Original Article

Adaptive Hybrid Bird Swarm Optimization Based Efficient Transmission In WSN

[1]B.Anjanee Kumar, [2]Dr.Neelam Labhade-Kumar, [3]Dr Badadapure Pravinkumar Rajkumar, [4]K.V.Daya Sagar, [5]Dr. Ganesh Kumar R, [6]Dr. Ch. Raja

[1]Department of Electronics and Communication Engineering, Dadi Institute of Engineering and Technology
[2]Shree Ramchandra College of Engineering, Wagholi Pune, India
[3]Adarsh Institute of Technology and Research centre, Khambale Vita Dist Sangli, India
[4]Department of Electronics and computer science, Koneru Lakshmaiah Education Foundation, vaddeswaram, Guntur, Andhrapradesh, India
[5]Department of Computer Science and Engineering, CHRIST (Deemed to be University), School of Engineering and Technology, Kengeri campus, Kanminike, Bangalore 560 074.
[6]Department of ECE, Mahatma Gandhi Institute of Technology, India
[1]anjanee.rit@gmail.com,[2]Neelam.labhade@gmail.com,[3]badadapurep@gmail.com , [4]sagar.tadepalli@gmail.com, [5]ganesh.kumar@christuniversity.in, [6]chaluvadiraja1972@gmail.com
DOI: 10.47750/pnr.2023.14.S02.59

Abstract

Networking proposed protocol, programming, node placement, positioning techniques, and data security are just a few of the study disciplines where the System has been used. As a consequence of the superior network topology, nodes may be separated into different clusters. The establishing groupings of device nodes is known as convergence. The persons in charge of all of the groups are known as cluster chiefs (CHs). It is Computationally to reduce total duration using segmenting techniques. The current study provides a hybrid evolutionary algorithm with an adjustable hybridization bird optimizer for successful clustering. The CH approach considers operational costs, as well as residual energy and data rate. According to simulation data, the Adaptive Hybrids Bird Swarm Optimization technique surpasses CL-LEACH and Hybrid Bird Swarm Optimized in terms of packet delay, packet delivery, and network longevity. Finally, AHBSO's speed is crucial that compare with partial swarm optimization, Combination Swarm Optimization, and its results. The proposed technique improves transmission speed by 25.34–35.50 percent depending on node density.

Keywords: Cluster analysis, Optimization, Hierarchical Cluster

I. INTRODUCTION

WSN solutions are rapidlyincreasing in a variation of industries, and they have conventional a lot of consideration in current decades. The rapid pace of development in sensor designs and classifications has reawakened interest in WSN among researchers. Wireless sensor networks are formed a large number of sensors with powered battery that data collected from surroundings for a variety of purposes. Wireless technology connects the sensor nodes, allowing them to communicate with one another and complete their responsibilities. Military, meteorological, biological, environmental sensing, industrial, and other sectors are among the fields where the WSN can be used.Cluster analysis is a powerful tool for allocating power in a resource WSN. Sensor nodes are groups of detectors that perform similar jobs. Cluster Density, Intra-cluster Connectivity, Node & CH Motion, Node Types and Functions, Cluster Allocation, Multiple Layers Clustering, and Overlapping are all things to take into account. As a result, current research proposes

a hybrid evolutionary algorithm that uses Adapted Hybrid Bird Swarm Optimisation to produce optimal results (AHBSO). The power, average energy, and the power limitation measure are CH technique selection into communication account. In terms of performance, packet drop, Simulationdiscoveries suggest that Adapted Hybrid Optimization performancethatHybrid Bird Swarm Optimal and CL-LEACH.

II. LITERATURE REVIEW

The use of a strong method to cope with variety of nodes traffic will extend the network's lifespan. This research examines a technique for predicting probable Articulation Points networks are based on Cat Swarm Optimization (CSO). Establishing points are susceptible nodes in such a network which, if removed, will cause the network to end. [1] The CSOmethod is best well-matched to handle this subject because to its merge these two. The proposed technique increases network overall performance of latencies and limits. [2] In a wide range of industries, wireless neural networks have become a more advanced tool. Conventional merger arrangements, non-compliant merger agreements, and co-operative merger contracts were categorized into 3 sets in this learning predicated on their interoperability processes and management competences: conventional blend contracts, non-compliantblend contracts, and co-operative merger arrangements [3].

