

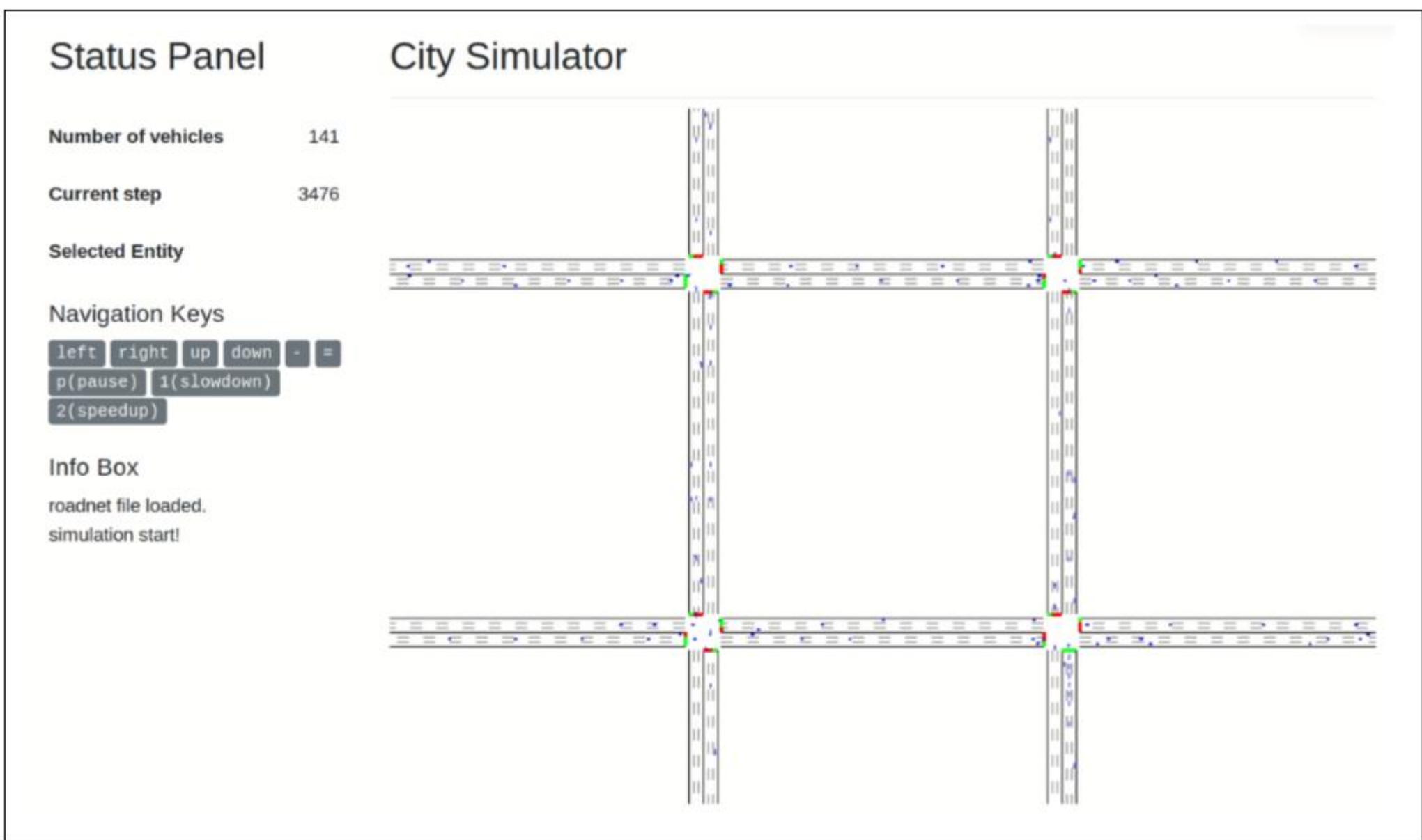
A One-Pass Model for Traffic Light Control

