Report

Learning Algorithm

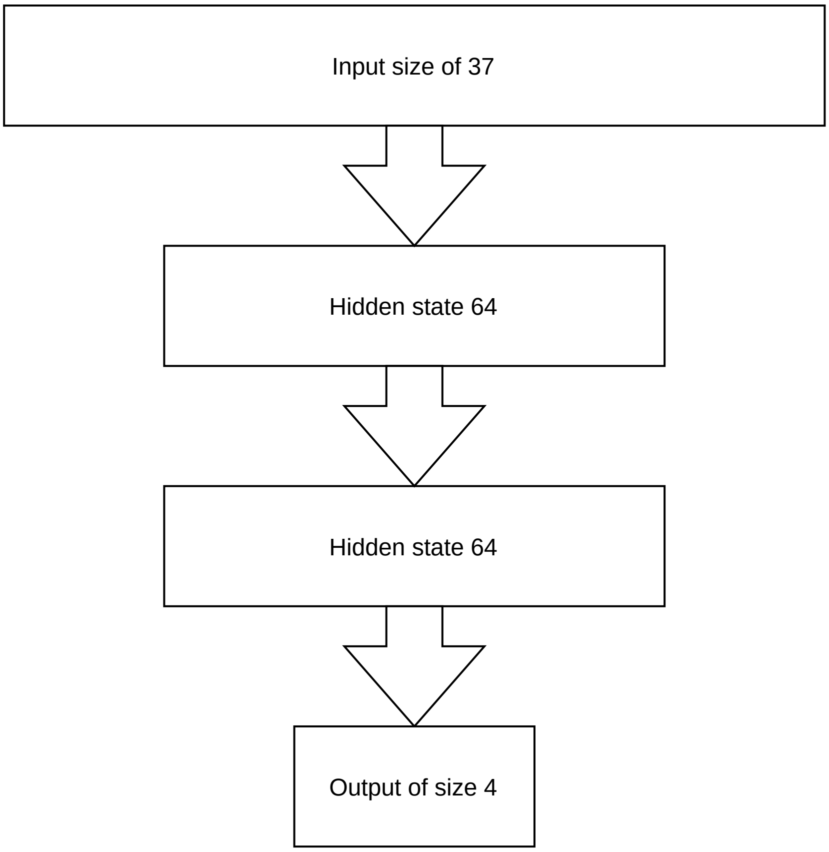
For this project , I have used and modified the code for Deep Q Network (DQN) from the lectures.

In DQN, we minimize the loss given by the minimizing the meas-squared error between the off-policy estimate of target state-value function and its approximate Q function

$$\mathcal{L}(\theta) = \mathbb{E}_{(s,a,r,s')\sim U(D)}\left[\left(r+\gamma\max_{a'} Q(s',a';\theta^{-}) - Q(s,a;\theta)\right)^2\right]$$

θ^{-} and θ are the target and approximate Q function parameters and the experience relay stores the samples (s,a,r,s') in a buffer, which are sampled using the uniform distribution $U(D)$

The model used for the agent:

