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Utilizing Interactive Data Analysis in Big Data Applications

The spread of the Web, mobile devices, and IoT (Internet of Things) makes it possible to transform massive real world events into digital data in real time. Now, diverse and large-scale real world information is generated from sensors installed in various equipment and moving objects, and the total amount of digital data in the world will reach 160 ZB (Zettabyte) in 2025. In our laboratory, we are researching and developing methods to interactively visualize and analyze diverse big data such as the web, social media, and traffic data. We are looking forward to the participation of students interested in realizing solutions for understanding various social phenomena.



Figure 1: Information diffusion in Twitter

Main fields of study

Cyber Space Information Analysis:

Social media allow users to connect and communicate with their friends. By analyzing the user network structure and information flow, it is possible to understand the mechanism of information diffusion. Figure 1 visualizes how Twitter users share evacuation information at the time of the great earthquake in 2011. It can visually monitor the central persons of topics and structural patterns of diffusions. We also analyze phenomena on social media from various viewpoints, such as social influence of topics, prediction of cross lingual diffusions, and polarization of controversies.

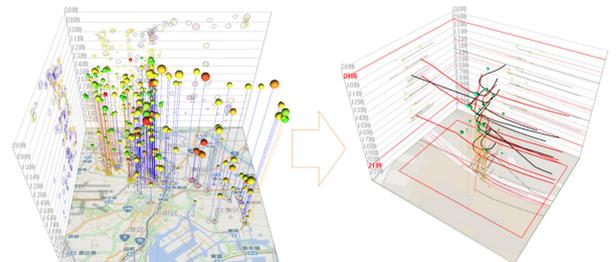


Figure 2: System for examining the risk of road traffic accidents

Real world information analysis:

We are developing interactive visualization techniques for a wide variety of sensor data collected from the real world. One important application is estimating risk of vehicle drivers and roads utilizing in-vehicle GPS and accelerometer. Figure 2 shows a visualization system that allows us to examine the risk of road traffic accidents. Another application is inspection of infrastructure supported by ICT. In collaboration with the Faculty of Engineering, we are developing a smartphone based system for measuring and visualizing road surface conditions (Figure 3) that provides local governments a way to efficiently manage large-scale road networks.

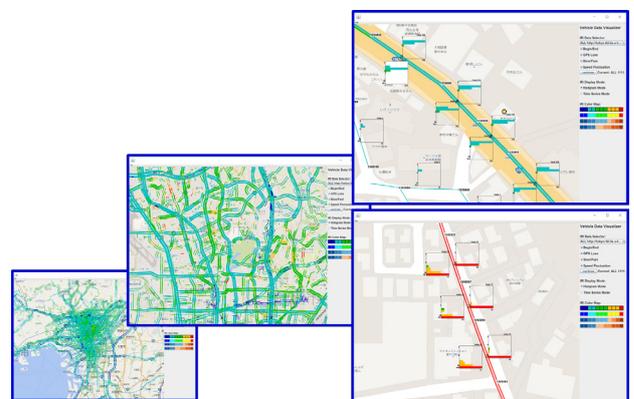


Figure 3: System for monitoring road surface conditions measured by smartphones

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