Reinforcement Learning Feedback

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Individual feedback and marks

Here are your (fkwz35) marks for deep learning, reinforcement learning, and your final grade:

Percentages	
Convergence:	78.21%
Sophistication:	80.0%
Video intuition:	60.0%

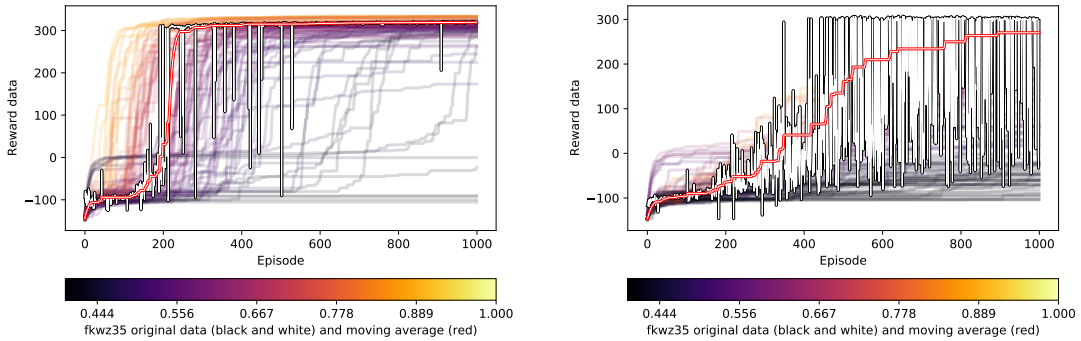
Student code:	fkwz35
Convergence marks:	39/50
Sophistication marks:	24/30
Video marks:	12/20
Final grade:	**75**/100

Comments

Normal environment: The agent has excellent convergence within a small number of episodes. There's still a small bit of room for improvement in the overall convergence ranks but the results are very competitive and perform at a level worthy of a 1st for this part. *Hardcore environment convergence:* The hardcore agent has outstanding convergence, ranking within the top 20% of the class. It achieves very high scores extremely quickly within relatively few episodes. *Sophistication and mastery of the domain:* An excellent report that demonstrates individual research and novel approaches outside of TD3. I would have like to further high-level analysis bridging the advances inlight of the fundamental trade-offs; while exploration vs exploitation and overestimation bias have been mentioned, it would be beneficial to see ablations of how the approaches can be used to optimise sample efficiency in this case. *Intuition of the video:* The policy learnt by the agent is not particularly intuitive; the agent seems more interested in the sky (looking upwards) than actually running. The hardcore agent similarly spends a lot of its time looking to the sky, and doesn't plan ahead to anticipate and avoid the objects.

Convergence data

These graphs show your individualised convergence data:



The left chart shows your (fkwz35) personalised log data relative to everyone else for the normal environment. The right chart shows the same for the hardcore environment. The colour in both graphs relates to your final convergence mark.

General feedback

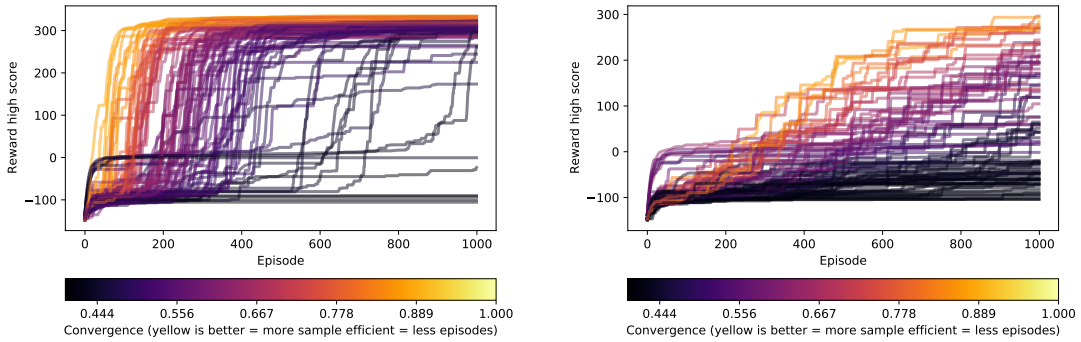
We're happy that the level of successful reinforcement learning solutions was very high this year, where nearly everyone was able to train an agent that was eventually able to learn to walk.

The successful strategy for a 2:1 was to implement the recommended TD3 agent and then carefully tune the hyperparameters inlight of exploration-exploitation and the overestimation bias issues. Several students attempted to alter the agent by incorporating novel ideas from other papers before doing robust parameter sweeps, and were often beaten in the convergence ranks by well-tuned baseline TD3 implementations.

A large group of students implemented FORK, a forward looking extension to TD3. This generally did well in the hardcore environment, where it could anticipate objects, but tended to not perform as well as people who focused on more rigorous optimisation of the original TD3 within the normal environment.

The students with the most efficient agents generally surveyed the recent literature that addresses overstimation bias with a focus on high-quality off-policy learning. In particular, they used distributional RL approaches such as TQCs, REDQs and ACCs with ensembles of distributional critics. They also tended to have rigorous experimental setups that considered AUCs over different intervals to predict a high-quality estimate of the final convergence from early on in training.

Marking of the convergence ranks was automated based on the log data. Can you reverse engineer the score function based on the figure?



These graphs show the results for everyone who submitted valid log data for the normal environment (left) and the hardcore environment (right). The interval on the x-axis is different to represent the task difficulty.

Closing Comment

We hope you found this assignment rewarding and that it has helped set realistic expectations into what can and cannot be achieved with these large models. We also hope that you appreciate the importance in keeping up-to-date with the never-ending stream of new literature in these fast-changing fields.
