

64. AKSHAY T

A Deep Reinforcement Learning Network for Traffic Light Cycle Control

Existing inefficient traffic light cycle control causes numerous problems, such as long delay and waste of energy. To improve efficiency, taking real-time traffic information as an input and dynamically adjusting the traffic light duration accordingly is a must. Existing works either split the traffic signal into equal duration or only leverage limited traffic information. In this paper, we study how to decide the traffic signal duration based on the collected data from different sensors. We propose a deep reinforcement learning model to control the traffic light cycle. In the model, we quantify the complex traffic scenario as states by collecting traffic data and dividing the whole intersection into small grids. The duration changes of a traffic light are the actions, which are modeled as a high-dimension Markov decision process. The reward is the cumulative waiting time difference between two cycles. To solve the model, a convolutional neural network is employed to map states to rewards. The proposed model incorporates multiple optimization elements to improve the performance, such as dueling network, target network, double Q-learning network, and prioritized experience replay. We evaluate our model via simulation on a Simulation of Urban MObility simulator.