Evaluation of Multivariate Outlier Detection and FTDA Algorithms on Data Aggregation Accuracy for Forest Fire Using Wireless Sensor Network

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Abstract

Wireless sensor networks (WSNs) have been a very important means in forest monitoring application. Clustered WSN is a set of clusters, each of them, comprises a set of cluster members and one cluster head. In clustered WSN, the sensor node can be randomly deployed in a hard environment whereby the human cannot access all of them after deployment. Due to this reason, the cluster members are located close to each other and overlapping among their sensing coverage is occurred within the cluster. Thus, the cluster members concurrently detect the same event, and generate redundant data that send to the cluster head node. Thus, part of data event that is generated by the cluster members in the sensing process maybe is an outlier due to redundant data. To solve this issue, data aggregation is achieved to remove the redundant data in WSN, but at the cost of the accuracy of the final aggregated data. Because the final aggregated data are used to get a significant event decision as regards the forest fire occurrence. Thus, it is an important to conserve the aggregated data accuracy by outlier data detection process is accomplished before data aggregation process is implemented. This paper proposed Multivariate Outlier Detection (MOD) algorithm that conserves aggregated data accuracy that can assist the cluster head node to detect the forest fire detection in quickly manner and to reduce false alarm about forest fire detection. The proposed MOD algorithm conserved approximately 59.5% of aggregated data accuracy compared with FTDA algorithm which conserved 54.25% of aggregated data accuracy.

Keywords: Wireless Sensor Network, Multivariate outlier Detection, FTDA Algorithm.