

Research on Sophistication of Urban Transportation Survey and Analysis Methodologies by Utilizing ICT

(Period of Study: From FY 2015 to FY 2017)

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1. Background and Purpose of Research

In recent years, there has been rapid progress in the research on utilization of big data and the actual use thereof in the field of urban transportation. The purpose of this research is to make more efficient and further sophisticate urban traffic survey/analysis methods utilizing information and communications technologies (ICT) in regard to mobile spatial dynamics^{1,2} etc. that are generated from data transmitted through mobile phone networks (see page 182 of related research by the Information Platform Division.).

2. Main Content and Results of Research

Person trips in mobile spatial dynamics are generated by judging migration or residence according to the distance between base stations that identify mobile phone units at regular time intervals (Figure 1).

Under the current methodology, the base station-to-base station distance that enables judgment is roughly one kilometer. It has been found that, if the zone scale is smaller, there is a big spread in the accuracy of collected statistical data on mobile spatial dynamics and the rate of collection of statistical data declines in zones in and around urban centers (Figure 2). In addition, as the identification interval is roughly one hour, it is implied that multiple trips that include a brief residence as often observed in trips in the urban center may contribute to a larger variation in accuracy and a decline in the rate of

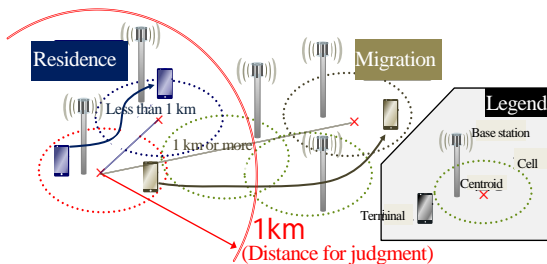


Figure 1. Judgment criteria for migration and residence for mobile spatial dynamics

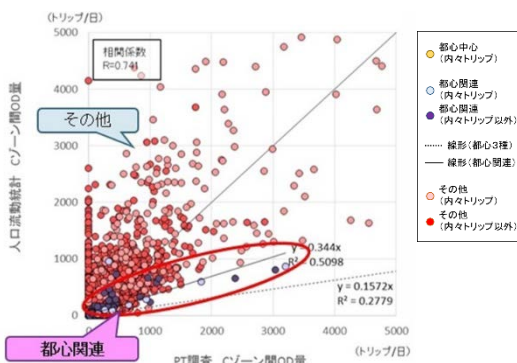


Figure 2. Accuracy of data collection for mobile spatial dynamics (in the case of small zones)

collection as they are joined together and thus recognized



Figure 3. Spatial resolution of mobile spatial dynamics (when a mobile phone unit is stationary)

as different types of trips.

Then, in order to investigate the spatial resolution in mobile spatial dynamics, we obtained statistical data by actually moving or keeping stationary all the 40 units of mobile phones in multiple urban areas. As a result, it has been found that statistical data can be collected within the radius of approximately 500 to 600 meters (Figure 3).¹

Furthermore, we selected certain areas and identified monitors that actually made trips to those areas through NTT DOCOMO's Location Information Services. We collected from them and tallied statistical data on the purpose of trips and the means of transportation they used. It has been found that the statistical data we thus obtained showed similar trends in terms of the composition of purpose of trips and the share rate of the means of transportation as in person trip (PT) surveys.²

This suggests that it is possible to complement or substitute the existing survey and analysis methodologies by using a combination of various ICT data.

3. Next Step

In order to make the existing survey and analysis methodologies more efficient and sophisticated, it is expected that we will develop more practical methodologies that can further improve spatial and time resolutions and more readily extract information on the purpose of trips and the means of transportation, etc., that can be grasped through existing surveys, among other things. Going forward, we will continue with research to develop such practical methodologies.

1) "A Study of the Possibility of the Utilization of Mobile Spatial Dynamics by a Comparison with Person-Trip Survey Technique", *A Collection of Studies and Lectures on Civil Engineering Planning*, Volume 53 by the Japan Society of Civil Engineers, May 2016

2) "A Study of the Possibility of Improvement of Person-Trip Survey Technique with Mobile Spatial Dynamics", *A Collection of Studies and Lectures on Civil Engineering Planning*, Volume 54 by the Japan Society of Civil Engineers, November 2016