

# IntelliLight: A Reinforcement Learning Approach for Intelligent Traffic Light Control



PennState



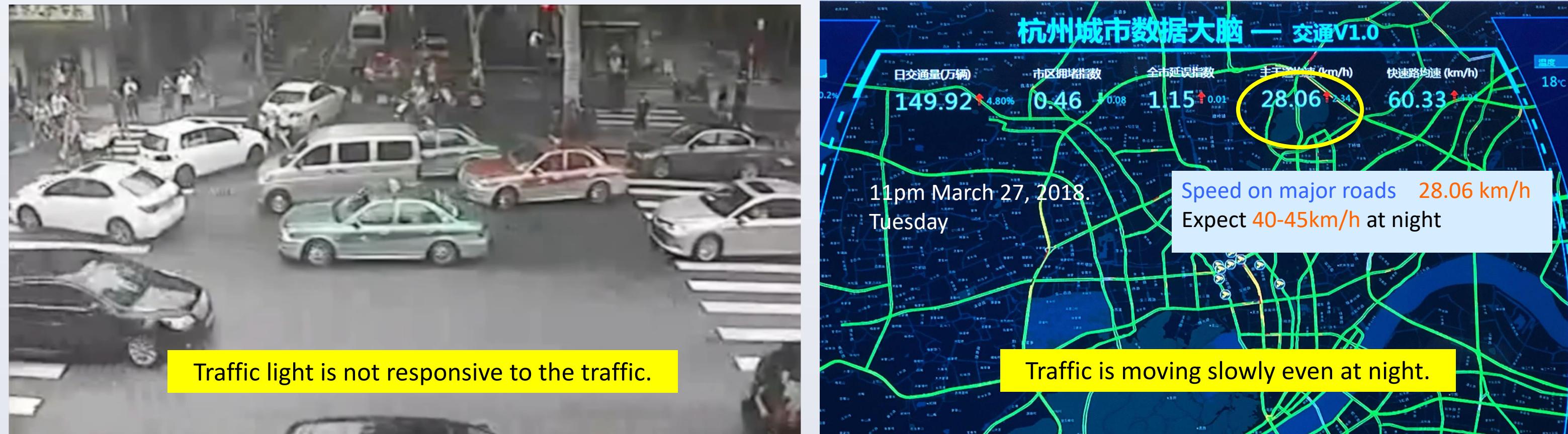
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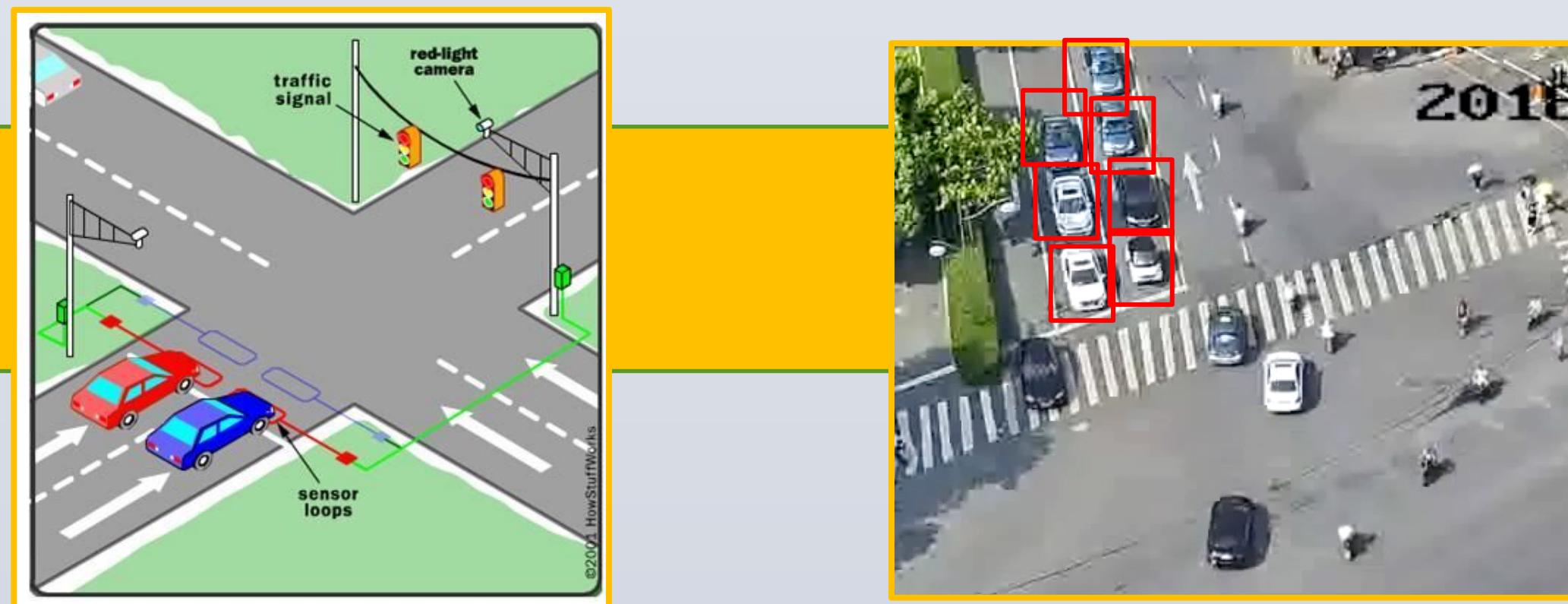
## 1. Introduction

