Reinforcement Learning - Project

Tirza Soute   Michiel van der Meer   Adriaan de Vries

Lukas Jelinek

29 November 2018

1   Topic

For our project, we chose the topic of evaluating the different types of experience replay. The project's description is as follows:

> *There are different types of experience replay, e.g. prioritised experience replay and hindsight experience replay. Compare two or more types of experience replay. Does the 'winner' depend on the type of environment.*

2   Experiments

In our case, the layout of the experiments can be set up in a hierarchical manner:

1. Start with the implementation of the two different kinds of experience replay, at least one of which we have done in the homework (the other being mentioned in Andrychowicz et al. [2017]). Since we have already implemented the experience replay in a DQN, we will evaluate the experience replay strategies in that context.

2. Choose the most simple grid environment we can come up with, and study the respective performance.

3. From there, we can expand to either more types of experience replay (e.g. Schaul et al. [2015]), or more involved environments. The most important factor here is to identify what "types" of environments we are considering, and how we can distinguish between them, such that we can properly evaluate the experience replay types.

4. Ideally, we would like to have around 3 different kinds of experience replay, and a series of environments that range both discrete and continuous state spaces, as well as finite versus infinite spaces. The same we would like to explore for the action space.

References

M. Andrychowicz, F. Wolski, A. Ray, J. Schneider, R. Fong, P. Welinder, B. Mc-Grew, J. Tobin, O. P. Abbeel, and W. Zaremba. Hindsight experience replay. In *Advances in Neural Information Processing Systems*, pages 5048–5058, 2017.

T. Schaul, J. Quan, I. Antonoglou, and D. Silver. Prioritized experience replay. *arXiv preprint arXiv:1511.05952*, 2015.