

Ant Colony Optimization for Wireless Sensor Network: A Review

Benu¹, Chakshu Goel², Sheenam³

¹(Lecturer, Department of ECE, SBSSTC Poly wing, Ferozepur (Pb.), India)

²(Assistant Professor, Department of ECE, SBSSTC, Ferozepur (Pb.), India)

³(M.Tech Scholar, Department of ECE, SBSSTC, Ferozepur (Pb.), India)

Abstract: A wireless sensor network is a gathering of specific transducers with a correspondences foundation for observing and recording conditions at diverse areas. Ant colony optimization algorithm (ACO) is a probabilistic procedure for tackling computational issues which can be lessened to discovering great ways through diagrams. Clustering is the undertaking of collection a set of items in such a route, to the point that questions in the same gathering are more comparative (in some way or an alternate) to one another than to those in dissimilar gatherings (clusters). We will execute this by utilizing NS-2 Simulator.

Keywords: Ant Colony Optimization, clustering, energy efficiency, WSN

I. Introduction

A wireless sensor network is a gathering of specific transducers with a correspondences foundation for observing and recording conditions at diverse areas. Generally checked parameters are temperature, humidity, weight, wind direction and velocity, enlightenment force, vibration power, sound force, force line voltage, substance focuses, pollutant and basic body capacities. A sensor system comprises of various detection stations called sensor hubs, each of which is little, lightweight and versatile. Each sensor hub is outfitted with a transducer, microcomputer, handset and force source. The transducer produces electrical signs focused around sensed physical impacts and phenomena. The microcomputer courses of action and stores the sensor yield. The handset gets charges from a focal PC and transmits information to that PC. The power for every sensor hub is gotten from a battery.

A Wireless Sensor Network Mobile communications and wireless networking technology has seen a third time advancement. In technological advancements and also in application demands various classes of communication networks have combined like Cellular networks, Ad hoc Networks, Sensor Networks and Mesh Networks. Cellular network depend upon infrastructure. Ad hoc networks are comes in the category of wireless networks that organize multi hop radio relaying when the nodes are dynamically and arbitrarily located. Ad-hoc network are does not depend upon network. Nodes measure the ambient conditions in the environment surrounding them. These measurements include signal transformation that can be processed to show some characteristics about the phenomenon. The data collected is routed to sink node which is very special node .Then by using internet or satellite the sink node send data to user, through a gateway.

II. Important Terms In WSN

2.1 Sensor Node

A sensor node is the center part of a WSN. Sensor nodes can tackle numerous parts in a system, for example, simple sensing; data storage; routing; and data processing.

2.2 Clusters

Clusters are the hierarchical unit for WSNs. The thick way of these net- works obliges the requirement for them to be separated into clusters to simplify tasks such a Communication.

2.3 Cluster Heads

Clusters heads are the association pioneer of a cluster. They frequently are obliged to arrange exercises in the cluster. These tasks incorporate yet are not restricted to data-aggregation and sorting out the communication schedule of a cluster.

2.4 Base Station

Base station is at the upper level of the progressive WSN. It gives the communication interface between the sensor network and the end-client.

2.5 End User

The information in a sensor network can be utilized for an extensive variety of uses. Hence, a specific application may make utilization of the system information over the web, utilizing a PDA, or even a desktop PC.

III. Routing Protocols in WSN

3.1 Location-based Protocols

In area based conventions, sensor hubs are tended to by method for their areas. Area data for sensor hubs is needed for sensor organizes by the greater part of the steering conventions to compute the separation between two specific hubs so that vitality utilization can be evaluated. In this segment, we display a specimen of area mind full routing protocols proposed for WSNs.

3.2 Data Centric Protocols

Data-centric protocols contrast from traditional address-centric protocols in the way that the information is sent from source sensors to the sink. In address-centric protocol each one source sensor that has the proper information reacts by sending its information to the sink freely of all different sensors. Be that as it may, in data-centric protocols, when the source sensors send their information to the sink, halfway sensors can perform some manifestation of collection on the information starting from different source sensors and send the totaled information around the sink. This procedure can bring about vitality funds due to less transmission needed to send the information from the sources to the sink.

3.3 Mobility-based Protocols

Mobility brings new difficulties to routing protocols in WSNs. Sink versatility requires energy efficient protocols to ensure information conveyance started from source sensors to portable sinks.

