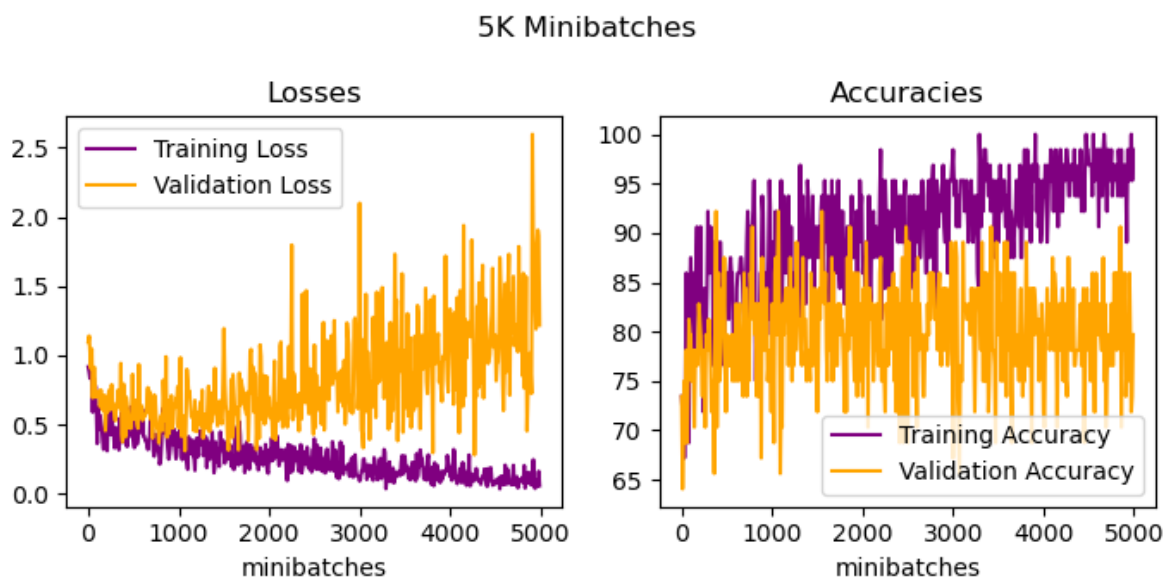
DL Lab

Exercise 1

Imitation Learning

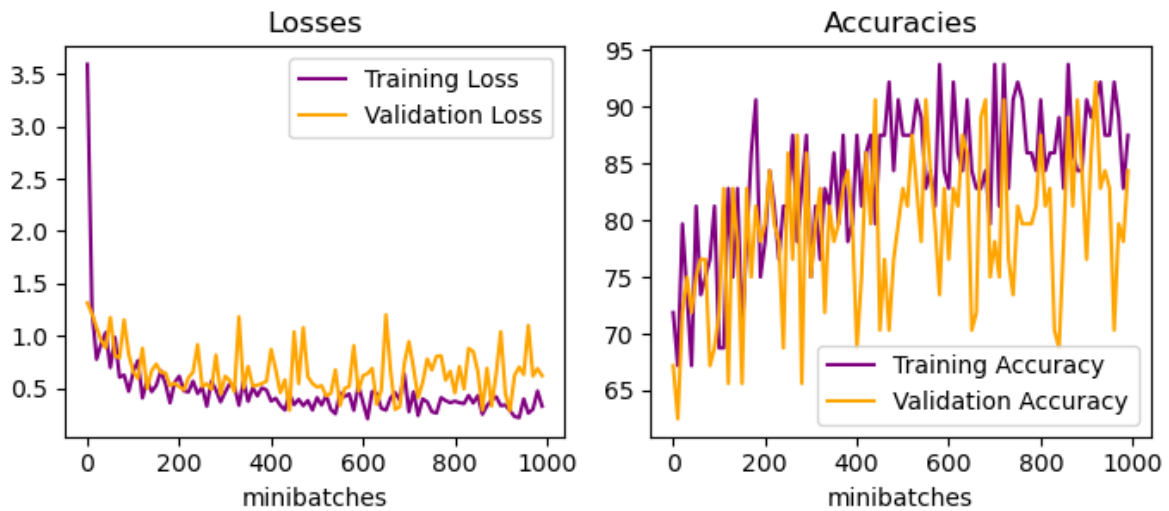
The network consists of convolution layers. The first layer has 1 input channel since the images were converted to grayscale. I used a kernel of size 3 and stride 1. I also added a padding of 1. These kernel settings were used across all the four convolution layers. I then applied a relu activation after each layer, then a 2D max pooling with a kernel size of 2 and a stride of 2 as well. I experimented with different batch sizes and number of mini batches, but in the end, my best performing model was trained on 5000 mini batches with the size of 64 each. I also tried different learning rates ranging from $1e-2$ to $1e-4$.

Here are some of the data I plotted using different hyperparameters.



