

Optimization for a Moving Camera Position at an Intersection

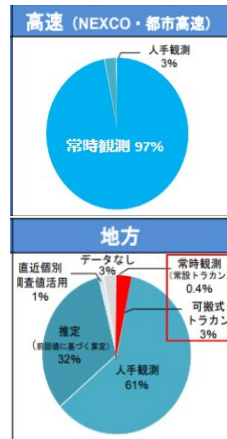
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1. Introduction

Current status of traffic surveys automation

- 97% of them in highways are automated
- 3% of them in general roads are done manually
- Counting precisions are low in intersections

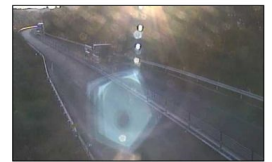
Ref:[1]



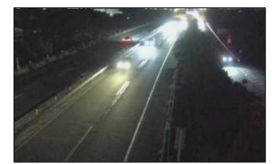
Causes of inaccuracy in automation using camera

- Occlusions with cars
- Measurement at night
- Effects of sunlight, headlights, etc.

■日照等の影響



太陽光のフレアによる影響



Ref:[2]

ヘッドライトのフレアによる影響

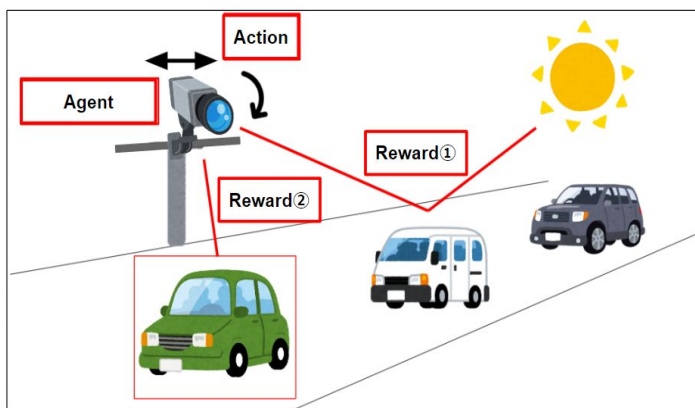
2. Purpose

To realize an automatic traffic counting system that is robust to the effects of sunlight over time, such as backlighting and shadows.

3. Method

Images acquired from a movable camera installed at an intersection are automatically measured by object recognition and tracking.

Reinforcement learning is applied to optimize the motion of the moving camera.



Elements of Reinforcement learning

- Agent: A moving camera
- Action: Left/right movement, up/down tilt
- Reward①: Backlight intensity (histogram)
- Reward②: Level of confidence of detector

4. Experiment

Compare precision in these two situations

- The camera location is decided by the method
- The camera location is decided by human

References

- [1] MLIT, Issues of data collection for traffic census, <https://www.mlit.go.jp/road/ir/ir-council/ict/pdf01/03.pdf>
[2] MLIT, Analysis of camera images for constant observation, <https://www.mlit.go.jp/road/ir/ir-council/ict/pdf04/04.pdf>