Yuxuan Chen
Zhiyuan College, Shanghai Jiao Tong University



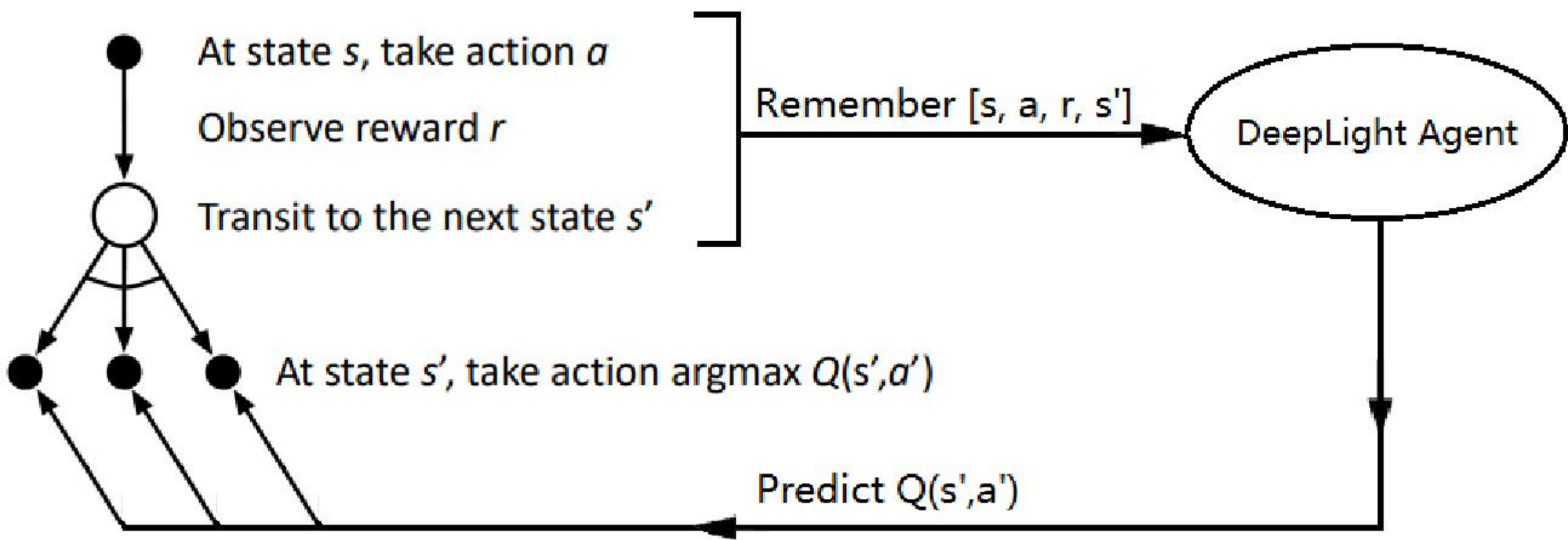
Problem Definition

Given a traffic scenario, we are supposed to provide a traffic light control plan for the traffic scenario to minimize the average travel time of vehicles.



Our Model

$Q(s, a)$: The expected total discounted reward starting from state s , taking action a .