unintelligent traffic signal

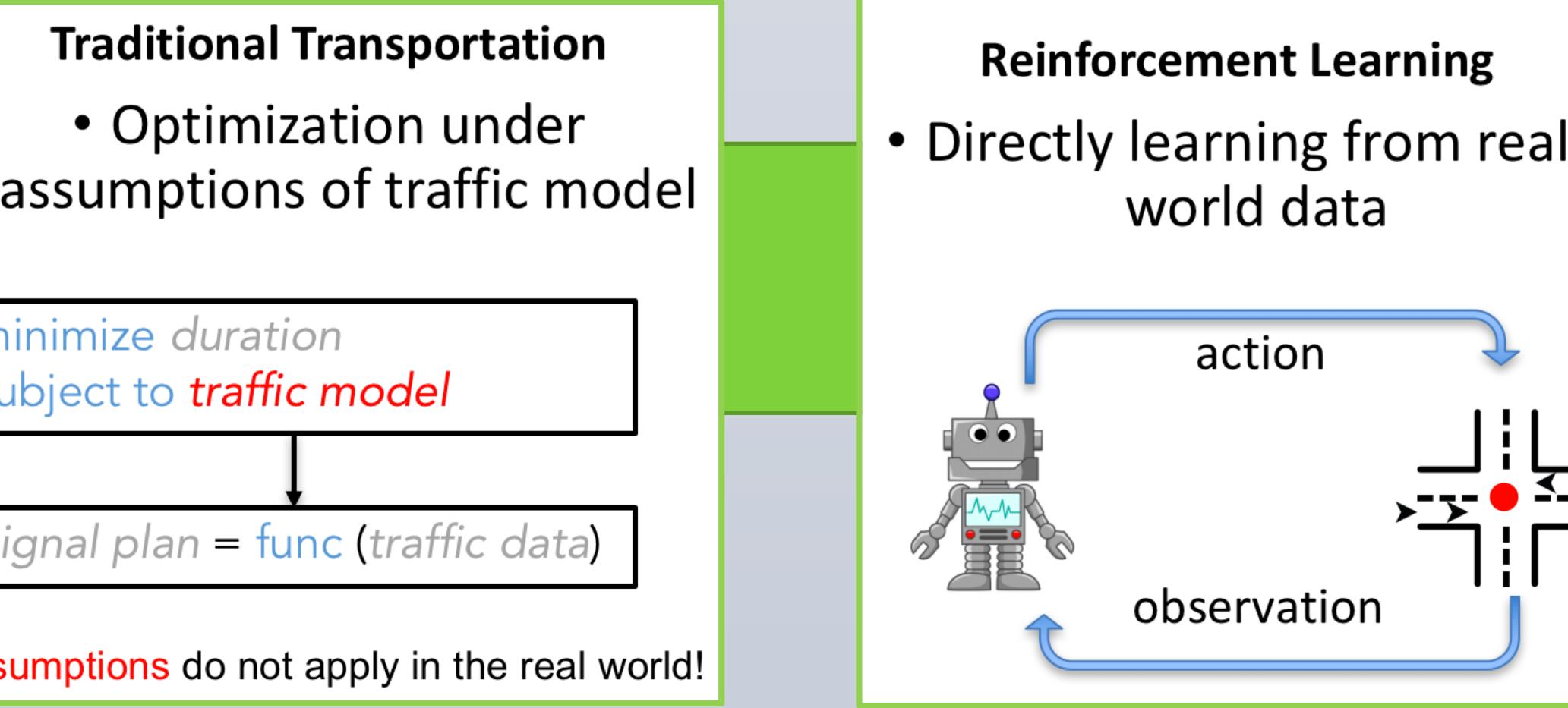


## 2. Why can we improve it today?

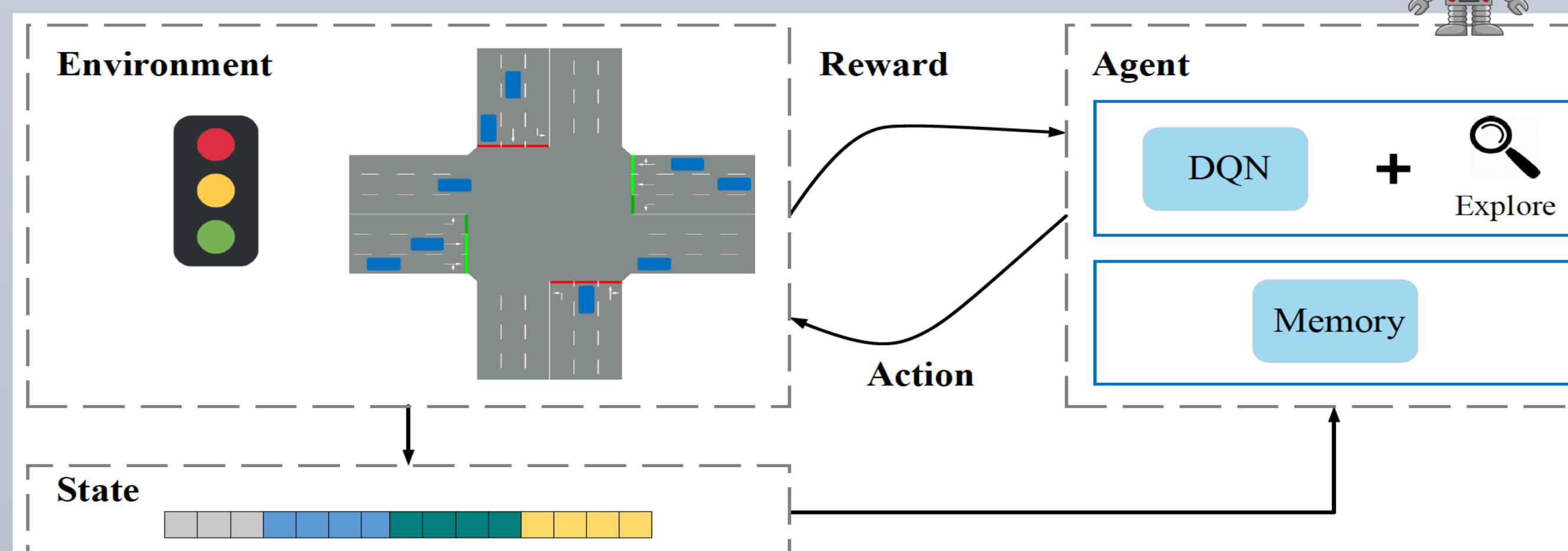
