IJRSET JANUARY 2021 Volume 8, Issue 1 Pages: 15-21
ISSN 2394-739X
International Journal for Research in Science Engineering and Technology

A REVIEW ON WEIGHTED BOOST SPEARMAN CORRELATIVE DUAL CLUSTER HEAD FOR ROBUST TRANSMISSION IN WIRELESS SENSOR NETWORK

[1] A. Vijayasarathi, [2] Dr. N. Elamathi
[1] Ph.D Research Scholar (PT), [2]Assistant Professor,
[1] Periyar University, [2] Trinity College for Women,
[1] Salem-11, [2] Namakkal– 2.

ABSTRACT- A wireless sensor network (WSN) ought to have the option to convey countless tiny nodes that can gather and arrange themselves for a typical reason. The part of wireless sensor nodes is to recognize and accumulate data from a sensor field or territory of interest figures the data and advances it through a radio module back to an essential issue or objective. This examination is centered around Spearman's correlation coefficient algorithm is that a hub that has satisfactory force and connected with countless neighbors ought to have need to choose as CH for gathering data from the neighbors, and energy efficient routing protocols, an energy saving strategy that is expected to find courses for transmission of data between the sensor nodes and the objective hub.

Keywords: [Wireless Sensor Network, Spearman's Correlation, Coefficient Algorithm, Routing Algorithm,Weighted Clustering Algorithm.]

1. INTRODUCTION

The improvement of wireless sensor networks (WSNs) has as of late opened up another and fascinating territory for the making of new kinds of utilizations. WSNs comprise of countless little detecting nodes that screen their current circumstance, measure data if fundamental (utilizing microprocessors) and send/get prepared data to/from other detecting nodes (Figure 1). These detecting nodes, conveyed in the climate, are associated with a sink hub – in incorporated networks – or to other detecting nodes by means of an organization. In incorporated networks, the sink gathers sensor data to be utilized by the end client. As a rule, the sink is likewise fit for actuating detecting nodes by means of broadcasting, by sending network strategy and control data (Le et al., 2008). Similarly, as with different networks, there are three normal plan difficulties that exceptionally impact the connectivity and productivity of the whole Network:

(1)Using network protocols to limit control and data packets,

(2) Selecting the best topology by situating nodes in the correct spots, and

(3) Deploying a routing algorithm that viably goes data through the network from the source node to objective node/nodes.

Characterizing Wireless Sensor Network (WSN) prerequisites there are a couple of necessities that apply to most sensor network applications (Rabaey et al., 2000, H. Edgar and Callaway, 2004, Akyildiz et al., 2002b, Pottie and Kaiser, 2000):

Lifetime: it is desirable to prolong the lifetime of the network because sensors are not accessible after deployment.

Network size: in most applications a larger network is of interest as it covers more area and therefore monitors more events.

Minimize faults: a faulty network utilizes assets to create fragmented data. At the sensor level, it implies the observing of the environment is broken and numerous occasions might be missed. In transmission to the sink, it implies packet misfortune is high; in the two cases, the information on the environment is fragmented and consequently the assembled data isn't dependable. As such, a dependable aggregate occasion to-sink is fundamental in WSNs (Sankar Subramaniam et al., 2003).

These requirements dictate the following criteria in communication protocols:

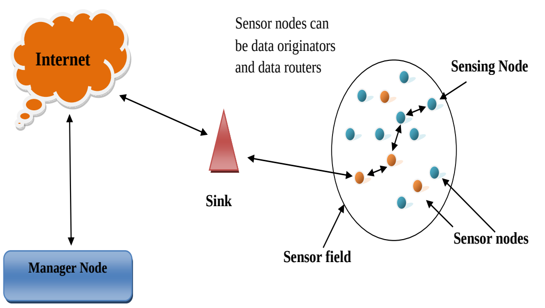


Figure1.Wireless Sensor Network

• **Lower energy consumption:** as an immediate result of the prerequisite for longer sensor lifetimes, the communication between these sensors (and sink) should gradually devour the accessible energy, as most of a sensor's energy is burned-through in communication.

• **Compatible with multi-hop communication:** commonly, sensors stay away from direct communication with the sink (as energy utilization is proportional to the square of distance); all things considered, it is favored that sensors utilize different sensors as hops to communicate.

• **Scalability:** the communication protocol should be dependable regarding building up and keeping network among sensors. This protocol should proceed as ordinary when the size of the organization expands.

