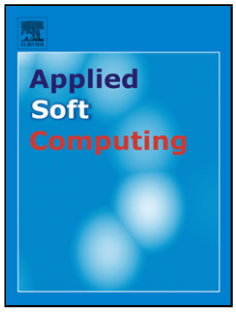

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A High Accurate Localization Algorithm with DV-Hop and Differential Evolution for Wireless Sensor Network

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Highlights:

- Discrete value of hop-count is converted to more accurate continuous value by utilizing the number of shared one-hop nodes. In this manner, the error of estimated distance between nodes can be reduced.
- The localization problem is formulated to be a minimizing optimization problem and Differential Evolution (DE) is applied to solve this optimization problem for obtaining the estimated location of unknown nodes.
- A novel localization algorithm (called DECHDV-Hop) is proposed, which performs better than other localization algorithms in different network situations.

Abstract: Localization technology has been a core component for Internet of Things (IoT), especially for Wireless Sensor Network (WSN). Among all localization technologies, Distance Vector-Hop (DV-Hop) algorithm is a very frequently used algorithm for WSN. DV-Hop estimates the distance through the hop-count between nodes in which the value of hop-count is discrete, and thus there is a serious consequence that some nodes have the same estimated distance when their hop-count with respect to identical node is equal. In this paper, we ameliorate the value of hop-count by the number of common one-hop nodes between adjacent nodes. The discrete values of hop-count will be converted to more accurate continuous values by our proposed method. Therefore, the error caused by the estimated distance can be effectively reduced. Furthermore, we formulate the location estimation process to be a minimizing optimization problem based on the weighted squared errors of estimated distance. We apply Differential Evolution (DE) algorithm to acquire the global optimum solution which corresponds to the estimated location of unknown nodes. The proposed localization algorithm based on improved DV-Hop and DE is called DECHDV-Hop. We conduct substantial experiments to evaluate the effectiveness of DECHDV-Hop including the comparison with DV-Hop, GADV-Hop and PSODV-Hop in four