yesterday      today



New data



## 3. Method



Reward: queue length, average waiting time, sum of delay

Action: keep the signal or change the signal

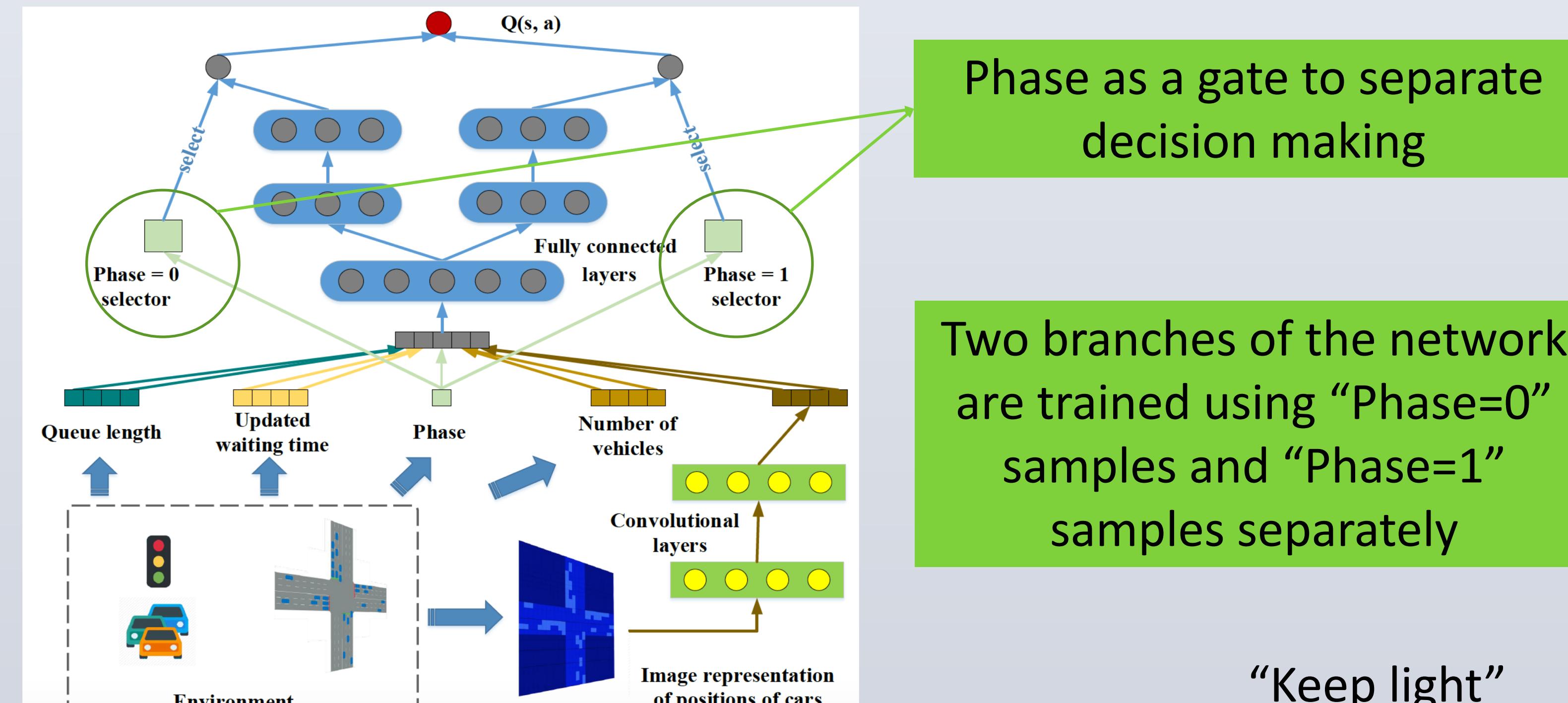
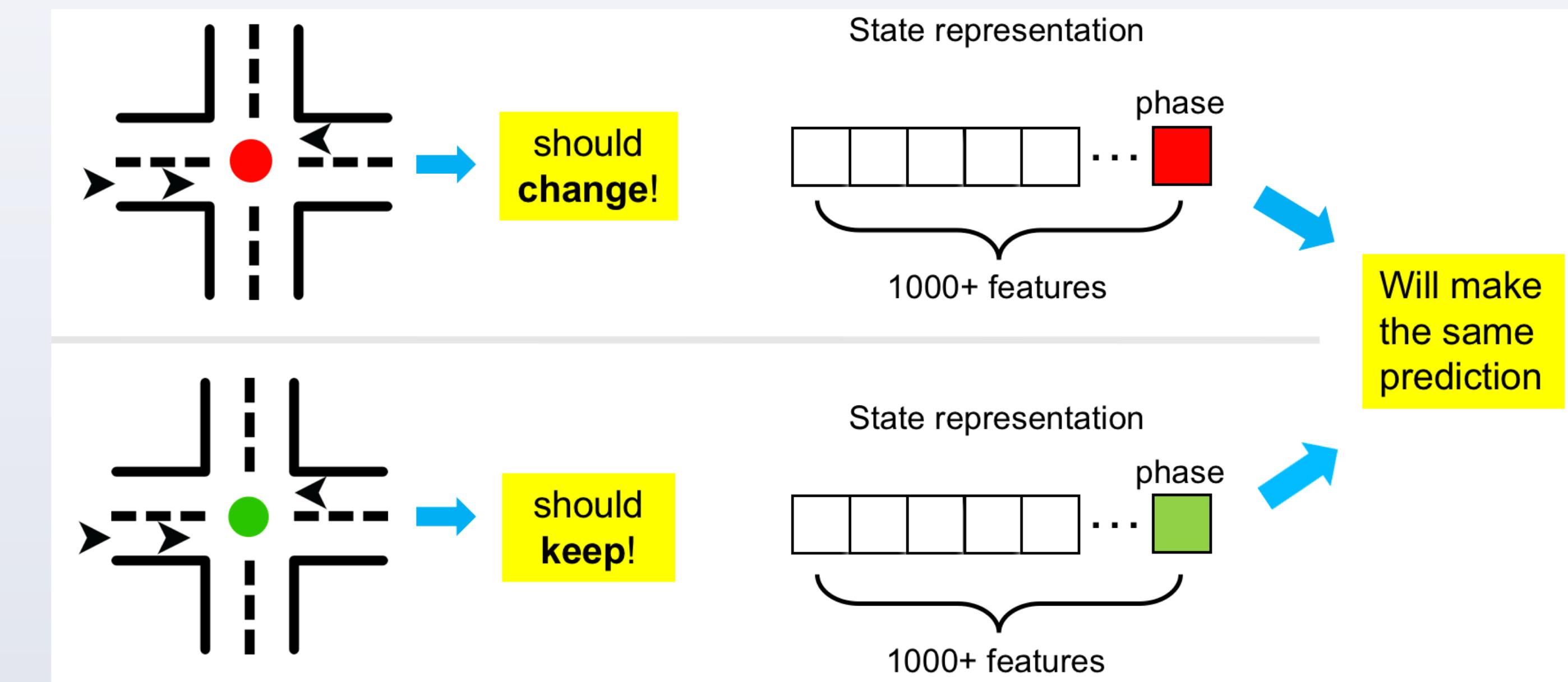
State: queue length, #cars, waiting time, traffic situations (image), signal

