Indonesian Journal of Electrical Engineering and Computer Science
Vol. 10, No. 3, June 2018, pp. 1278~1286
ISSN: 2502-4752, DOI: 10.11591/ijeecs.v10.i3.pp1278-1286

Random, PSO and MDBPSO based Sensor Deployment in Wireless Sensor Network

Aparna Pradeep Laturkar[1], Sridharan Bhavani[2], DeepaliParag Adhyapak[3]
[1,3]Department of Electronics & Telecommunication, PES's Modern College of Engineering, Savitribai Phule Pune University, Pune, India
[2]Department of Electronics & Communication, Karpagam Academy of Higher Education, Coimbtore, India

Article Info

Article history:

Received Nov 21, 2017
Revised Feb 20, 2018
Accepted Mar 11, 2018

Keywords:

DBPSO
MDBPSO
PSO
Wireless Sensor Network

ABSTRACT

Wireless Sensor Network (WSN) is emergingtechnology and has wide range of applications, such as environment monitoring, industrial automation and numerous military applications. Hence, WSN is popular among researchers. WSN has several constraints such as restricted sensing range, communication range and limited battery capacity. These limitations bring issues such as coverage, connectivity, network lifetime and scheduling and data aggregation. There are mainly three strategies for solving coverage problems namely; force, grid and computational geometry based. This paper discusses sensor deployment using Random; Particle Swarm Optimization (PSO) and grid based MDBPSO (Modified Discrete Binary Particle Swarm Optimization) methods. This paper analyzes the performance of Random, PSO based and MDBPSO based sensor deployment methods by varying different grid sizes and the region of interest (ROI). PSO and MDBPSO based sensor deployment methods are analyzed based on number of iterations. From the simulation results; it can be concluded that MDBPSO performs better than other two methods

Corresponding Author:

Aparna Pradeep Laturkar,
Karpagam University,
Pollachi Main Road, L & T By Pass Road Junction,
Eachanari Post, Eachanari,
Coimbatore, Tamil Nadu, India – 641021.
Email: aparna.laturkar@moderncoe.edu.in

1. INTRODUCTION

Advancement in wireless communication have enabled the development of low-cost, multifunctional, small sensor nodes which can sense the environment, perform data processing and communicate with each other un-tethered over short distances [1]. Wireless sensor networks idea is envisioned and defined as self-deployed, error prone, long living inexpensive communication devices that are densely deployed to collect data from physical space. Sensor nodes communicate with each other to detect events depending on the application, to collect and process data, and to transmit the sensed information to the base station by hopping the data from node to node [2]. The sensor nodes are deployed either randomly or according to statistical distribution which is predefined, over a geographic region of interest (ROI). Wireless sensor network consists of various sensor nodes that are used to monitor any target area like forest fire detection by our army person and monitoring any industrial activity by industry manager [3]. A sensor node has resource constraints, like low battery power, limited signal processing, limited computation and communication capabilities and a small memory; that's why it can sense only a small portion of the environment [4]. Hence, energy saving along with coverage optimization is a critical issue in the design of a WSN.

WSN issues which can be formulated as optimization problems are localization, node deployment,