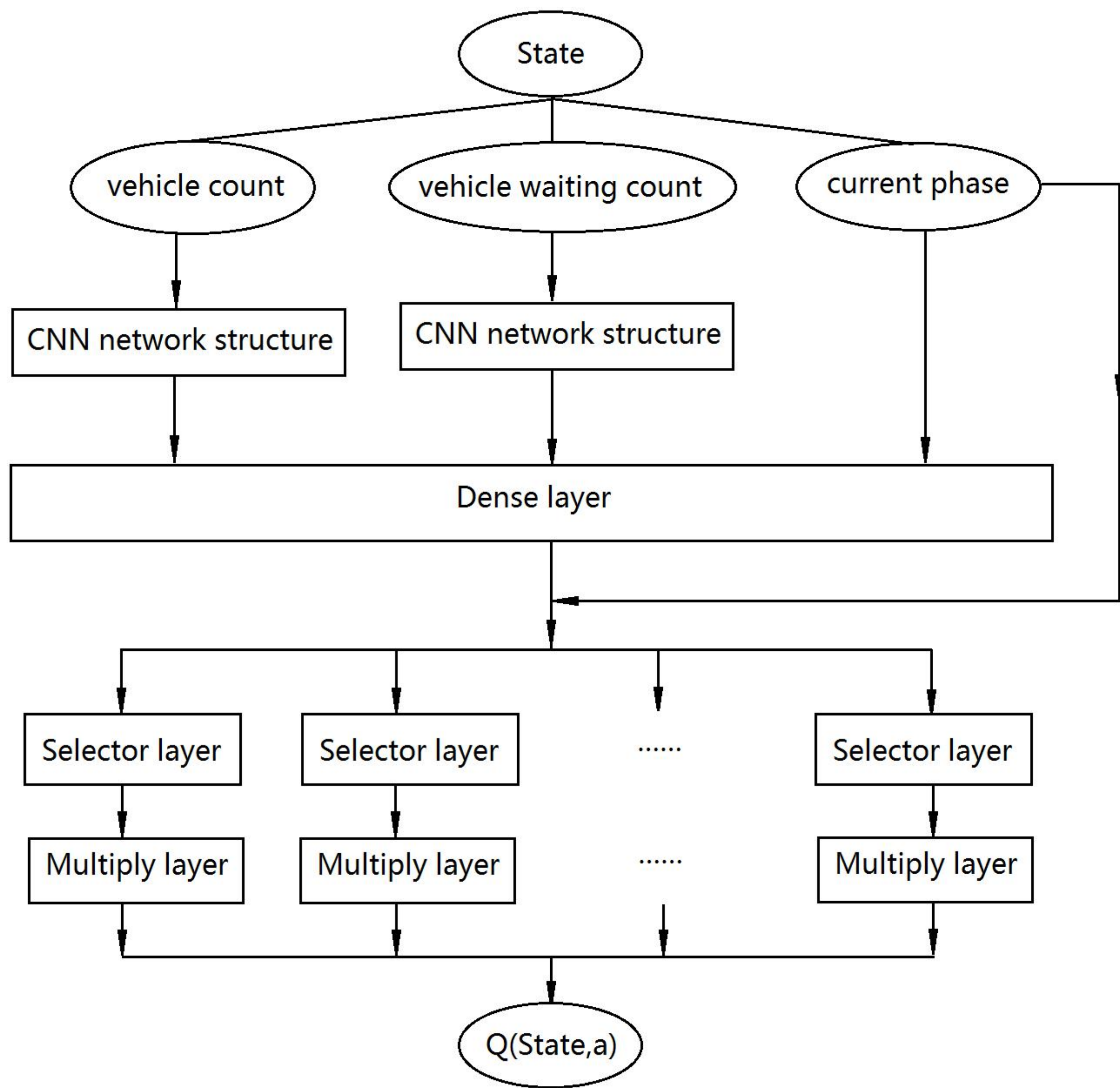


Agent Design

The DeepLight Agent consists of the following:

- Memory:** A set of quadruples $[s, a, r, s']$.
- Eval Net:** A neural network to fit the data sampled from memory and make predictions.
- Target Net:** A version of the past eval nets.

