

# 04

## Datifying cities

- Event analysis by environmental sensing and machine learning -



### Abstract

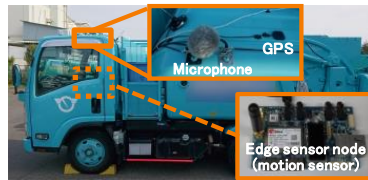
We investigated **datification of spatio-temporal city-wide events**. We addressed environmental sensing mounted on such public vehicles as garbage trucks. By using the sensor data, we can extract city events and analyze them. To achieve stable environmental sensing, we implemented **dynamic programming technology** that enables us to change system behaviors based on actual environments. We also developed **reduction technology** to reduce communication cost from sensors and processing costs on servers. Moreover, we also investigated **integrated analysis of heterogeneous data**. The analyzed result supports intuitions of city officials. By collecting and analyzing city-events with our proposed technology, more **efficient city management** and **urban planning** based on detailed prediction are possible. In this demonstration, we introduce our six years of research and field trials in Fujisawa city.

### Datifying cities: achieved by spatio-temporal event analysis toward smart cities

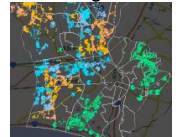


### Regional solid waste amount estimation

- **Data abridgement** on edge sensors
- Extraction of garbage collection events by sensing engine vibrations
- **Event extraction** reduces amount of transmitted data amount drastically



### Garbage collecting status



### Regional garbage amount



Garbage management planning based on long-term fluctuation and regional seasonal variations in amount of solid waste

Amount distributed by collecting-time duration

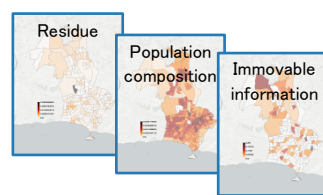
### Air quality monitoring

- **Environmental monitoring** by mounting air quality sensors on garbage trucks
- **Dynamic program update technology** stabilizes system by trial and error



Detailed city management using both noise level and air pollution distribution maps

### Data analysis between garbage and regional characteristics



Less residue areas

Characteristics	
1	Condominiums
2	Terraces
3	Internet available
4	70'
5	No room-sharing

\* Residue: inadvertently discarded garbage

- **Data analysis** using regression between regional characteristics and amount of residue
- Extracted characteristics agree with garbage collectors' intuition

Garbage management depends on regional characteristics

- A part of this research was supported by National Institute of Information and Communications Technology (NICT).

- This map is based on GSI Tiles published by Geospatial Information Authority of Japan. Source of city block segmentation data is e-Stat by Statistics Bureau of Japan.

### References

[1] Yasue Kishino, Koh Takeuchi, Yoshinari Shirai, Futoshi Naya, and Naonori Ueda, "Datifying city: Detecting and accumulating spatio-temporal events by vehicle-mounted sensors," in *Proc. of IEEE BigData, International Workshops on Smart Cities: People, Technology and Data (IWSC'17)*, 2017.

### Contact

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