

# Reinforcement Learning

## Exercise 6

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### Submission Instructions:

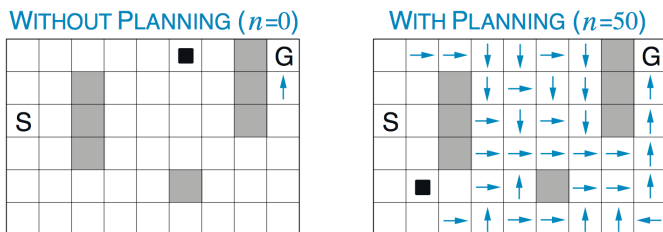
The submission deadline for this exercise sheet is 16.06., 23:55.

Put your answers into a single pdf. Your python code should be a single python script. Upload both files to ilias. Make sure that the code runs with *python3 yourscrip.py* without any errors.

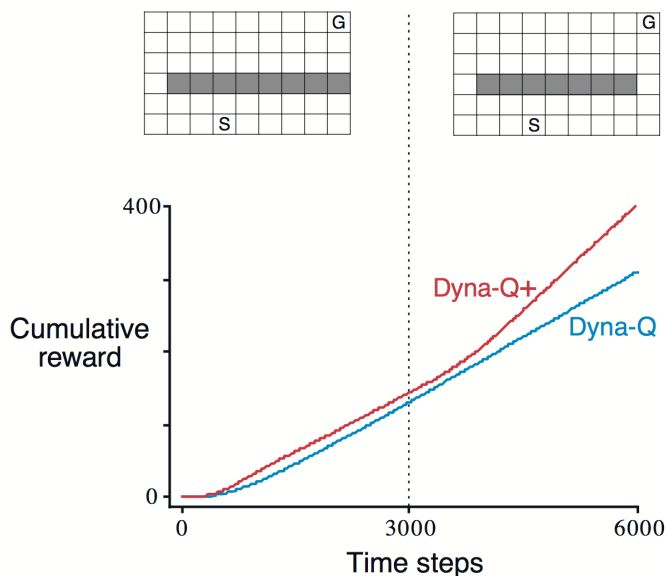
Group submissions of up to three students are allowed.

## 1 Planning and Learning (4P)

a) The nonplanning method looks particularly poor in the figure below; a method using  $n$ -step bootstrapping would do better. Do you think one of the  $n$ -step bootstrapping methods could do as well as the Dyna-Q method? Explain why or why not. (2P)



b) Why did the Dyna-Q+ (i.e., with exploration bonus) perform better in the first phase as well as in the second phase of the blocking and shortcut experiments (see figure below)? (2P)



## 2 n-step sarsa on the FrozenLake (4P)

The code template can be found on github (<https://github.com/humans-to-robots-motion/rl-course>) in *ex06-nstep/ex06-nstep.py*.

Implement  $n$ -step Sarsa and evaluate it on the  $8 \times 8$  *Frozen Lake* environment. Evaluate the performance for different choices of  $n$  and  $\alpha$ . Visualize your results (plot the performance over  $\alpha$  for different choices of  $n$ , similar to lecture 6 slide 9).