• **Reliability:** solid information transmission in term of bundle misfortune is one of the principles worries to give a serious level of proficiency in checking and control frameworks.

In this way, utilizing energy-efficient communication strategies, considering multi-hop ability, scalability and reliability, is exceptionally wanted. As an immediate outcome, the lifetime of the network will be improved.

Prior to finding out about Spearman's connection it is essential to comprehend Pearson's connection which is a factual proportion of the strength of a straight connection between combined information. Its estimation and resulting importance testing of it requires the accompanying information assumptions to hold:

•Interval or ratio level;

•Linearly related;

•Bivariate normally distributed.

If your data does not meet the above assumptions then use Spearman's rank correlation!

2. THE CLUSTERING-BASED ROUTING ALGORITHM

The clustering-based routing algorithm is proposed a framework, where CH choice will be in a hierarchical manner. CH's are chosen by some probabilistic boundaries or arbitrarily and considering explicit boundaries like CH current cycle number, delay or sensor node ID. In DCHSM [I], CH's are select in two stages subsequent to isolating the absolute checking zone utilizing the Voronoi graph. In the main stage, CH is chosen utilizing the perceived probability idea, and in the subsequent stage, CH is choosing dependent on endurance time assessment. On the off chance that the top of the line chosen, CH nodes are dead at that point choose below average of CH nodes from the leftover nodes. As of late Huamei proposed energy-efficient weighted clustering algorithm (RE2WCA) clustering algorithm takes the remaining energy and gathering portability into thought by limiting least cycle times. They proposed a disseminated issue recognition algorithm and cluster head reinforcement mechanism to achieve the occasional and ongoing geography upkeep to improve the power of the network.

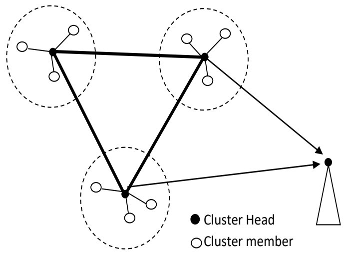


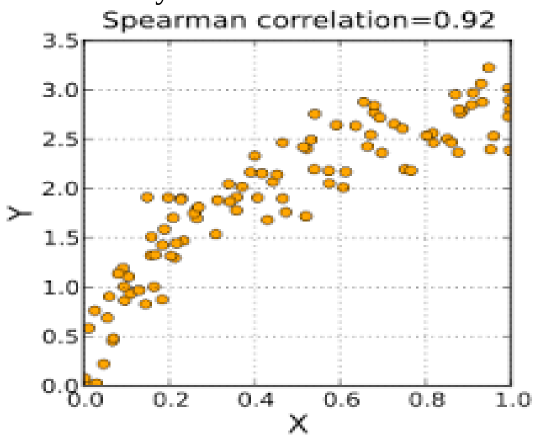
Figure2.Clustering Wireless Sensor Network Model

As per this perspective, we propose a clustering algorithm for hierarchical sensor network called Clustering with Residual Energy and Neighbors (CREN) in view of residual energy and number of neighbors of a node. The critical thought of our proposed algorithm is that a node that has satisfactory force and connected with an enormous number of neighbors ought to have need to choose as CH for gathering information from the neighbors. The CHs choice uses a probability conspire. Every node created an irregular number and decides if it very well may be the CH just if the arbitrary number not exactly a threshold esteem dependent on a bunch of neighbor nodes, residual energy of that node and number of clusters in the network. The CHs are chosen locally, and after a specific time span, all clusters remake to circulate the energy load among the sensor nodes equally in the whole network.

3. SPEARMAN'S CORRELATION COEFFICIENT

Spearman's correlation coefficient is a factual proportion of the strength of a monotonic connection between matched data. In an example it is indicated by and is by configuration compelled as follows and its interpretation is like that of Pearson's, for example the nearer is to the more grounded the monotonic relationship. Correlation is an impact size thus we can verbally depict the strength of the correlation utilizing the accompanying aide for the total estimation of:
.00-.19 "very weak"
.20-.39 "weak"
.40-.59 "moderate"
.60-.79 "strong"
.80-1.0 "very strong"

The calculation of Spearman's correlation coefficient and subsequent significance testing of it requires the following data assumptions to hold:
Interval or ratio level or ordinal;
Monotonically related.



