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Detection of uneven road surfaces on internet of vehicles

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This study aims at finding uneven road surfaces on an Internet of Vehicles (IoV) network composed of about 40 taxis and 2 dedicated vehicles. The taxis are operating in Daegu city, which is the 4th largest metropolitan city of 883.56 km² in Korea, for 7 months and are transmitting sensor data every 10 seconds. Thus, about 1.1 million sensing points per month are generated from the network. There are 10 types of sensors including vibration sensor, particulate matter sensors (PM10 and PM2.5), carbon monoxide (CO) sensor, and nitrogen dioxide (NO2) sensor inside taxi cab light. For the dedicated vehicles, 32 types of sensors including vibration sensor, acceleration sensor, gyro sensor, and black box are mounted inside hard-shell carrier. In this study, we've drawn a heat map as shown in fig. 2 with the vibration-related sensor data without pre-fixed road segmentation. Intensive road imbalances have been observed in major arterial roads leading from Daegu city hall (center in the map) to Seongseo industrial complex (left in the map), which imply that such roads are affected by frequent traffic and heavy trucks. Field inspections allowed us to identify a series of potholes and cracks at these points, many of which occur on maintained roads. It indicates that it is necessary to consider maintenance method for preventing and repairing potholes and pavement cracks as well as various environmental factors such as temperature, humidity, and traffic volume. Future study will include the monitoring and analysis of road conditions for other cities in Korea and abroad, and tracking the changes of the conditions through stable IoV deployment. Further, we will investigate the relationships among the factors affecting road imbalances on major bridges as such abnormality causes serious disaster.

**Figure 1:** Sensor systems in hard-shell carrier.**Figure 2:** Heat map of unbalanced road surface (Daegu city)**Figure 3:** Example of potholes and cracks.

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5. Um J (2016) Distributed RDF store for efficient searching billions of triples based on Hadoop. *The Journal of Supercomputing* 72(5):1825-1840.

Biography

Hanmin Jung works as the Head of Scientific Data Research Center and Chief Researcher at Korea Institute of Science and Technology Information, Korea since 2004. He received his BS, MS, and PhD degrees in computer science and engineering from Pohang University of Science and Technology, Korea in 1992, 1994, and 2003. Previously, he was senior researcher at Electronics and Telecommunications Research Institute, Korea, and worked as CTO at DiQuest Inc., Korea. Now, he is also full Professor at University of Science & Technology, Korea; Visiting Professor at National Human Resources Development Institute, Korea; Visiting Fellow at University of Southampton, UK; Guest Professor at Graz University, Austria; Guest Professor at Paderborn University, Germany; Editor at Korea Contents Association; Director at Korean Society for Internet Information; Director at Korean Society for Big Data Service; Director at the Korean Society of Computer and Information and; Committee Member of ISO/IEC JTC1/SC32. His current research interests include the fourth industrial revolution, semantic web, artificial intelligence, text mining, big data, information retrieval, human-computer interaction (HCI), data analytics, natural language processing (NLP), and Internet of Things (IoT).

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