

Distributed k-Means Algorithm and Fuzzy c-Means Algorithm for Sensor Networks Based on Multiagent

This paper is concerned with developing a distributed k-means algorithm and a distributed fuzzy c-means algorithm for wireless sensor networks (WSNs) where each node is equipped with sensors. The underlying topology of the WSN is supposed to be strongly connected. The consensus algorithm in multiagent consensus theory is utilized to exchange the measurement information of the sensors in WSN. To obtain a faster convergence speed as well as a higher possibility of having the global optimum, a distributed k-means++ algorithm is first proposed to find the initial centroids before executing the distributed k-means algorithm and the distributed fuzzy c-means algorithm. The proposed distributed k-means algorithm is capable of partitioning the data observed by the nodes into measure-dependent groups which have small in-group and large out-group distances, while the proposed distributed fuzzy c-means algorithm is capable of partitioning the data observed by the nodes into different measure-dependent groups with degrees of membership values ranging from 0 to 1. Simulation results show that the proposed distributed algorithms can achieve almost the same results as that given by the centralized clustering algorithms.