

SC42050 Literature Assignment

Reinforcement Learning for Traffic Light Control

Anahita Jamshidnejad

This assignment concerns the application of reinforcement learning algorithms in control of traffic lights.

In your report paper please make sure that the following questions are all addressed.

- In (Wiering, 2000) you will see that reinforcement learning is applied to a multi-agent system. What does the word autonomous agent refer to (try to find different definitions that are given in the literature and compare them)? Why is the approach of multi-agent system being used extensively for traffic networks? Explain the characteristics of multi-agent systems that make them appropriate for traffic control.
- What is model-based reinforcement learning being mentioned in (Wiering, 2000)? In (Wiering, 2000) the objective of reinforcement learning algorithm is to minimize the overall waiting time of the vehicles in the system. What would be the difference in your opinion if the objective is changed to minimization of the total travel time of the vehicles or to minimization of the emissions?
- How is reinforcement learning utilized in (Abdulhai et al., 2003) compared with (Wiering, 2000)? What does Q-learning mean and how is it explained in (Abdulhai et al., 2003) for the example of the mobile robot navigating in the grid world? How could this idea be extended to the field of traffic?

References

- Abdulhai, B., Pringle, R., and Karakoulas, G. J. (2003). Reinforcement learning for true adaptive traffic signal control. *Journal of Transportation Engineering*, 129(3):278–285.
- Wiering, M. (2000). Multi-agent reinforcement learning for traffic light control. In *Proceedings of the Seventeenth International Conference on Machine Learning*, pages 1151–1158.