

Big Data Reduction for a Smart City's Critical Infrastructural Health Monitoring

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ABSTRACT

Critical infrastructure monitoring is one of the most important applications of a smart city. The objective is to monitor the integrity of the structures (e.g., buildings, bridges) and detect and pinpoint the locations of possible events (e.g., damages, cracks). Regarding today's complex structures, collecting data using wireless sensor data over extensive vertical lengths creates enormous challenges. With a direct BS deployment, a big amount of data will accumulate to be relayed to the BS. As a result, traditional models and schemes developed for health monitoring are largely challenged by low-cost, quality-guaranteed, and real-time event monitoring. In this article, we propose BigReduce, a cloud based healthmonitoring application with an IoT framework that could cover most of the key infrastructures of a smart city under an umbrella and provide event monitoring. To reduce the burden of big data processing at the BS and enhance the quality of event detection, we integrate real-time data processing and intelligent decision making capabilities with BigReduce. Particularly, we provide two innovative schemes for health event monitoring so that an IoT sensor can use them locally; one is a big data reduction scheme, and the other is a decision making scheme. We believe that BigReduce will result in a remarkable performance in terms of data reduction, energy cost reduction, and the quality of monitoring.

KEYWORDS: Monitoring; Big Data; Cloud computing; Computational modeling; Mathematical model; Smart cities