Reinforcement Learning in Traffic

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https://github.com/superman-alien/final-project

Problem:

Cars spend excess time waiting at traffic lights in transit between cities. This wastes gasoline (anywhere from 0.2 to 0.7 gallons per hour, *edf.org study, 2009*) and people's time.

Traffic is complex and can change in non-trivial ways.

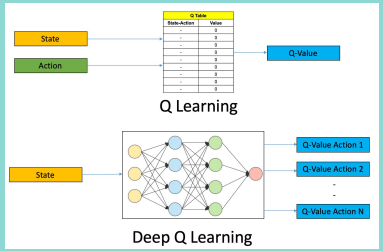
Reinforcement learning:

- Begins randomly or semi-randomly
- Uses a reward/penalty structure to skew the randomness towards desired results
- Can use its findings to influence the environment surrounding it
- Could potentially be adapted from one situation to the next with minimal retraining

While a simple Q algorithm might be able to handle a single intersection, Deep Q is likely best suited for a complex city network.

Procedure and findings:

- Utilized Simulation of Urban Mobility (SUMo) in conjunction with the code of *Andrea Vidali - University of Milano-Bicocca*.
- Comparison of 1000, 2500, and 5000-car simulations



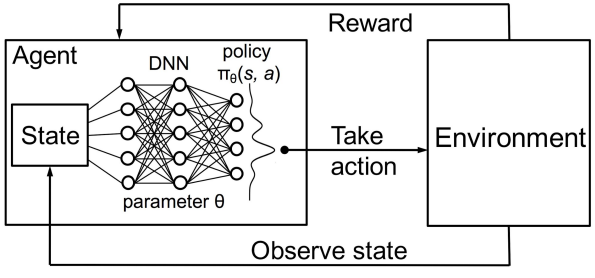


Image credit: Hongzi Mao, Resource Management with Deep Reinforcement Learning, MIT (http://people.csail.mit.edu/hongzi/content/publications/DeepRM-NENS16.pdf)

Conclusion and future work:

- Compare training efficiency with other ML techniques
- Measure cross-applicability between trained models and on different streets
- Import real-world maps into the SUMo simulation
- Explore real-time updating of traffic signals based on present flow, rather than generating an inference

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