The Low-Energy Adaptive Clustering Hierarchy(LEACH) approach stayed created, however it remained shown to be inefficient in terms of energy control. The study looks at how difficult it is to choose the best route to a wireless connection of switches and routers in order to increase the lifetime of the system. [4] The SOSS power path in HWSN is built just on RP and the majority of MS. The best CHs are chosen using the Bald eagle search algorithm, and data is collected effectively using numerous MS. The use of several MSs in HWSNs may enhance data collection effectiveness while saving energy. A versatilebased grouping and Sailfish Optimizer guided routing method remains applied in WSNs to save energy. Root Node (CH) [5] is chosen based on the efficient durability functionality accessible for a variety of reasons.

Following the CH selection, the SFO is utilized to find the best path to the data transmission sink. [6] We advanced an energy-efficient planning approach constructed on the Deep Strengthening Learning (E2 S-DRL) algorithm at WSN. The DR2's E2 S-competences to prolong network's lifetime and minimize network latency are aided by the assembly, cycle, and road phases. [7] To solve the transmission node placement of the gateways, the particle swarm optimization (APSO) approach is presented, with the duration of the route between both the node and the barrier as desired. The APSO algorithm now includes advanced approaches such as random inertia weight modification, flexible study variable changes, and neighbors search [8].

The EALAR (local energy route) Manets system blends particle swarm optimization (PSO) with classic LAR law enforcement methods. By incorporating the OPSO through into LAR system, all major performance parameters, such as packet delivery rate, energy usage, excess, and end latencies, are improved.

III. PROPOSED METHODOLOGY

The unique strategy needs a high node as that of the cluster leader, subsequent in clusters that are uniformly dispersed concluded a node. The novel Classified Cluster approach uses CH to minimize intra-cluster distances among self and cluster neighbors while also taking use of network power managerial skills. This research presents a hybrid evolutionary algorithm using Adaptive Hybrid Bird Swarm Optimization (AHBSO). Transmission energy, residual energy, and the energy limitation measure are all taken into account by the CH selection approach.

Adaptive Hybrid Optimization Technique

In the hypothesized Hybrid differentiated evolution using adaptable hybrid Optimization algorithm (AHBSO) based approach, CH segmentation is based on an analytic fitness value that includes communication energy as a primary

factor. The length among transmitting components consumes energy. Two further factors to examine are residual energy as well as the Resource Constraint (EC) metric. Other particles will gravitate toward a particle that has discovered an excellent location at the moment. The method will converge & clusters in the local optimum if the point is the local ideal. Communication energy, as well as based on residual and indeed the energy limitation measure, are all taken into consideration by the CH selection strategy. CH selection, clustering and overlapping at various levels. Additional particles will move forward in search of a particle that has discovered an ideal place at the moment. The approach will converge and cluster in local optimization if the point is the locally optimal point. It's conceivable that the untimely will look as if. Assume that the population's HPSO-DE size is NP, that each i^{th}particle's fitness value is fi and that the average fitness rate is f avg. The level of merging is described as follows:

$$d = \sqrt{\sum_{i=1}^{NP} \left(\frac{f_i - f_{avg}}{\max\{1, \max_{1 \le i \le N}(f_i - f_{avg})} \right)^2} \quad (1)$$

The step of merging is characterized by the constraint d. The method enters casual search mode when the parameter d is large. On the additionalpointer, the procedure could reach an optimal answer and then stop working. The equation below is used to calculate the parameter d,d c, where p is the mutation probability. The balancing parameter p is one of the most essential parameters in the wished-for AHBSO. In the next section, we'll examine the AHBSO's efficiency in optimizing a number of sample functions in order to perform a thorough investigation of the major parameter.

