DRLND Project 1: Navigation

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1 Overview

This project utilised the architecture for solving the Deep-Q-Learning (DQN) coding exercise as outlined in the solution provided by udacity.

DQN is a simple value based method where a deep neural network approximates the action-value-function Q. For a given state the value for each possible action is approximated. Learning occurs in an ϵ-greedy fashion where at each time point the action is not determined by our network but randomly.

2 Result

```
Episode 100     Average Score: 0.93
Episode 200     Average Score: 3.34
Episode 300     Average Score: 6.87
Episode 400     Average Score: 9.45
Episode 500     Average Score: 12.12
Episode 568     Average Score: 13.04
Environment solved in 468 episodes!     Average Score: 13.04
```
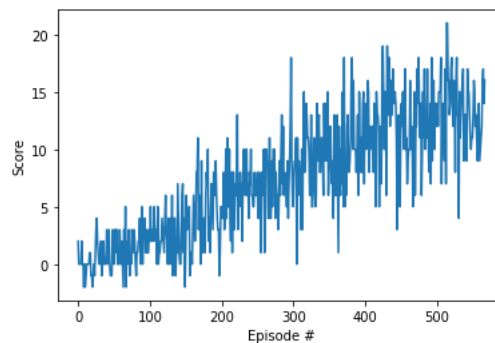

Figure 1: Learning

3   Ideas for making this better

There are a lot ideas on how to make DQN more efficient. I tried to implement Dueling DQNs but that did not work out in the time I could spend on the project. Other ideas is importance sampling and different flavours of double-DQNs.

Best overview what the pinnacle of value based methods give you can be found in [1].

References

[1] Matteo Hessel, Joseph Modayil, Hado Van Hasselt, Tom Schaul, Georg Ostrovski, Will Dabney, Dan Horgan, Bilal Piot, Mohammad Azar, and David Silver. Rainbow: Combining improvements in deep reinforcement learning. In *Thirty-Second AAAI Conference on Artificial Intelligence*, 2018.