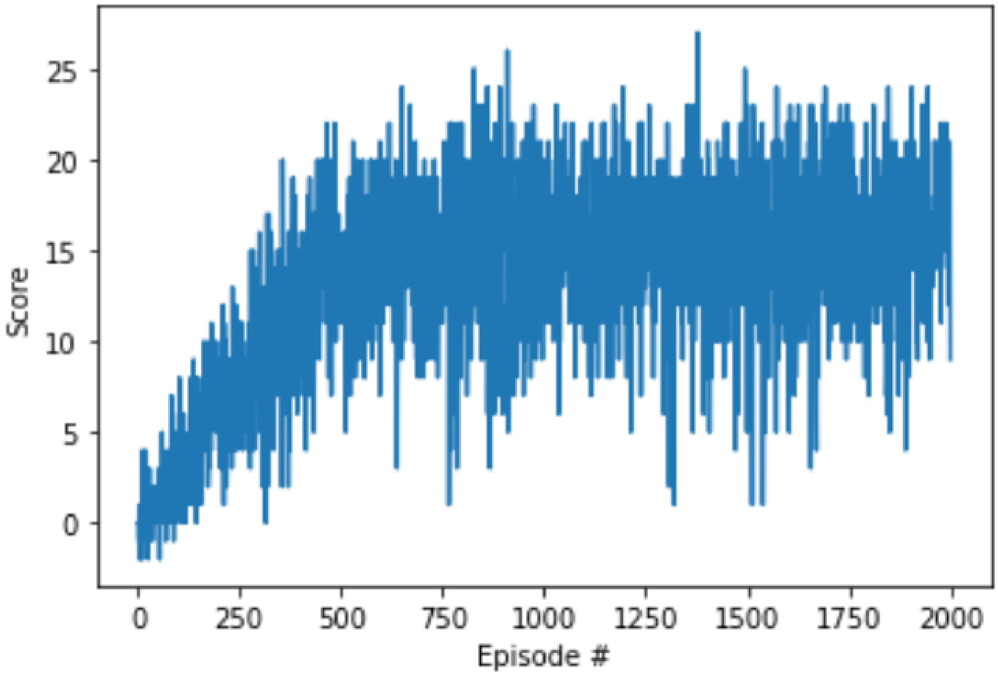


The hyperparameters used:

- Batch size of 64

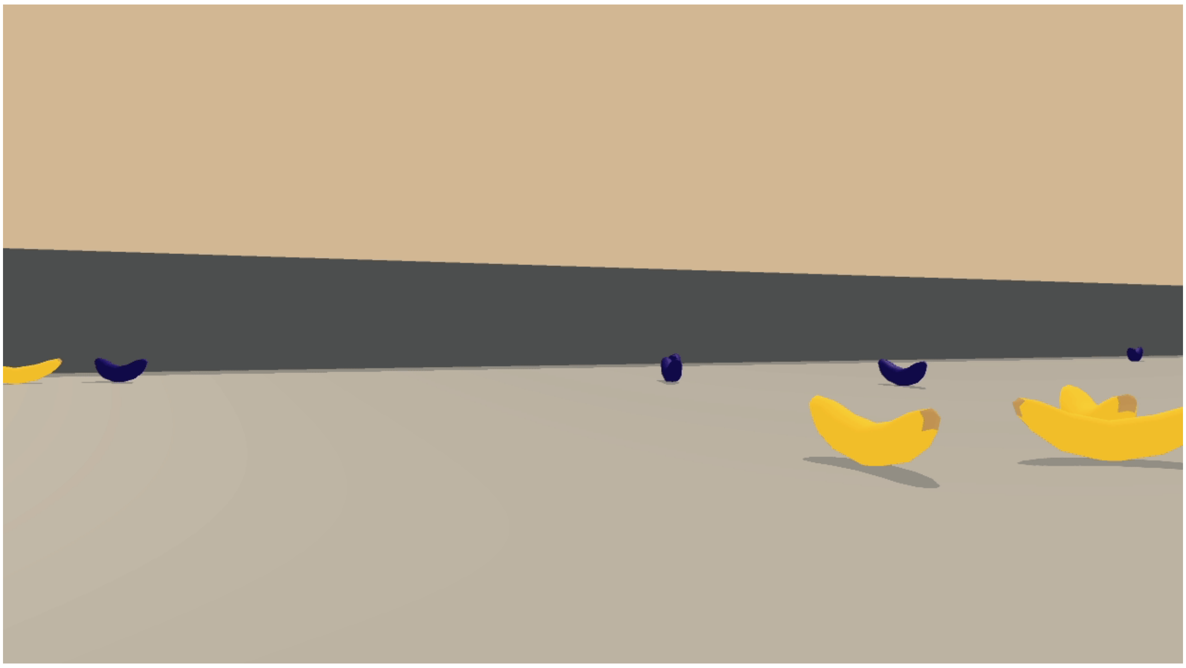
- Discount factor of 0.99
- Tau (τ) which updated the target Q function is 1e-3
- Learning rate 5e-4
- Update every 4 steps

Plot of Rewards



The environment was solved by episode 500 as can be seen in `Navigation.ipynb`

Trained agent behavior



Ideas for Future Work

- Will extend the the DQN to dueling DQN and also solve the learning from pixels challenge.
- Invest in more time to explore different hyper-parameters and ablations studies