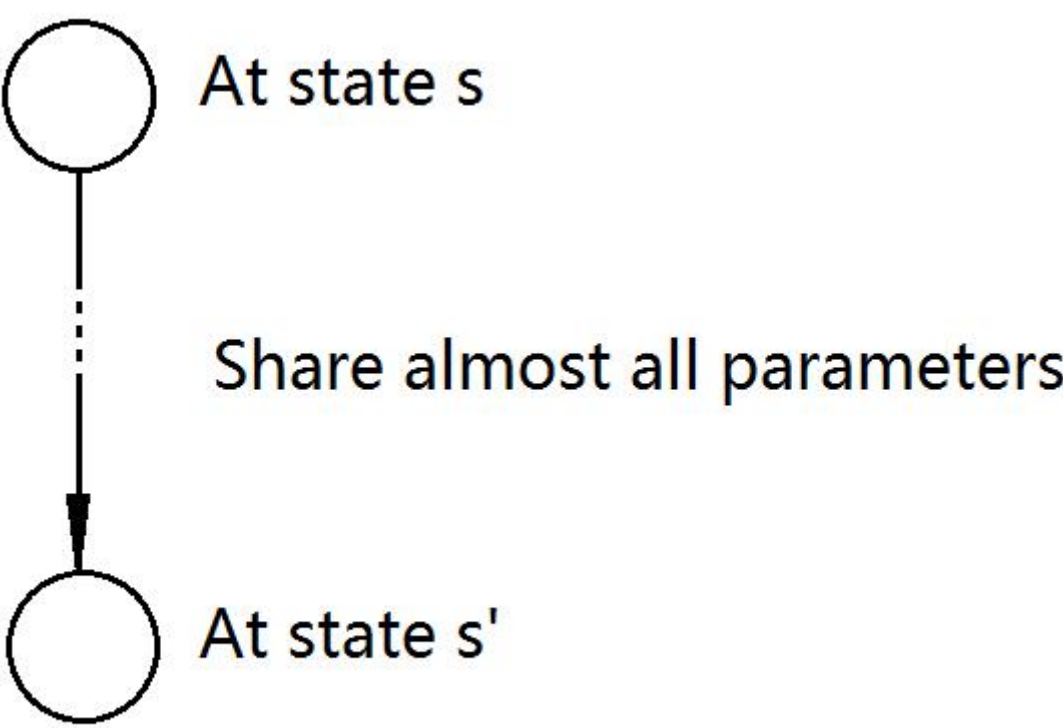
Structure of Eval Net



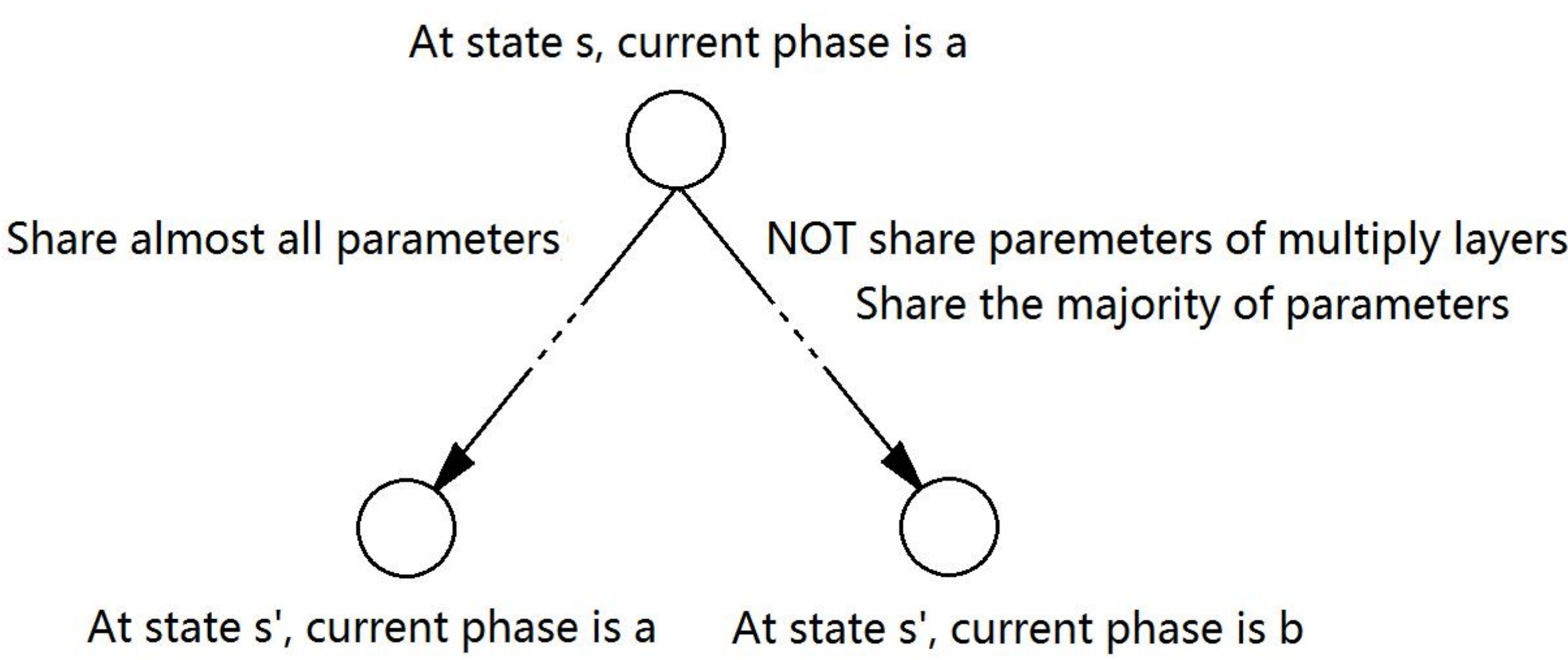
Our Approach

Precise Parameter-Sharing

In normal parameter-sharing, if a state s can transfer to s' in several steps:



