Multimedia Tools and Applications (2024) 83:9761–9784
https://doi.org/10.1007/s11042-023-16030-4

Effect of fitness function on localization performance in range-free localization algorithm

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Received: 24 August 2021 / Revised: 18 April 2023 / Accepted: 12 June 2023 /
Published online: 26 June 2023

Abstract
The problem of solving the nonlinear equations in the range-free localization algorithm has been transformed into an optimal solution problem. Meta-heuristic optimization method has been widely adopted to tackle above issues. How to choose the best localization fitness function for a specific target is a key factor in determining whether the localization algorithm is accurate or not. However, so far there is no literature to investigate the effect of fitness function on rang-free localization algorithm. Firstly, this study comprehensively reviews and classifies the frequently-used localization fitness function in range-free localization scheme. Next, multiple experiments are carried out for each typical localization fitness function. The experimental results are analyzed in terms of accuracy and stability. Besides, the advantage and disadvantage of each localization fitness function are also given. Finally, an advanced localization fitness function is proposed based on the above experimental results, which will provide a guide and reference for selection and improvement of the fitness function in range-free localization algorithm.

Keywords Wireless sensor network (WSNs) · DV-Hop Localization algorithm · Metaheuristic optimization algorithm · Fitness function · Particle Swarm Optimization (PSO)

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