3.4 Multipath-based Protocols

Considering information transmission between source sensors and the sink, there are two routing paradigms: single-way routing and multipath routing. In single-way routing, each one source sensor sends its information to the sink by means of the briefest way. In multipath routing, each one source sensor finds to start with k shortest ways to the sink and partitions its heap evenly among these ways.

IV. Ant Colony Optimization Algorithm

This algorithm is an individual of the ant colony algorithm family, in swarm intelligence method, and it constitutes some met heuristic improvements. At first proposed by Marco Dorigo in 1992 in his PhD thesis, the first algorithm was expecting to hunt down an ideal way in a graph, in light of the conduct of ants looking for a way between their colony and a source of food. The first thought has since differentiated to understand a more extensive class of numerical issues, and accordingly, a few issues have developed, drawing on different parts of the conduct of ants.

4.1 Related work

Yan Liang et al [1] "A Biologically Inspired Sensor Wakeup Control Method for Wireless Sensor Networks" This paper displays an artificial ant colony approach to distributed sensor wakeup control (SWC) in wireless sensor networks (WSN) to finish the joint errand of surveillance and target following. Every sensor hub is displayed as a ground dwelling insect, and the issue of target discovery is demonstrated as the sustenance finding by ants. Once the sustenance is found, the ground dwelling insect will discharge pheromone. The correspondence, nullification, and combination of target data are demonstrated as the methods of pheromone dispersion, misfortune, and collection. Since the collected pheromone can gauge the presence of a target, it is utilized to focus the likelihood of ground dwelling insect seeking action in the following round. To the best of our insight, this is the primary organically motivated SWC technique in the WSN. Such an organically motivated strategy has different alluring points of interest. First and foremost, it is distributive and does not oblige a unified control alternately group pioneers. In this way, it is free of the issues created by pioneer disappointments and can spare the correspondence cost for pioneer choice. Second, it is strong to false cautions on the grounds that the performance is gathered transiently and spatially and hence is more solid for wakeup control. Third, the proposed system does not require the information of hub position. Two hypotheses are displayed to diagnostically focus the key parameters in the system: the base what's more greatest performance. Recreations are completed to assess the execution of the proposed system in examination with agent techniques.

Liu Yanfei et al [2] "An improved design of ZigBee Wireless Sensor Network" ZigBee is a low rate, low power utilization remote correspondence innovation, which can be generally utilized as a part of the remote sensor system (WSN). WSN is made out of many hubs, the majority of the sensor hubs data in the system will be sent to the facilitator, so the organizer typically attempt the undertaking to gather sensor information data,

moderate the data, prepare the data, furthermore as the interface of the system with the client. The facilitator ought to speak with the host PC by the upper convention, so the organizer conveys an excess of burden, particularly in the expansive scale remote sensor system, which will have a terrible impact on the system correspondence. The impact demonstrated terrible ongoing, information bundle misfortune, and steadiness diminish. The paper introduces an enhanced configuration of ZigBee Wireless Sensor Network. In the system the facilitator just manages the undertaking on the ZigBee system, the rest undertakings will be prepared by an alternate processor. The processor joined with the Coordinator by RS-232 interface. All information data will be sent to the processor however the serial port. So the processor embraces the errand to manage information, preserve the system data, and speak with the host PC. Finally we tried the enhanced ZigBee remote system and check the impact.

Modares, H et al [3] "Overview of Security Issues in Wireless Sensor Networks" Wireless sensor networks (WSN) are for the most part set up for social affair records from insecure environment. Almost all security protocols' for WSN accept that the adversary can attain to completely control over a sensor hub by method for direct physical access. The presence of sensor systems as one of the primary innovation later on has postured different difficulties to specialists. Remote sensor systems are made out of expansive number of small sensor hubs, running independently, and in different cases, with none get to renewable vitality assets. Likewise, security being major to the acknowledgement and utilize of sensor systems for various applications, additionally diverse set of difficulties in sensor systems are existed. In this paper we will concentrate on security of Wireless Sensor Network.