Pers on	Age(x)	Income (y)	(xy)	(x^2)	(y^2)
1	20	1500	3000 0	400	225000 0
2	30	3000	9000 0	900	900000 0
3	40	5000	2000 00	160 0	250000 00
4	50	7500	3750 00	250 0	562500 00
Total	140	17000	6950 00	540 0	925000 00

3.1 Dual-Cluster Heads Clustering Routing Algorithm Based on PSO (DC-PSO)

Another dual-cluster heads clustering routing algorithm dependent on PSO (DC-PSO). This algorithm can share the energy consumption of cluster heads by setting the cluster routing algorithm. Nonetheless, a lot of data transmission is delivered when the clusters are close to the base station. This prompts the unexpected passing of the cluster head hubs. Along these lines, the algorithm can't essentially address the "hot spots". Clearly extraordinary swarm intelligence algorithms have their interesting favourable circumstances. Contrasted and conventional keen algorithms, the later evolved algorithms perform better. When all is said in done, choosing and improving another swarm intelligence algorithm has reasonable examination importance. We will probably successfully tackle the issue of clustering routing rapidly.

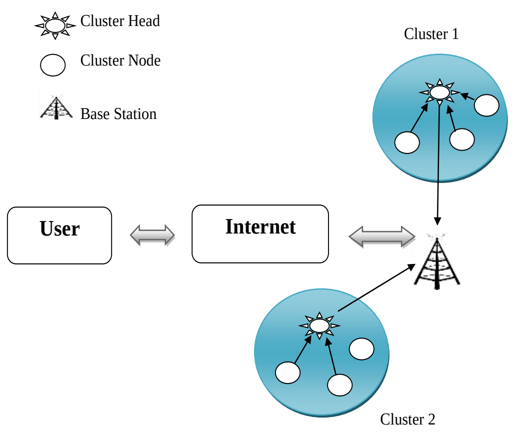


Figure 3. Dual-Cluster Heads System

To improve the use of network energy, this paper proposes dynamic layered dual-cluster heads routing algorithm dependent on Krill Herd (KH) advancement in UWSNs. At the point when the distance between sink nodes is insignificant, a colossal measure of energy is burned-through. For this situation, the submerged network sets the non-uniform clusters as per the size of the clusters and the distance among nodes and the sink node. It can diminish the sudden passing of the upper nodes. The dynamic hierarchical component is presented. It can lessen the cluster head nodes that are consistently chosen by a similar node. In the interim, the network energy consumption is adjusted. At last, the centre of the KH streamlining is utilized to pick the expert cluster head nodes and bad habit cluster head nodes. It tackles the issue that the cluster head nodes are under substantial burden, and successfully delays the endurance season of cluster nodes.

3.2 KH Main Cluster Head and Vice-Cluster Head Selection Phase

At the point when the dynamic layer and non-uniform clustering stage is finished, the master cluster heads and bad habit cluster heads are chosen with the improved KH algorithm. Most importantly, a threshold is set. When the radius of the cluster is not exactly this threshold, the applicant cluster head turns into the cluster head. Actually, the two cluster heads are chosen in the primary stage as per the KH algorithm.

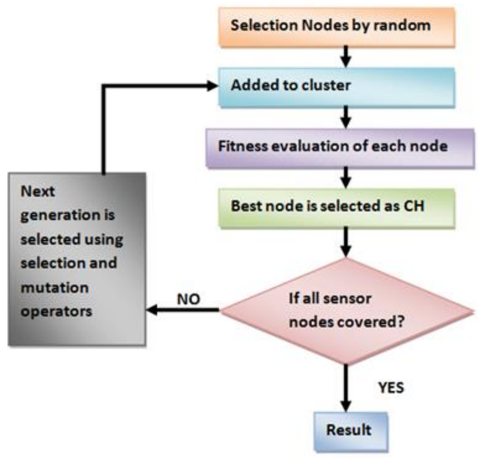


Figure4.Cluster Head and Vice-Cluster Head Selection

3.2.1. Fitness Function

The presentation of cluster head in the cluster routing algorithm depends upon the choice of the wellbeing work. To postpone the perseverance period of the master cluster, head, the condition that the energy loss of the essential cluster head is altogether more than that of the basic centre point should be considered. The decision of the territory of the master cluster head should be considered also to accumulate the data of various nodes in cluster. The distance between the two nodes is needed to show up at the base. To pick the ideal cluster head, the formula of the adaptable limit showed up underneath is embraced:

The following Lagrangian model is generalized to an n-dimensional decision space:

$$Dxidt = Ni+Di+Fi \quad (1)$$

3.2.2. Movement Induced by Other Krill Individuals

Krill individuals try to maintain a high density and move due to their mutual effects. For an individual krill, this movement can be defined as follows:

$$Nnewi=Nmaxdi+wnNoldi \quad (2)$$

$$di=dlocali+dtargeti(3)$$

where N^{max} is the maximum induced speed which set to 0.01 (ms^{-1}), d_i is estimated from the local swarm density (local effect), w_n is the inertia weight of the motion which is distributed in the range [0, 1], Nolde is the last induced motion, dlocalis the local effect provided by the neighbours, and dtargetis the target direction effect provided by the best krill individual.

The impact of the neighbors can be expected as appealing and repulsive tendency between the people for a nearby hunt. In this examination, the impact of the neighbors on individual krill development individual is resolved with the accompanying conditions:

$$dlocali=\sum j=1NNKi,jXi,j \qquad (4)$$

$$Xi,j=Xj-Xi\|Xj-Xi\|+\varepsilon \quad (5)$$

$$Ki,j=Kj-KiKworst-Kbest \qquad (6)$$

To avoid singularities, a small positive number ε is added to the denominator. NN is the number of the neighbours, K_i represents the fitness or the objective function value of the i-th krill individual, K_j is the fitness of j-th (j = 1, 2, …, NN), K^{best} and K^{worst} are the best fitness and the worst fitness values of the krill individuals respectively, and X represents the related positions.

As indicated by the genuine conduct of krill, the neighbors can be found by other krill individual once the sensing distance is resolved. The articulation for this condition is as per the following:

$$ds,i=15N\sum j=1N\|Xj-Xi\|(7)$$

Where $d_{s,i}$ is the sensing distance for the i-th krill individual, and N is the number of krill individuals. If the distance of two krill individuals is less than the defined sensing distance, then they are neighbours.

Considering the effect of the individual krill with the best fitness, the following equation can be obtained:

$$dtargeti=CbestKi,bestXi,best(8)$$

$$Cbest=2(rand+IImax) \quad (9)$$

Where C^{best} is the effective coefficient of the krill individual with the best fitness, rand is the random values between 0 and 1 which is for enhancing exploration, I is the actual iteration number, and I_{max} is the maximum number of iterations.

3.2.3. Foraging Motion

The foraging motion of the krill people is figured regarding two principle viable parameters. The first is the food area. The second is the past experience about the food area. These parameters are portrayed underneath.

$$Fi=vf\ \beta i+wfFoldi(10)$$

Where Foldi is the old foraging motion.

$$\beta i=\beta foodi+\beta besti(11)$$

where v_f is the foraging speed which sets to 0.02 (ms^{-1}), w_f is the inertia weight of the foraging motion which distributes in the range [0, 1], βfoodi is the food attractive, and βbesti is the effect of the best fitness.

Food impact is characterized as far as its area. The center of food should initially be distinguished. It is trailed by the formulation of food fascination. Food impact can't be resolved yet can be assessed. In this investigation, the virtual center of food focus is assessed by the wellness appropriation of the krill people motivated from the "center of mass". The formula for this variable is as per the following:

$$Xfood=\sum Ni=1\ 1Ki\ Xi\sum Ni=1\ 1Ki \qquad (12)$$

Therefore, the food attraction for the i-th krill individual can be determined using the following equation:

$$\beta foodi=CfoodKi,foodXi,food \qquad (13)$$

$$Cfood=2\times(1-IImax) \qquad (14)$$

where C^{food} is the food coefficient. The effect of food on KH decreases with time.

The foraging movement of individual krill advances global streamlining, and krill people ordinarily crowd around the global optima after various cycles. Hence, this procedure can be viewed as a proficient global streamlining system that can improve the globality of the KH algorithm.

The effect of the best fitness of the i-th krill individual is identified using the following equation:

$$\beta besti=Ki,ibestXi,ibest \qquad (15)$$

where $K_{i,ibest}$ is the best previously visited position of the i-th krill individual.