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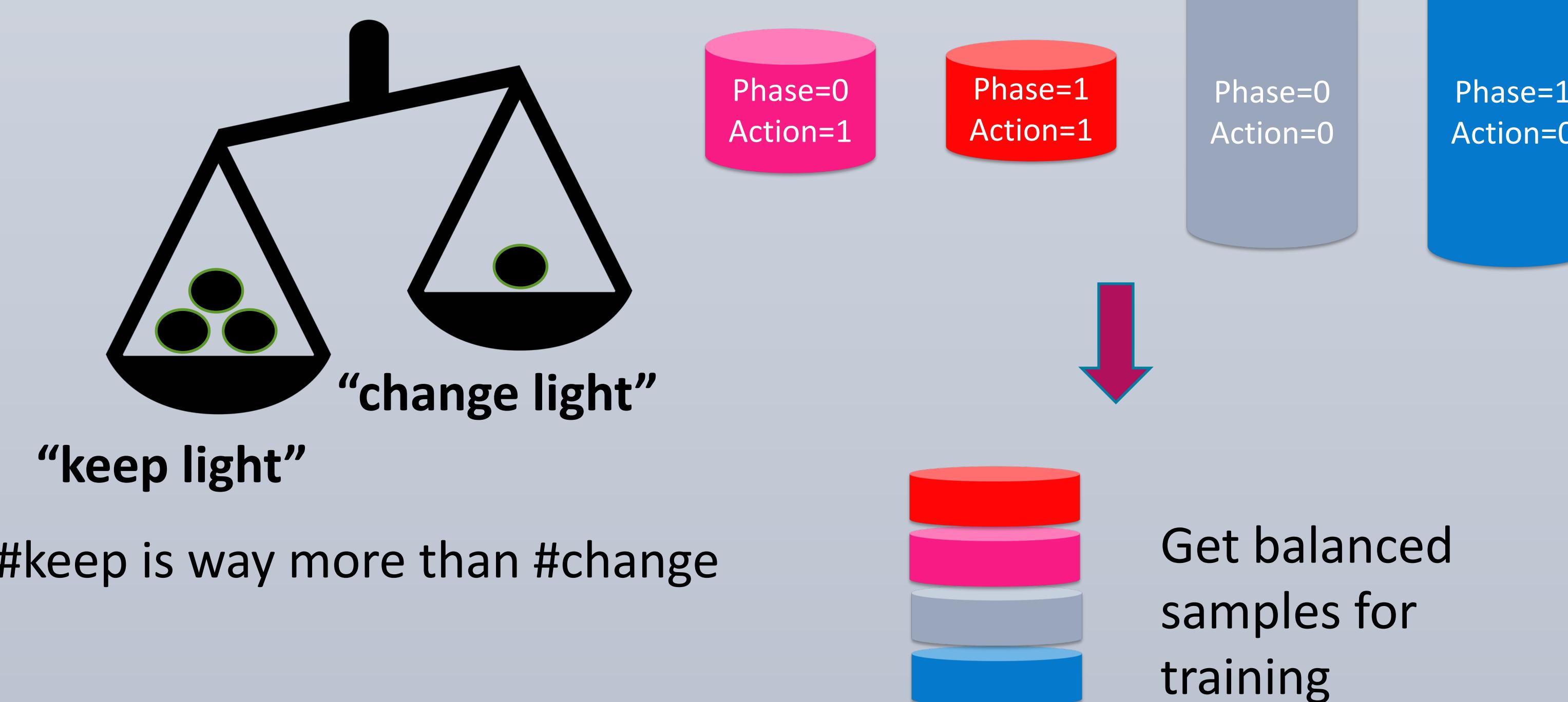
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## 3. 1 Phase-gated Deep Q-Network



