強化學習在開源環境下的應用

A Few OpenAI Examples with Reinforcement Learning

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Abstract

Recently, the field of artificial intelligence has grown in popularity. Related researches and applications have been released, and among them, reinforcement learning (RL) is of great concern.

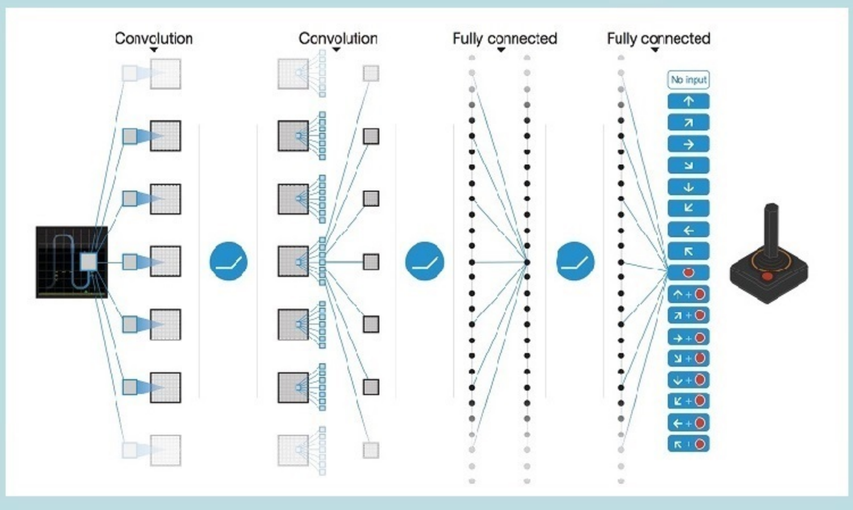
In this report, we implemented a few RL methods to train Pong, one of the Atari games from OpenAI. This can help us analyze and get accustomed to these methods.

The RL methods we applied are Deep-Q-Network (DQN) and Asynchronous Advantage Actor-Critic (A3C). Both of them are common approaches, and can train Atari games from raw pixel.

DQN

DQN stands for Deep-Q-Network. In this method, we implement the Q-function with multiple layers of CNN.

We also applied experience replay and periodical update to our network, as in the work of Mnih et al.[1]

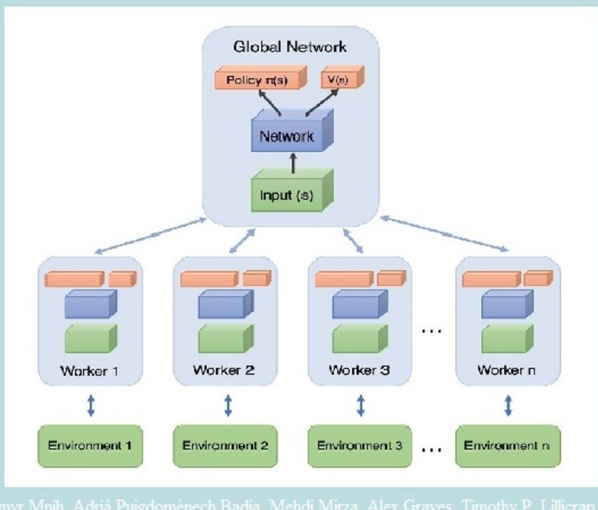


[1] Mnih, V. et al. Human-level control through deep reinforcement learning. Nature 518, 529–533 (2015)

A3C

A3C stands for asynchronous advantage actor-critic, by which parallel actor-learners can be trained asynchronously to stablize the training.

Unlike DQN, A3C does not need experience replay. More related information can be found in the work of Mnih et al.[2]



[2] Volodymyr Mnih, Adrià Puigdomènech Badia, Mehdi Mirza, Alex Graves, Timothy P. Lillicrap, Tim Harley, David Silver, and Koray Kavukcuoglu. Asynchronous methods for deep reinforcement learning. In Int'l Conf. on Machine Learning (ICML), 2016

Conclusion

Our results indicate that both approaches are effective on Pong training over a period of time.

After this project, not only did we learn the basic of RL theories but also the related applications of open source environments. In the future, more utilizations on daily life can be developed.