

【Grant-in-Aid for Scientific Research (S)】
Science and Engineering (Engineering)



Title of Project : Dynamic Risk Management of Transport Network Using Mobile Data

Masao Kuwahara
(Tohoku University, Graduate School of Information Sciences,
Professor)

Research Project Number : 26220906 Researcher Number : 50183322

Research Area : Engineering

Keyword : Traffic Engineering

【Purpose and Background of the Research】

Purposes of the study are (1) to upgrade a monitoring system of user behavior, (2) to evolve a dynamic network analysis using behavioral data with high resolution in time-space positions and (3) to propose a dynamic risk management for recovering the system reliability under disaster. Eventually, the study aims to develop a dynamic risk management system for a transport network exploiting mobile data by unifying the above three sub-components: (1) user behavioral monitoring, (2) network analysis and (3) risk management. The unified system will be fully validated its usefulness based on applications to the real world.

【Research Methods】

A research sub-group is assigned to each of the three subtopics: (1) user behavioral monitoring, (2) network analysis and (3) risk management. And, leading oversea researchers are invited to members of the Advisory Board.

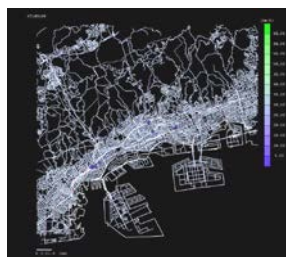


Fig.1 Probe Analysis

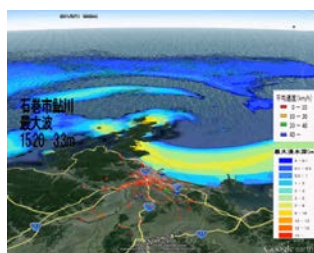


Fig.2 Traffic Monitoring under Disaster

In the first and second years, related previous studies will be systematically reviewed and a whole framework of the study will be made. In addition, behavioral measurements will be made on public urban spaces. In the third year, visualization and analysis of user movements on networks are planned and a dynamic transport simulation model and a dynamic risk management

method will be proposed. In the fourth year, each of the three proposed components will be validated using observed data. In the final fifth year, the above mentioned unified system will be validated and finalized. And, through an international symposium, the major research outcomes will be disseminated.

【Expected Research Achievements and Scientific Significance】

Consistent with the theory of transport system engineering, the trinity theory of behavioral analysis, dynamic network analysis and reliability/risk management are developed. This study is of worth not only academically but also practically in the sense that the fundamental theory of traffic engineering, which has been mainly applied to a normal condition, is extended so as to manage a transport network even under a disaster situation.

【Publications Relevant to the Project】

- Mehran, B., Kuwahara, M. and Naznin, F. (2012) Implementing kinematic wave theory to reconstruct vehicle trajectories from fixed and probe sensor data. *Transportation Research Part C*, 20, 144-163.
- Asakura, Y. and Hato, E. (2004) Tracking survey for individual travel behaviour using mobile communication instruments. *Transportation Research Part C*, 12 (3/4), 273-291.

【Term of Project】 FY2014-2018

【Budget Allocation】 150,000 Thousand Yen

【Homepage Address and Other Contact Information】

<http://www.plan.civil.tohoku.ac.jp/kuwahara/>