Chapter 7
Study on Query-Based Information Extraction in IoT-Integrated Wireless Sensor Networks

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ABSTRACT

The internet of things-integrated sensor nodes (IoT-WSN) is widely adopted in variety of applications such as fire detection, gas leakage detection in industry, earthquake detection, vibrating locations on flyover, weather monitoring, and many more wherein highest value is required in time to serve the abnormal areas with highest priority. The query-based information extraction has increased attention of many researchers working on increasing the network lifetime of the IoT-WSN. In resource-constraint IoT-WSN, executing the requests (in the form of queries) in time with minimum energy consumption is the main requirement and focus. The query processing at sink node in collaboration with neighboring nodes and then finding the top-k values for data aggregation is the most challenging job in IoT-WSN. This chapter investigates the various query-based approaches and improvements in the query data availability. The chapter also presents a comparative analysis that gives an idea of different aspects and applications of query-based schemes.

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INTRODUCTION

Wireless Sensor Network (WSN) Cao and Wang (2004) is an application specific network consisting of sensor nodes that senses data, do some computation and communicate the information. However, Sensors nodes are energy constrained, which pose many research challenges to create an energy efficient networks which comprises various types of traffic models and data delivery models. Recent work focuses on query-based data delivery, event-based data delivery, continuous data delivery, and hybrid-based data delivery models. There are many applications using Internet of Things integrated WSN (IoT-WSN) where sensor nodes join internet dynamically, use it to collaborate and accomplish their tasks. This integration requires many investigations and analysis to resolve the architectural issues. The Figure 1 given below shows IoT architecture layers and their integration with other private networks. The IoT-WSN is used in variety of applications such as Fire detection, Gas leakage detection in industry, earthquake detection, and vibrating locations on flyover, weather monitoring and many more wherein highest values is required in time to serve the abnormal areas with highest priority. This study focuses on query-based delivery models considering the requirements of distinct cases. The job of sink node is to find the highest value(s) from specific region of the sensor network by broadcasting the control query message to all the neighbor nodes. Generally, after reception of query message, the sensor nodes report the updated highest top-k value(s) to its parent node after an authentication process. In most of cases for processing the data, sink node will be require only part of the information instead of whole event data of a particular region. Henceforth the authentication process assures the data shared is reliable and the adopted query-based data aggregation reduces the overheads of the network and thereby contributes to prolong the network life. So, the scheme assures reliability, timeliness and efficiency in data aggregation at various levels in underlying network configuration.

Figure 1. IoT architecture layers