$$P = \int \begin{matrix} K, & d < d_c \\ 0 & others \end{matrix} \quad (2)$$

Hierarchical Clustering

CH selects a data transmission path depending on mobility parameters including energy usage. An power limited measure is used while looking for several pathways between CHs & sink nodes. The EC measure is used to calculate inter-flow noise, data transmission fluctuation, and wireless communication loss of control. The mass centre was used in the CH selection because the sensor network requires less energy in conveying data to the clustered geometric centre. The root node is chosen using the following equation:

$$IEC_{ij}(c) = ETT_{ij}(c) * \left| N_i(c) \cup N_j(c) \right| \quad (3)$$

The suggested Adapted hybrid Bird Swarm Optimization approach (AHBSO) approach is divided into rounds, with in every round starting with such an installation phase wherein clusters are generated and ending with a steady state phase. Cluster heads were nodes in the cluster which have a greater energy level than the rest. Communication systems then use the (AHBSO) protocols to calculate optimum K CHs that can reduce cost function based on the average Euclidean distance of networks to their connected Agglomerative for CH and overall starting energy of each node. The fitness value increases network energy efficiency while reducing the inter-node and selected cluster length.
In this technique, the CHs are selected to use the fitness value provided by, which would be determined theoretically and takes account as follows:

$$\text{fitness} = \sum_{i=1}^{n} \frac{E_c^i}{E_i^i} \times D(BS_z, k_i), \quad (4)$$

IV. RESULTS AND DISSCUSSIONS

The Network Simulator 3 (NS3) programme in Ubuntu implements our recommended method. We picked NS3 for a hybrid algorithms with Adaptive Hybrid Bird Optimization Technique (AHBSO) in a WSN context since it is a complex event simulator that really can model numerous sorts of systems. The packet arrival ratio measures the measure of incoming signals to traffic generating packets. Due to the added cost of the target or path construction, including for flexibly improving the way, AHBSO delivers lower bandwidths, as seen in Fig. 2.

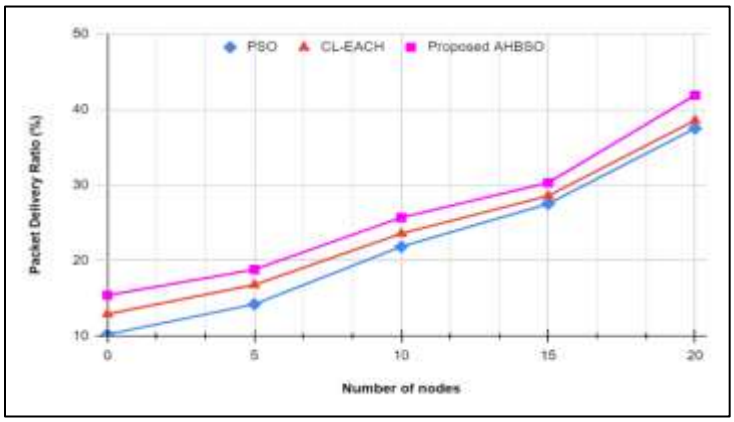

Figure 1: Regular packet transfer ratio

The network throughput statistics is being used to estimate the lifespan of a sensor network. The time taken for perhaps the first node to die is commonly used to determine the network's lifetime as shown in figure 2.