## 3.2 Memory Palace

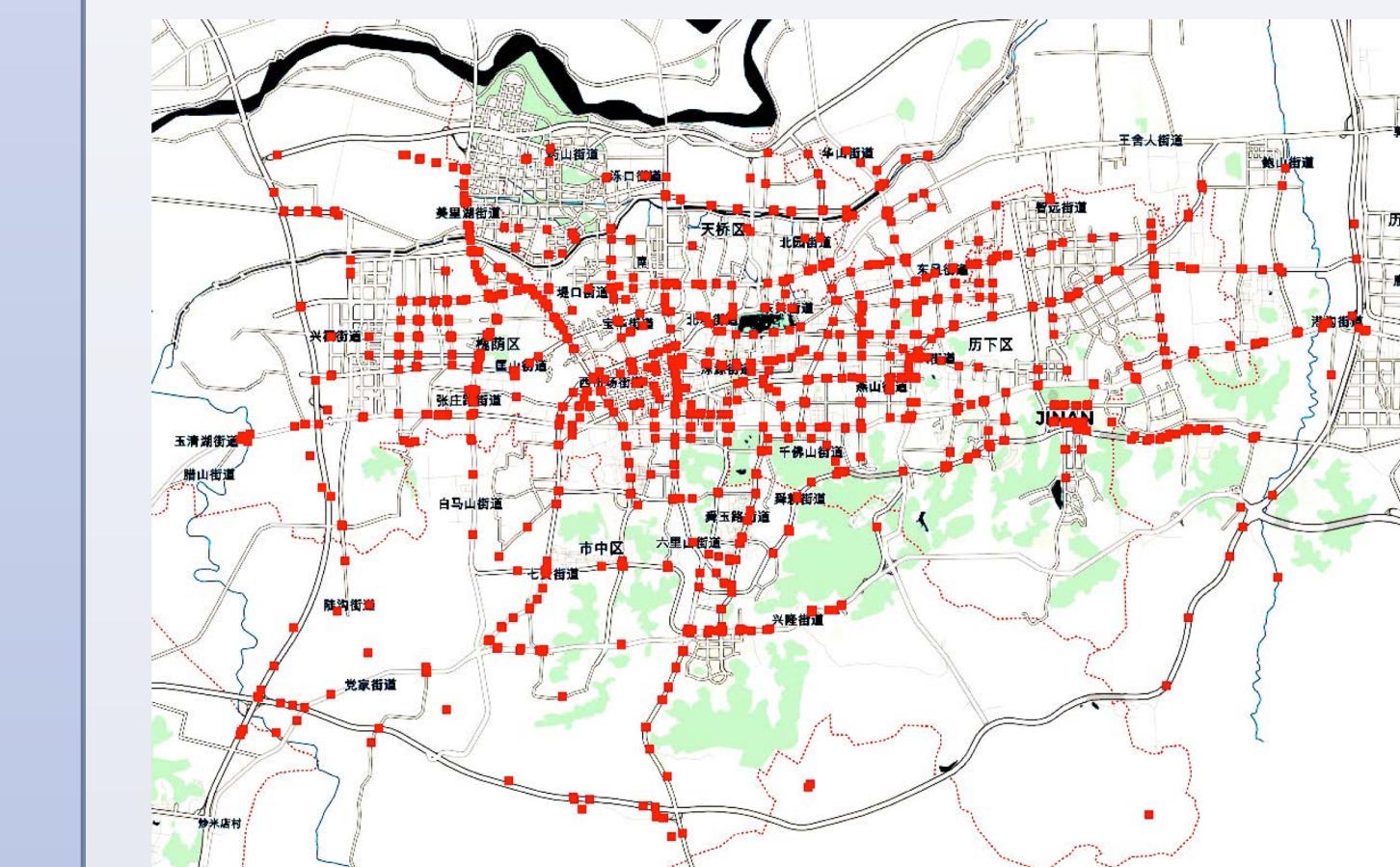


We are implementing our model in Hangzhou China!