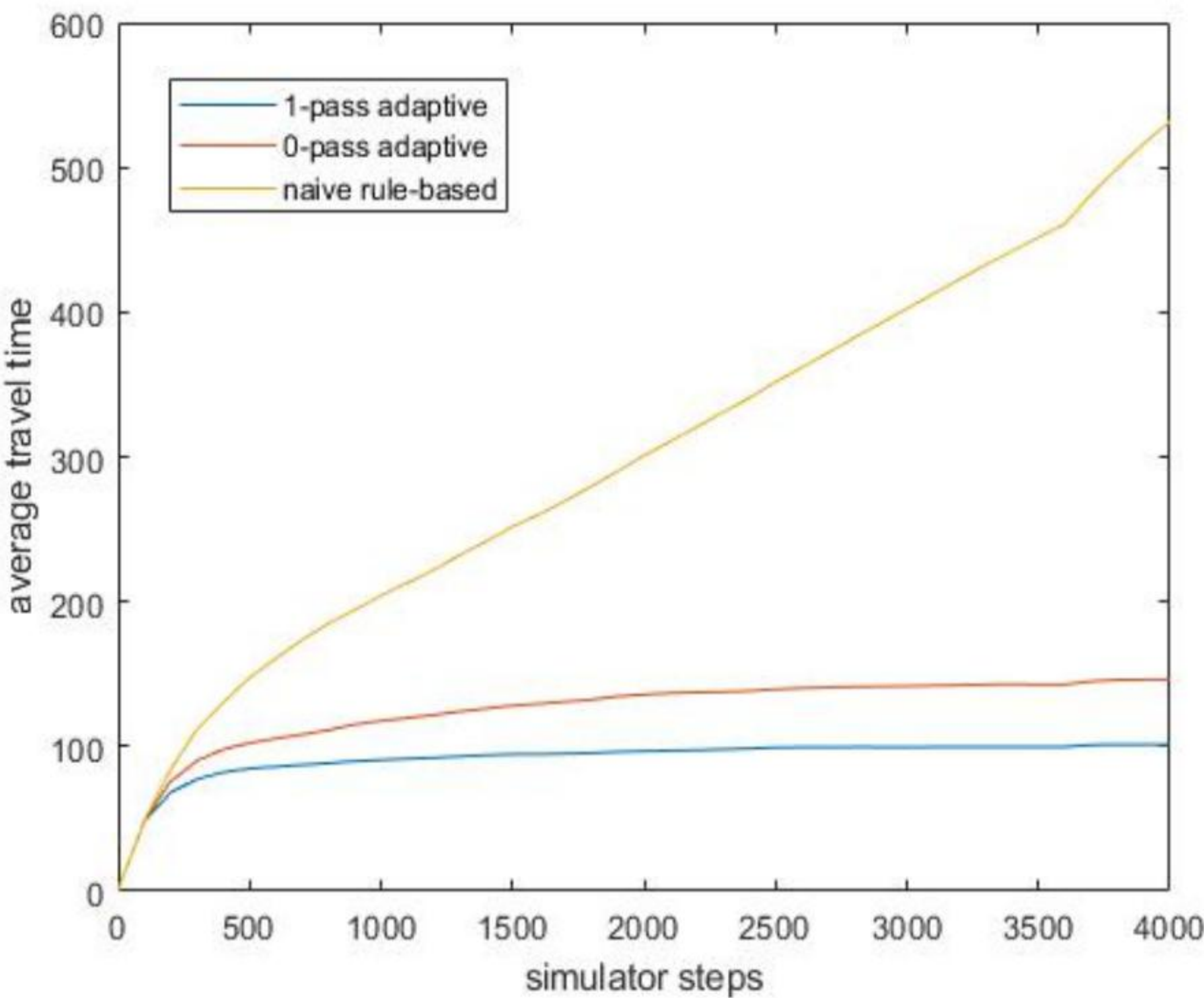
But sometimes this can be not true, so we added extra layers to distinguish current phases:



With this method, our model gets very adaptive and can be trained well in one pass.

Experiments

- We applied three agent to one traffic scenario.
- 1-Pass Adaptive:** A DeepLight Agent that has been trained for one pass.
- 0-Pass Adaptive:** An untrained DeepLight Agent.
- Naive Rule-Based:** A rule-based agent that change the phases periodically.



Scan the QR code to watch demo:

