MAKE NEW STANDARDS. 東海国立大学機構 | GIFU UNIVERSITY

Exchange in transport sciences Switzerland-Japan
Friday, 05 July 2024
ETH Zurich, Campus Hönggerberg HIL F 36.1 13.30-15.30

Overview of our team:
Mobility Analytics Lab.

Fumitaka KURAUCHI
Gifu University
kurauchi.fumitaka.c3@f.gifu-u.ac.jp

MAKE NEW STANDARDS. 東海国立大学機構 | GIFU UNIVERSITY

Self introduction – who am I?

- Name: Fumitaka KURAUCHI
- Age: 55
- Birthplace: Osaka, Japan
- Degree: Doctor of Engineering, 2002 (Kyoto University)
- Academic career
  - Research Associate, Kyoto University (1994-2006)
  - Assistant Professor, Kyoto University (2007)
  - Associate Professor, Gifu University (2008-2012)
  - Professor, Gifu University (2012-current)
- Research interests
  - Transport management in an emergent situations, resilient transport network design, transit assignment modelling, driver/passenger behaviour analysis, ...

History of our laboratory

- Regional System Planning Lab. (2008-2012)
  - Chair: Prof. Akiyoshi Takagi (Disaster Prevention / Environmental Economics, Regional planning)
  - Prof. Satoshi (Kendge) Sugiura was MC2 student when I joined the lab.
- Transport System Design Lab. (2012-2020)
  - Prof. Hiroe Ando joined us as an undergraduate student in 2014
  - Prof. Toshihiko Miyagi joined us from Tohoku University in 2016 (Specially-appointed Professor)
    - Transport network analysis, Spatial Computable General Equilibrium (SCGE) model and game-theoretic route choice model
- Mobility Analytics Lab. (2021-)
  - Associate Professor Toshiyuki Nakamura joined us in 2023,
    - Travel behaviour analysis, mobility management and people flow modelling
  - Two part-time researchers:
    - Dr. Yoshiro Azuma: Gamification
    - Ms. Yukiko Oka: Travel Behaviour Analysis, Mobility Management

Current research topics

- Enhancing societal resilience against disaster
  - Transport management under emergent situations
  - Transport network design model for improving transport network reliability/resilience
  - Improving connectivity redundancy of transport and power supply network considering their interdependency
- Understanding people movement using big data
  - Habitual behaviour of demand responsive transport users
  - Identifying within-day trip chain patterns using GPS trajectory data
- Social acceptance analysis for autonomous bus service in Gifu
- Gamification for transport demand management

Enhancing societal resilience against disaster

- Motivation
  - Great Hanshin-Awaji Earthquake (1995)
    - Heavy congestion happened after the earthquake, and importance of road transport network as well as its management after the disaster has been recognised.
- Research interest
  - How should we manage road and public transport services after a disaster?
  - How can we create more disaster-resilient transport network?
  - May progress of electrification contribute to improve transport resiliency or not?
- Research progress
  - Will be presented by Hiroe (Heidi).

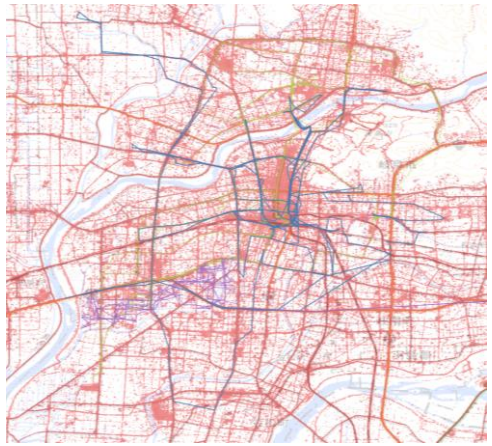
Understanding people movement using big data

- Motivation
  - Plenty of transport-related 'big data' is now available in Japan,
  - Each product has its pros and cons.
  - Can we have unbiased result by combining several 'biased' big data?

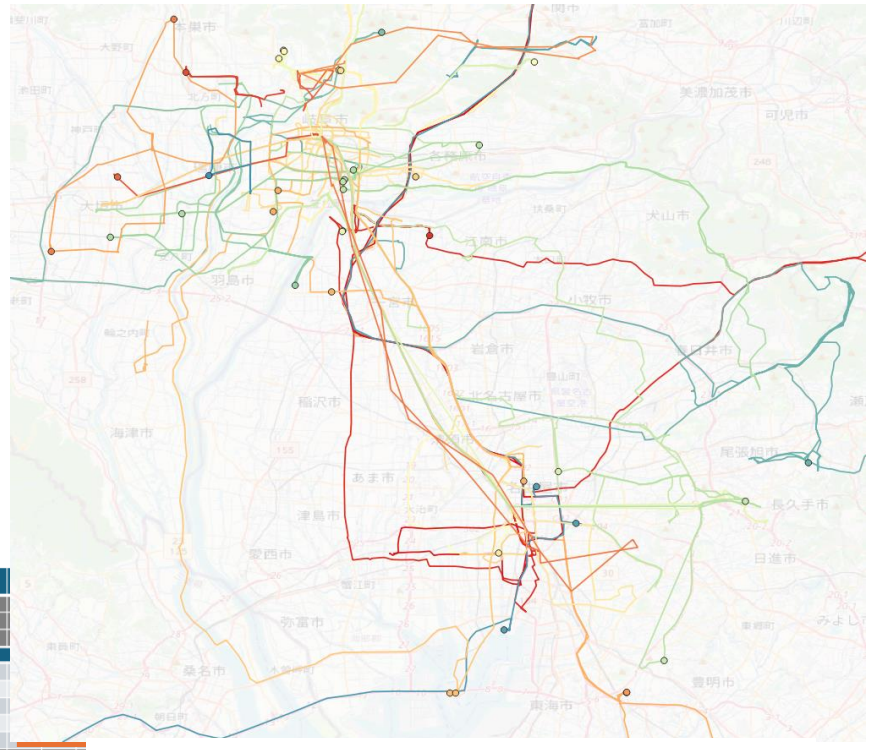
	Mobile Spatial Statistics	Agoop (and others)	Booking data for DRT	Personal trip survey
Data source	Mobile communication antenna	Smartphone application with GPS location	Online booking system	Questionnaire
Data type	# of people in 500m-mesh by hour	Point data	BS to BS ride with time and user ID	Zone-based movement
Pros	Rather accurate compared with other app-based data	Detail movement can be estimated	Long period of data available	Trip purpose recorded. Rather large samples
Cons	Individual movement unobservable, difficult to distinguish whether people are staying or moving	Large bias of users using specific apps	Only people using DRT service recorded.	Low frequency (once / 10 years)

Understanding people movement using big data

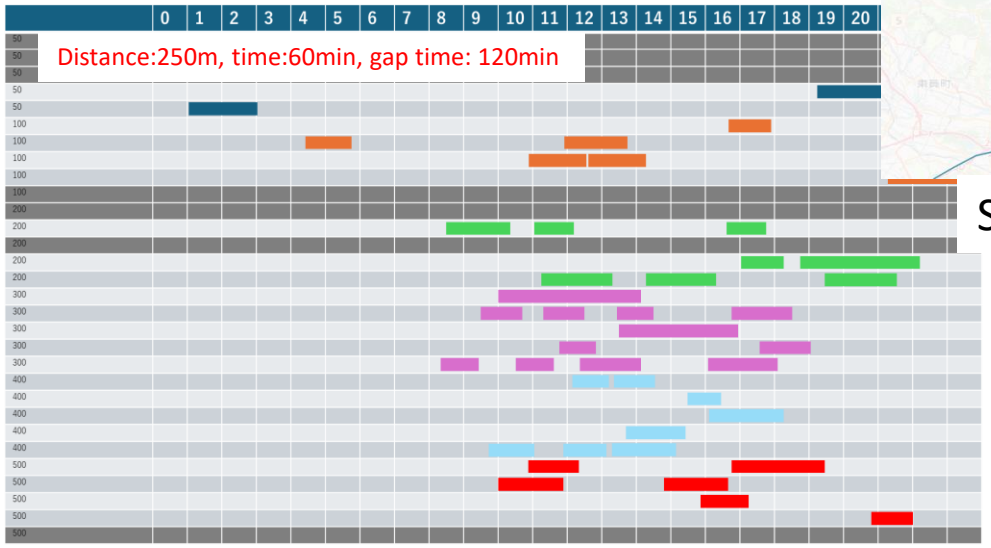
- Research progress
  - Habitual behavioural analysis using demand-responsive transport booking data – by Mr. Ran Du
  - Day-to-day as well as within-day behavioural analysis using big data
  - People movement will further be modelled...



AGOOP data



Spatial movement of 30 individuals

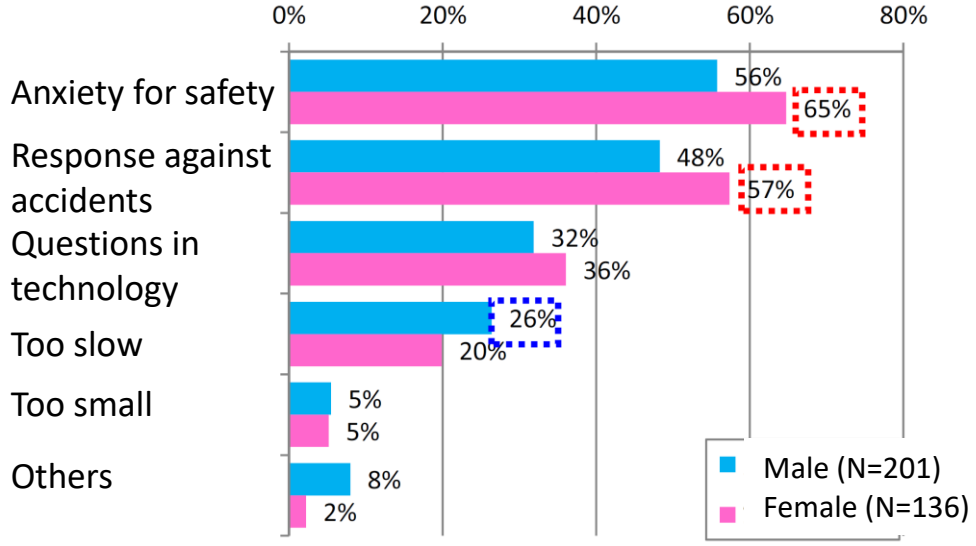


Move-stay estimation (30 individuals)