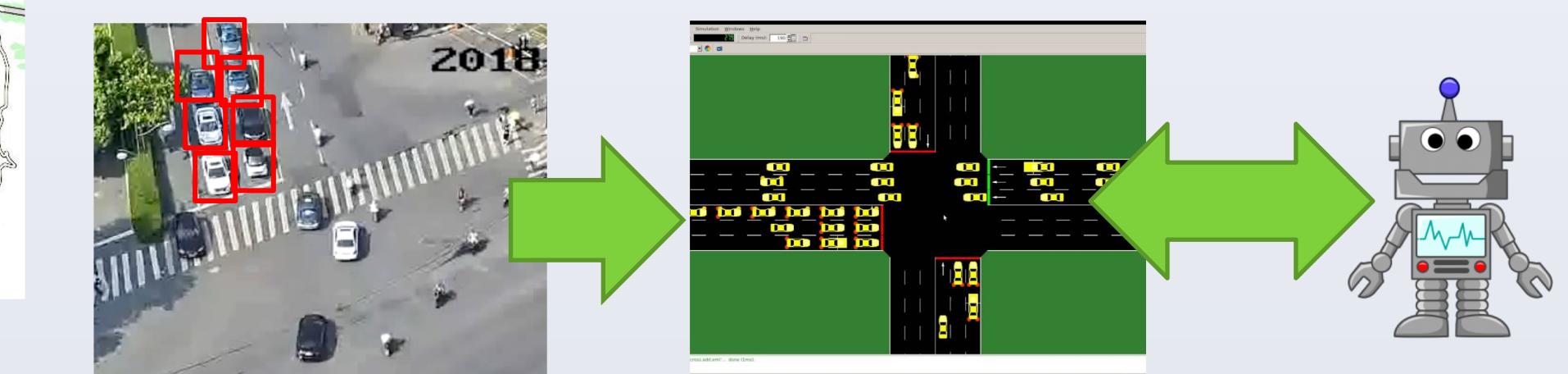
Interested in collaborating with us for city research in Hangzhou?  
<https://faculty.ist.psu.edu/jessili>



