

**“Technical Research and Development for Road Policy Quality Improvement”
Study Summary**

No.	Title	Principal Researcher
No.27 - 2	The model development assimilated with various observation for evaluating the road policies	Waseda Univ. Prof. Sasaki

The development of assimilating method of various big data into an activity and network simulation system for evaluating the impact of road traffic policy accurately as the changes of individual behavior. So that, not only the government but the inhabitants can understand the effect of the road policy

1. Backgrounds and Objects

The purpose of this study is to develop an activity model system that can evaluate the changes of activity caused by road traffic policies. So far, there are problems with the accuracy of the sub-models, especially the destination choice sub-model, so that it is less applicable practically. Besides, it is necessary for activity simulator to use network assignment model to evaluate the traffic state. These years, micro traffic simulators as the traffic assignment model have become practically applicable. However, there are various problems in the simulation parameters setting. This research is to improve these problems by assimilating the simulation model into the big data, and to develop a methodology to evaluate the effect of the road traffic policy on the citizen's life.

2. Activities in Research Period

[2015]

1) Construct an activity model system

We develop the activity model system in both Kofu and Tokyo for evaluating road policy

2) Select appropriate observation for assimilation

We chose Mobile Space Statistics as observations of the system and implemented assimilation algorithms

3) Select network simulator

We chose AIMSUN as network simulator for its applicability of API

[2016]

1) Improvement of the assimilation algorithm and update parameters

The algorithm of assimilating the activity into MSS was modified to reduce computational burden

2) Activity model development considering TDM policy

The development of activity system considering the prism constraint for analyzing TDM policies.

3) Implementation of assimilation algorithm on the network simulator

[2017]

1) The improvement of practical applicability of activity simulator

The proposal of semi-automated estimation. The update of parameter using time series observation

2) Application of network simulator to City area

Proposal of the hybrid model of micro and meso-scale simulator to apply the simulator to the Kofu city.

[2018]

1) Integration of activity simulator and network simulator

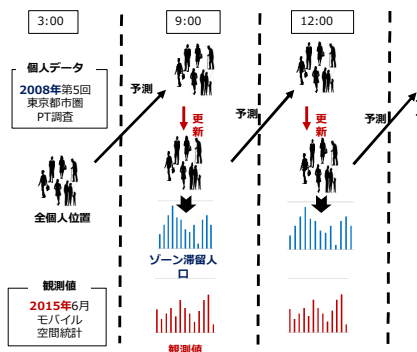
Activity simulator with data assimilation was combined with network simulator to evaluate a road policy

2) Advancement of the network simulator

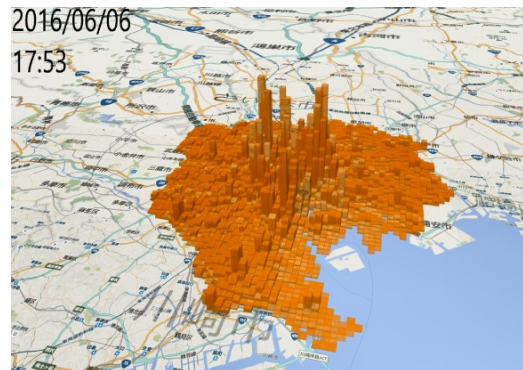
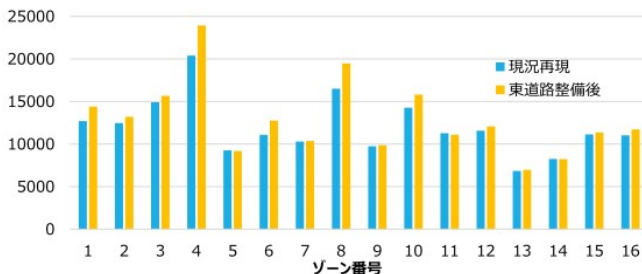
To assimilate the link condition such as travel speed into the simulator to adjust parameters of simulator

3. Study Results

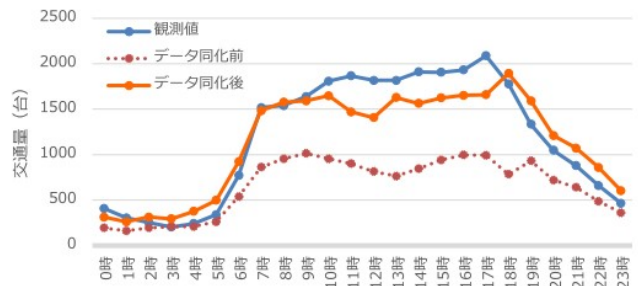
- 1) We developed multiple activity models, implemented data assimilation, and confirmed accuracy improvement by assimilating to mobile spatial statistics, and integrated it with a network simulator and presented policy evaluation according to the characteristics.
- 2) We carry out high-precision simulation by taking in various observation data of link in network simulator and correcting parameter



Data assimilation for activity simulator



Example of Mobile Space Statistics



The discretionary activity change of citizens

Improvement of the accuracy of link flow

4. Papers for Presentation

- 1) The Update of the Parameters in Activity-Based Simulation by Assimilation into Mobile Spatial Statistics, Akane Sawada, Kuniaki Sasaki, Asian Transport Studies, Vol.5(3), pp.439-452,2019.3
- 2) The study of traffic demand forecasting by the integration of simulation and observation, Tsukasa Ohtake, Akira Kikuchi, Proceedings of Infrastructure planning, Vol.58, 2018.11
- 3) Integrating of Activity-Based Simulation and Observation Data for Estimation of Detailed Travel Behavior, Takashi Fuse, Ryo Harada, Proceedings of Infrastructure planning, Vol.57, 2018.6
- 4) The Assimilation of Activity-Based Simulation and Mobile Phone-Based Dynamic Population, Akane SAWADA, Kuniaki SASAKI, Journal of the Eastern Asia Society for Transportation Studies, Vol.12, pp.690-708, 2018.4
- 5) A study on the estimation of OD matrix assimilating the OD matrix forecasted by tour based model to the observed OD matrix, Akane SAWADA, Takuya KAWABE, Eiki SHIRASU, Kuniaki SASAKI, Journal of JSCE D3, Vol. 73(5), I_579-I_588, 2017.12

5. Study Development and Future Issues

This study made it possible to show indices which are relevant to the improvement of the quality of life of the residents, and to make an evaluation on the quality in both the hardware and software measures. As future issues, various observation data are becoming available, so that it will be the issue to select observation data and its assimilation method for the evaluation.

6. Contribution to Road Policy Quality Improvement

It is possible to evaluate the improvement of quality of life by hard and soft road traffic measures. In addition, it is possible to predict the state change of the network using various observation data of the road, which may contribute to the social innovation.

7. References, Websites, etc.
