

Deep Reinforcement Learning in PyTorch



Introduction



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Why do we need to use Deep Reinforcement Learning?

- High complexity tasks require a more complex structure -> Deep Neural Networks consist on multiple hidden layers that help the agent learn more in depth.
- New features that further provide information are produced thanks to those hidden layers that guide the agent. More complex learning is allowed as a result.
- While RL uses a tabular function, Deep RL uses Neural Networks to predict Q-values (which indicate the reward).

PyTorch

Definition: PyTorch is an optimized tensor library for deep learning using GPUs and CPUs in Python

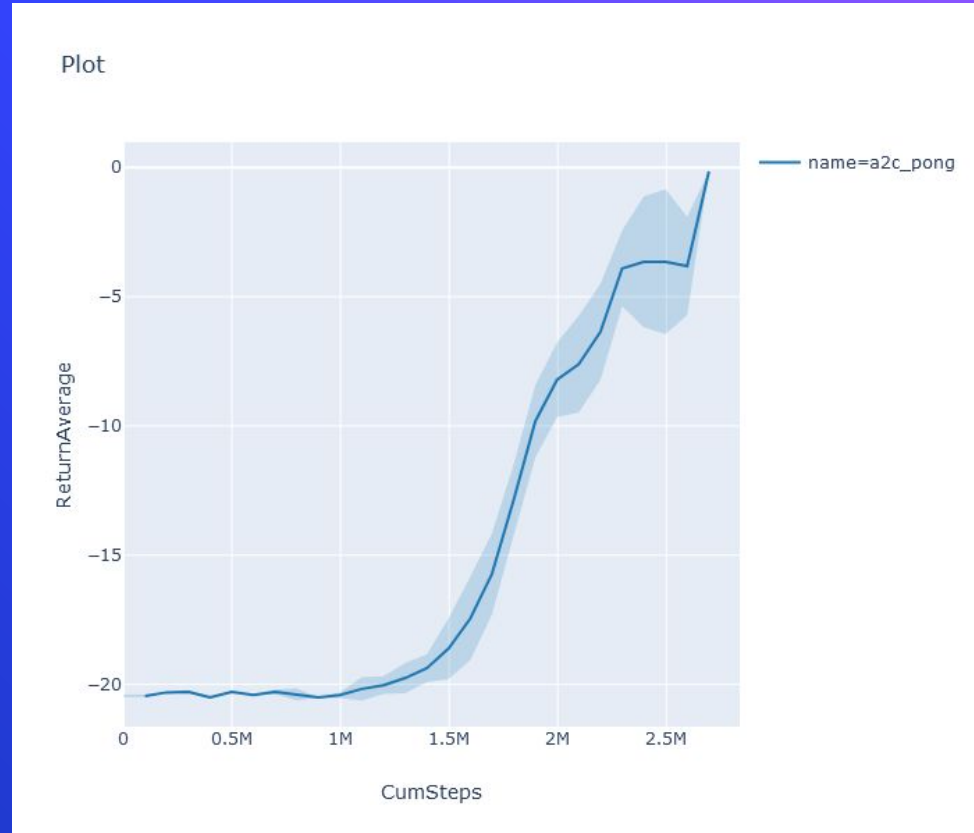
Features:

1. Powerful library that uses C++ runtime environment.
2. Optimized to make the best use of the CPU and GPU. Highly efficient.
3. Alternative to TensorFlow, another flagship library in python.

The PyTorch logo is displayed within a white rectangular box. It features the word "PYTORCH" in a bold, black, sans-serif font. The letter "O" is replaced by a stylized orange flame icon with a small purple dot above it, representing a torch.

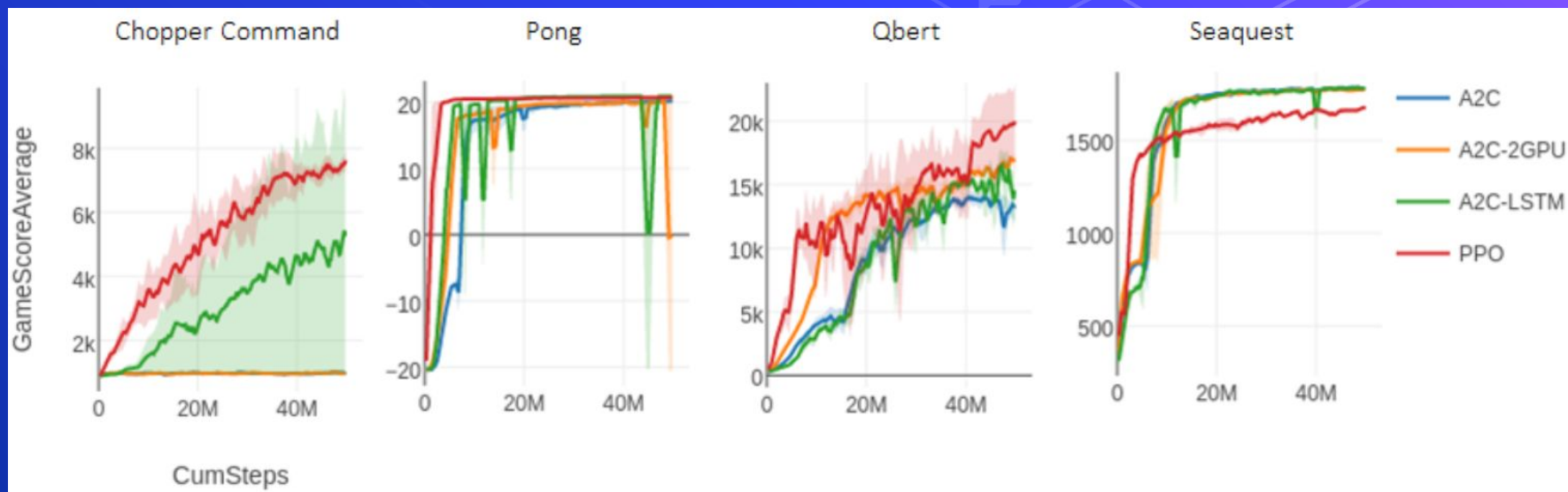
Graphic diagrams after executing

- An agent training for 3 million steps produces results in line with the expectations.
- This is a representation of the learning progress of the agent with a neural network.
- The algorithm used for training is A2C



Original graphic of the paper

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Reflections

1. After working with PyTorch, we consider it to be a solid and a reliable library whose performance is consistent and includes all the necessary tools to carry out experiments in AI.
2. The results obtained in the execution correspond to those included in the papers. We have successfully made use of PyTorch for that purpose.
3. Even though the concept of RL at its core is present in all the methodologies, the diverse array of approaches available conditions the type of problem suitable for each scenario.

Conclusions

- One of the most groundbreaking and future-proof emerging fields.
- There is still a long way to go both in the hardware constructions and limitations and the software development.
- The spontaneity of human conduct is still hard to reproduce with the available resources.
- PyTorch is a versatile library and supports Deep Reinforcement Learning with a high stability and performance score.

**Thank you for your time and
attention**