## 4. Experiment



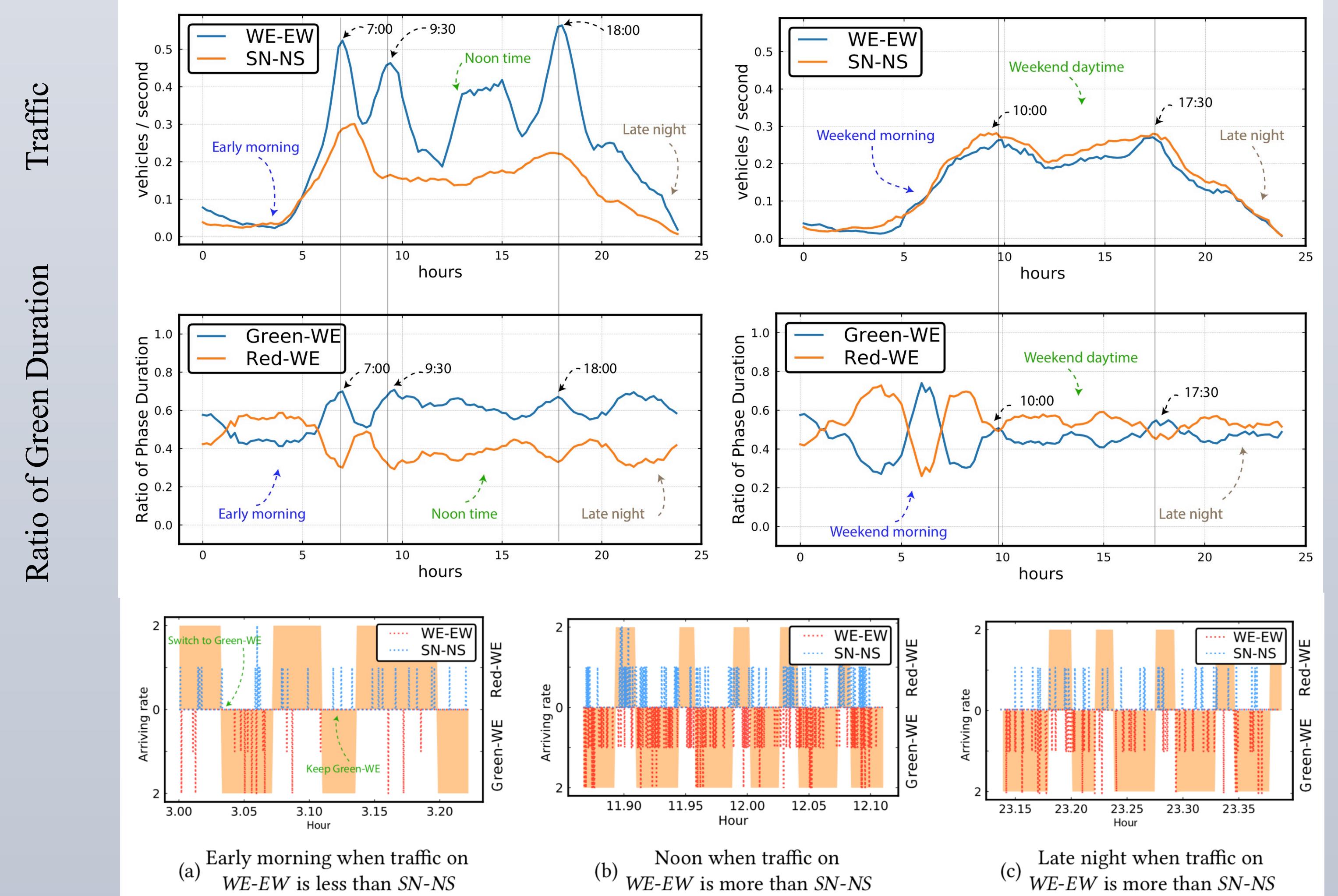
- Jinan, China
- Cameras on 935 intersections
- 24 intersections with 4-way full data
- 08/01/2016-08/31/2016



Methods	Reward	Queue Length	Delay	Duration
FT	-5.727 ± 5.977	19.542 ± 22.405	3.377 ± 1.057	84.513 ± 60.888
SOTL	-35.338 ± 65.108	16.603 ± 17.718	4.070 ± 0.420	64.833 ± 23.136
DRL	-30.577 ± 26.242	54.148 ± 43.420	4.209 ± 1.023	166.861 ± 93.985
IntelliLight	-3.892 ± 7.609	<b>10.238 ± 20.949</b>	<b>2.730 ± 1.086</b>	<b>50.487 ± 46.439</b>

- FT: Fixed Time
- SOTL: Self-Organizing Traffic Light Control (changing the light when #cars waiting > threshold)
- DRL: Deep Reinforcement Learning (van der Pol et al, 2016)

August 1st, 2016      August 7th, 2016



## 5. Open Discussion

- Complicated traffic
- Messy real data
- Cost of applying RL in the real world