Marriwala, N et al [4] "An approach to increase the wireless sensor network lifetime" A wireless sensor network comprise of little gadgets, called sensor hubs that are outfitted with sensors to screen the physical and natural conditions, for example, weight, temperature, stickiness, movement, speed and so on. The hubs in the remote sensor system were battery fueled, so one of the vital issues in remote sensor system is the intrinsic constrained battery control inside system sensor hubs. Minimizing vitality dispersal and amplifying system lifetime are imperative issues in the configuration of sensor systems so if the force depleted hub would stop from the system, and it general influence the system lifetime. Minimizing vitality dissemination and boosting system lifetime are imperative issues in the outline of uses and conventions for sensor systems. In this paper there is change of lifetime of remote sensor arrange in wording expanding alive hubs in system by utilizing an alternate methodology to choose group head. The bunch head determination is focused around the premise of greatest leftover vitality and least separation and picks an ideal congratulatory gesture between the group heads to transmit to the base station.

Mittal, R. et al [5] "Wireless sensor networks for monitoring the environmental activities" The region of sensor system has a long history and numerous sort of sensor gadgets are utilized as a part of different genuine applications. Here, we present Wireless sensor system which when consolidate with different zones then assumes an imperative part in investigating the information of backwoods temperature, bioinformatics, water pollution, activity control, telecom and so forth. Because of the progression in the territory of remote sensor system and their capacity to create huge measure of spatial/transient information, dependably pull in specialists for applying information mining systems and getting intriguing results. Remote sensor arranges in checking the ecological exercises develops and this pull in more prominent investment and test for discovering the examples from substantial measure of spatial/transient datasets. These datasets are produced by sensor hubs which are conveyed in some tropical locales or from some wearable sensor hubs which are joined with wild creatures in natural life hundreds of years. Sensor systems create constant stream of information over the long haul. Thus, Data mining procedures dependably assumes an imperative part for extricating the learning structure huge remote sensor system information. In this paper, we show the recognition of sensor information abnormalities, Sensor information grouping, Pattern matching and their intriguing results and with these results we can investigate the sensor hub information in distinctive ways.

Sobralet al [6] "Automated design of fuzzy rule base using ant colony optimization for improving the performance in Wireless Sensor Networks" "In this paper author displays a proposition for evaluating the nature of courses utilizing fuzzy system to help the Directed Diffusion directing protocol. The fuzzy system is utilized to gauge the level of the course quality, in view of the number of hops and the least vitality level among the nodes that structure the route. An Ant Colony Optimization (ACO) algorithm is utilized to change in a programmed way the standard base of the fuzzy system with a specific end goal to enhance the order method of courses, subsequently expanding the vitality proficiency of the system. The simulations demonstrated that the proposition is successful from the perspective of the packet loss rate, the important time to send a particular number of messages to the sink node and the lifetime of the first sensor node, which is characterized as the period that the first sensor node die due to the battery exhaustion.

V. Techniques Used

5.1 Data Mining

Data mining is the computational methodology of finding patterns in large information sets including systems at the crossing point of artificial consciousness, machine learning, insights, and database systems. The general objective of the information mining procedure is to concentrate data from an information set and change it into a reasonable structure for further use. Aside from the crude examination step, it includes database and information administration perspectives, information preprocessing, model and derivation contemplations, interestingness measurements, complexity contemplations, post-handling of found structures, visualization, and online updating.

5.2 Ant Colony Optimization algorithm

The ant colony optimization algorithm (ACO) is a probabilistic system for tackling computational issues which can be diminished to discovering great ways through diagrams. This algorithm is a part of the ant colony algorithms family, in swarm insights routines, and it constitutes some Meta heuristic advancements.

VI. Conclusion

Previous work presents an artificial ant colony approach to distributed sensor wakeup control (SWC) in wireless sensor networks (WSN) to accomplish the joint task of surveillance and target tracking. Once the food is found, the ant will release pheromone. The communication, nullification, and combination of target data are displayed as the techniques of pheromone dissemination, misfortune, and aggregation. Since the aggregated pheromone can measure the presence of a target, it is utilized to focus the likelihood of ant-searching activity movement in the following round. This method has multiple advantages but still it lacks by various ways like there is a lack of criteria for selection of clusters that which one are affected or not and also affected area node wake up all other nodes, this need to be improve. In our work we introduce new probability function for routing, introduce Intensity based wake up selection in the cluster, find effected area in the cluster & find efficiency routing for affected clusters.

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