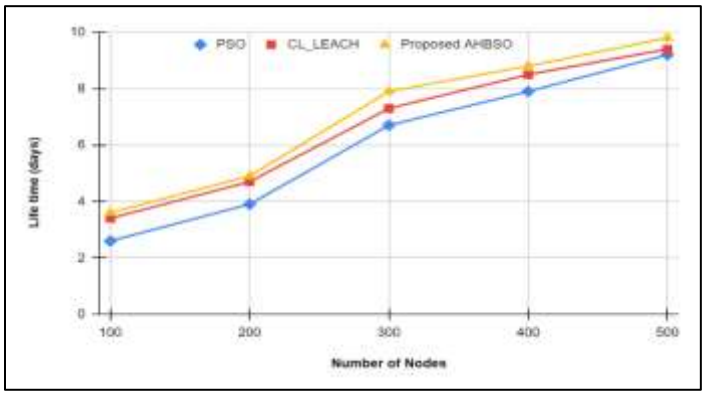

Figure 2: Lifetime computation

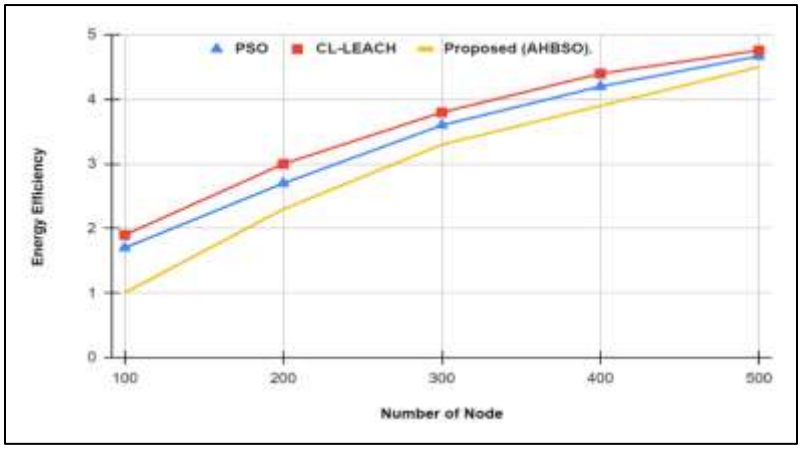

Figure 3: energy efficiency

Figure 3 depicts the outcomes of a comparative of power consumption rates between both the planned AHBSO and the current PSO and CL LEACH. According to the research, as number of nodes grows, so does power consumption. The statistics, however, imply that the suggested approach requires less power than the others.

V. CONCLUSION

WSNs' coverage is widened using clustering-based routing protocol. The identity and improved efficiency of a large, wireless sensing network are two elements that define system operations and longevity. Clustering methods improve the life of sensing devices by reducing the amount of packets which must be broadcast to a drain or BS. Power efficiency is a major difficulty in WSN since it is rare, precious, and hard to get. Several clustering techniques have been presented in order to minimise sensor power usage and extend their lifetime. In this work, adaptable hybrid bird swarm optimization is combined with hybrid dynamic programming. The findings shows that the suggested hybrid evolutionary algorithm approach delivers a longer lifetime of the network, lower power efficiency, and greater packet transmission than existing methods.

REFERENCES

1. Rao, M., & Kamila, N. K. (2021). Cat swarm optimization based autonomous recovery from network partitioning in heterogeneous underwater wireless sensor network. International Journal of System Assurance Engineering and Management, 12(3), 480–494. doi:10.1007/s13198-021-01095-x .
2. Rawat, P., & Chauhan, S. (2021). A survey on clustering protocols in wireless sensor network: taxonomy, comparison, and future scope. Journal of Ambient Intelligence and Humanized Computing. doi:10.1007/s12652-021-03381-9 .
3. Nandhini, P., & Suresh, A. (2021). Energy Efficient Cluster Based Routing Protocol Using Charged System Harmony Search Algorithm in WSN. Wireless Personal Communications. doi:10.1007/s11277-021-08679-7 .
4. Gupta, P., Tripathi, S., & Singh, S. (2021). Energy efficient rendezvous points-based routing technique using multiple mobile sinks in heterogeneous wireless sensor networks. Wireless Networks, 27(6), 3733–3746. doi:10.1007/s11276-021-02714-y
5. Mehta, Deepak; Saxena, Sharad (2020). MCH-EOR: Multi-objective Cluster Head base. Energy-aware Optimized Routing Algorithm in Wireless Sensor Networks. Sustainable Computing: Informatics and Systems, (), 100406–. doi: 10.1016/j.suscom.2020.100406
6. Sinde, Ramadhani; Begum, Feroza; Njau, Karoli; Kaijage, Shubi (2020). Refining Network Lifetime of Wireless Sensor Network Using Energy-Efficient Clustering and DRL-Based Sleep Scheduling. Sensors, 20(5), 1540–. doi:10.3390/s20051540.
7. Wang, Weiqiang (2020). Deployment and optimization of wireless network node deployment and optimization in smart cities. Computer Communications, 155(), 117–124. doi: 10.1016/j.comcom.2020.03.022
8. Abdali, Taj-Aldeen Naser; Hassan, Rosilah; Muniyandi, Ravie Chandren; Mohd Aman, AzanaHafizah; Nguyen, Quang Ngoc; Al-Khaleefa, Ahmed Salih (2020). Optimized Particle Swarm Optimization Algorithm for the Realization of an Enhanced Energy-Aware Location-Aided Routing Protocol in MANET. Information, 11(11), 529–. doi:10.3390/info11110529.
9. Sedak, M., &Rosić, B. (2021). Multi-Objective Optimization of Planetary Gearbox with Adaptive Hybrid Particle Swarm Differential Evolution Algorithm. Applied Sciences, 11(3), 1107. doi:10.3390/app11031107