Urban and Transportation Systems Laboratory

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Key words	Road traffic management, public transport network, traffic big data, intelligent transport systems (ITS), travel behavior analysis, public service demand, urban model, microsimulation

This laboratory researches the following themes in the pursuit of the ideal state for a safe, convenient, comfortable, and environmentally-friendly urban structure and transport systems that is in unison with regional society, and how it might be realized.

Theme 1 ▶ Traffic safety management methods that make use of traffic big data

The effective and efficient realization of traffic safety management that lies at the center of improving the road traffic environment demands a scientific understanding of the risks posed by traffic accidents. Our laboratory is aiming to construct a traffic safety management method that uses not only traffic accident statistical data, but also traffic big data such as drive recorder data, vehicle probe data, and three dimensional road space data. Our approach is focused on Aichi Prefecture and Toyohashi City, and includes the construction of an accident risk statistical model, the evaluation of accident risks by location and type of accident and an analysis of their causes, the observational survey, analysis and construction of a simulation model for detailed traffic flows at specific accident risk points, and the proposal and evaluation of traffic safety measures based on all of this information.

Extraction of rat-run traffic from car probe data

### Theme 2 ▶ Local public transport network planning considering taxi mode

It is important to consider ideas that make use of taxi mode in local public transport network. Taxi mode is an individual and door to door transport system and has the advantage of being able to meet the diverse needs which mass transit systems such as railways and buses could not meet. Our laboratory analyses the actual situation of of taxi trips and the mechanisms of the use taxi mode based on digital daily log data and evaluates several policies that make use of taxi mode as a local public transport network through simulations and so on.
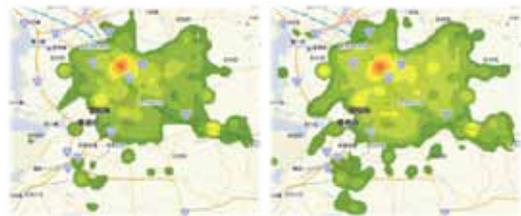
Distribution of departure and arrival points of taxi trips in Toyohashi (Left: Departure, Right: Arrival)

Theme 3 ▶ Future public service demand estimation for sustainable urban structure

It is concerned in the local government it becoming severe to offer public service at the same level now by annual revenue decrease under a population decline and aging society. Emerging pressures for more efficient and effective public management require more rational approach in forecasting future demand for public services before such problems will be actualized. Our laboratory develops the method to estimate the future distribution of population or households and grasp the change of urban service demand including transportation using urban model considering interaction between land use and transportation, in particular, microsimulation model. And we evaluate policy measures for sustainable urban structure, such as encouraging relocation policy to , improving or rebuilding of public transport network.
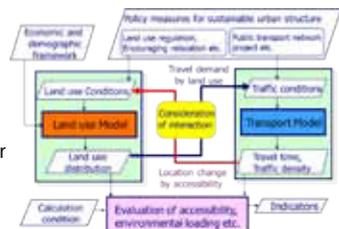
Analysis framework of urban model considering interaction between land use and transportation