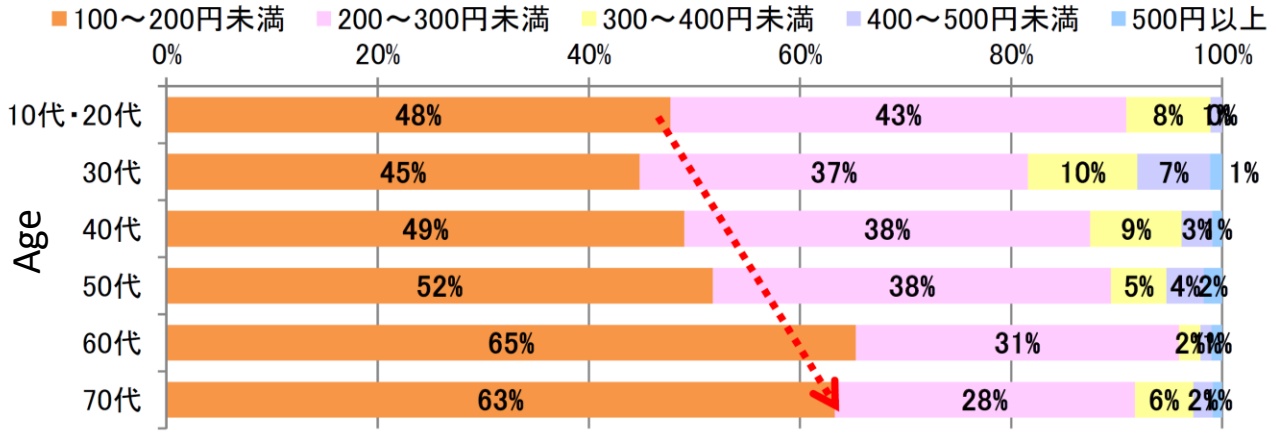
Social acceptance for autonomous bus service

- 5-year experiment of autonomous bus service in Gifu (Gifu HEART Bus)
  - ➢ Aiming to gain societal acceptance of autonomous bus service by continually exposing them.
- Carrying out questionnaire survey to see the societal acceptance,
  - ➢ Unifying the questionnaire to compare among Japanese cities as well as European cities. (by Prof. Ayako Taniguchi, Tsukuba University)
- Panel data will be further collected.

Reasons why not using autonomous vehicles

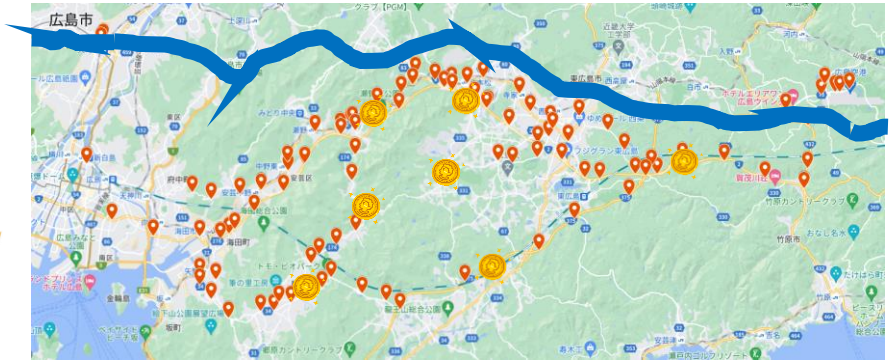


Willingness-to-pay for one ride of autonomous vehicle



Gamification for transport demand management

- Motivation
  - Road congestion may be improved by adding a new value onto less attractive routes.
  - Why not utilising 'game' to add a new value?
- Research progress
  - Literature review on gamification in the context of transport management
  - Field experiment in Hiroshima to encourage drivers to avoid using Sanyo Expressway during congested time by 'congestion mitigation game'



The game will be applied to Gifu TDM Project with a collaboration of Gifu National Road Office of the Ministry of Land, Infrastructure, Transport and Tourism of Japan.

Wishing to see all of you at CASPT and TransitData2025!!

- Date: 1-4th, July, 2025
- Venue: Clock tower, Kyoto University, Kyoto, Japan.
- Chair:
  - Prof. Jan-Dirk Schmöcker (Kyoto Univ)
  - Fumitaka Kurauchi (Gifu Univ)
- Important dates:
  - 31 Oct 2024: Deadline for short paper submission
  - 15 Feb 2025: Announcement of acceptance/rejection and invitation to Sis
  - 15 May 2025: Submission of finalised short papers

Further information can be found at (https://www.caspt.org).

Thank you!

kurauchi.fumitaka.c3@f.gifu-u.ac.jp