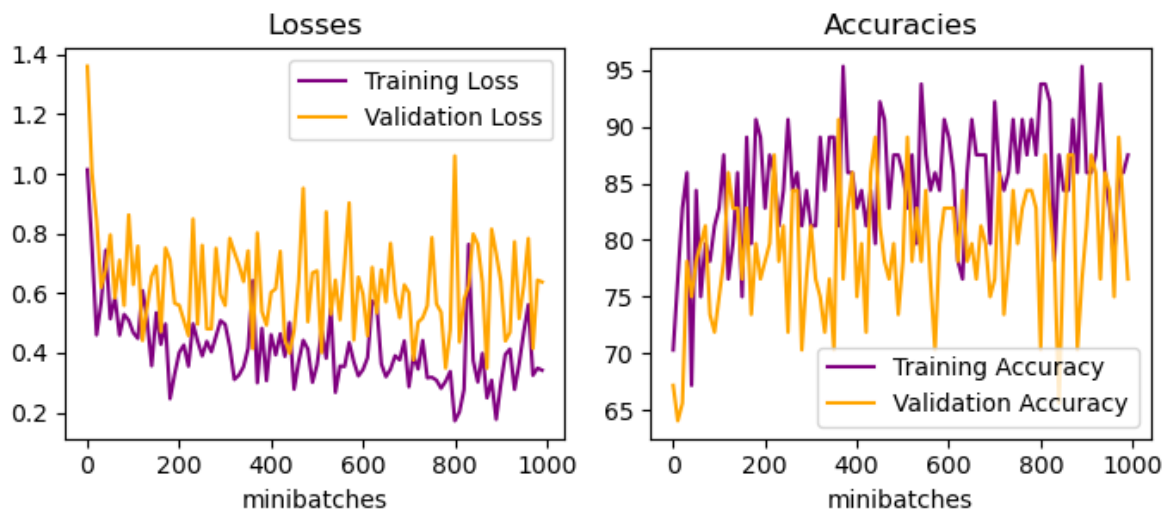
In the figure above, you could see that the model started to overfit the training data since the training losses were decreasing and the validation loss started to increase again after 1000 mini batches, however the validation accuracy seemed to stay constant after the 1000 mini batch mark. Based on these observations I decided to use 1000 mini batches after that.

1K Minibatches - Lr=0.01



The data shows the losses and accuracies of a model trained on 1000 mini batches and 0.01 learning rate.

1K Minibatches - Lr=0.001 - 3 layers

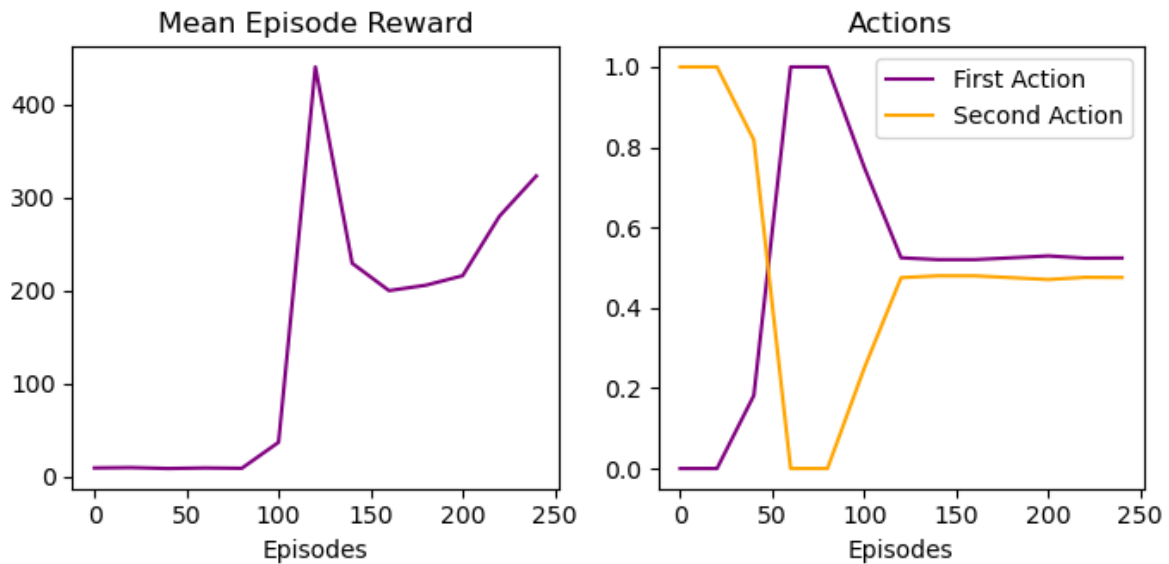


The data shows the losses and accuracies of a model trained on 1000 mini batches, 0.001 learning rate and 3 convoluted layers instead of 4.

Performance Mean	316.88
Standard deviation	106.12

Reinforcement learning

The following figures shows a DQN trained for 250 episodes. Most of the hyperparameters I used were the default ones. The mean episode stays over 200 for 100 trials.



This was the best performing model and the results were as follows

Mean performance	252.6
Standard Deviation	16.7