3.2.4. Random Diffusion

Random motion can be communicated regarding a most extreme diffusion speed and a random directional vector. This variable can be formulated as follows:

$$Di=Dmax(1-IImax)\ \delta\ (16)$$

where D^{max} is the maximum diffusion speed, and δ is the random directional vector whose arrays are random values varying between −1 and 1.

3.2.5. Status Update

The status update can be formulated as follows:

X (n+1) i=X (n)i+ (Nnewi+ Fnewi+ Dnewi)· Δt (17)

where Δt is the time span and ought to be deliberately set by genuine circumstances, and Nnewi is the newest induced motion speed, Fnewi is the newest rummaging motion speed, Dnewi is the newest dissemination speed.

The limits of krill swarm optimization algorithm rely upon the real reproduction of krill development and test endorsement. Among these limits, simply the one-time stretch limits ought to be changed thus. This case is one of the ascribes of the intelligent algorithm that improves it than various get-togethers. "A Spearman's correlation was dashed to choose the association between 23 groundwater uranium and TDS regards. There was a strong, positive monotonic correlation among Uranium and TDS (= .71, n = 23, p < .001).

CONCLUSION

This paper has explored and taken a gander at communication protocols in wireless sensor networks with the expect to give an establishment and comprehension into most recent things in WSNs. Essential segments to be considered during the arrangement of wireless sensor networks and routing protocols have been comprehensively investigated. In this examination, we attempt to improve the krill swarm optimization algorithm to deal with the routing issue. Thusly, this strategy can be seen as a capable overall optimization system that can improve the globality of the KH algorithm.

REFERENCE

[1]. PengJiang , Yang Feng, Feng Wu, Shanen Yu and Huan Xu, "Communication protocols for wireless sensor networks: A survey and comparison", 30 May 2016; Accepted: 23 August 2016; Published: 29 August 2016.

[2]. Lucia KeleadileKetshabetswe, AdamuMurtalaZungeru ,MmolokiMangwala, Joseph M. Chuma, Boyce Sigweni, "Communication protocols for wireless sensor networks: A survey and comparison", Received 21 July 2018; Received in revised form 25 September 2018; Accepted 24 April 2019.

[3]. Md. ShamimHossain , Md. Ibrahim Abdullah , Md. MartuzaAhamad , Md. AlamgirHossain , Md. Shohidul Islam ," ROBUST HIERARCHICAL CLUSTERING TECHNIQUE OF WSNTO PROLONG NETWORK LIFETIME ", ISSN (Online) : 2454 -7190 Vol.-15, No.-1, January (2020) pp 263-274 ISSN (Print) 0973-8975.

[4]. John, and K. V. Babu (2017). Two Phase Dynamic Method for Clustering Head Selection in Wireless Sensor Network for Internet of Things Applications,pp 1232, IEEE WiSPNET conference.

[5]. Z. Cheng, L. Hongbing and H. Yi (2018). Mechanism of immune system based topology control clustering algorithm in wireless sensor networks, IEEE.

[6]. Hong, C.J.; Wu, W.J.; Tang, P.P. Dynamic layered clustering routing algorithm in underwater sensor networks. J. Electron. Inf. Technol. 2015, 37, 1291–1297.

[7]. Zhang Q.Y., Sun Z.M., Zhang F. A clustering routing protocol for wireless sensor networks based on type-2 fuzzy logic and ACO; Proceedings of the IEEE International Conference Fuzzy Systems; Xiamen, China. 25–28 May 2014; pp. 1060–1067.

[8]. Kong L., Chen C.M., Shih H.C., Lin C., He B., Pan J. Advanced Technologies, Embedded and Multimedia for Human-Centric Computing. Springer; Dordrecht, The Netherlands: 2014. An energy-aware routing protocol using cat Swarm optimization for wireless sensor networks; pp. 311–318.

[9]. Hong C.J., Wu W.J., Tang P.P. Dynamic layered clustering routing algorithm in underwater sensor networks. J. Electron. Inf. Technol. 2015;37:1291–1297.

[10]. Naser M.A. Study analysis and propose enhancement on the performance of

cluster routing algorithm in a Mobile Ad hoc Network. J. Adv. Comput. Sci. Technol. Res. 2014;4:1–13.
[11]. Keskin, M.; Ealtinel, I.K.; Aras, N.; Ersoyet, C. Wireless sensor network lifetime maximization by optimal sensor deployment, activity scheduling, data routing and sink mobility. Ad Hoc Netw. 2014, 17, 18–36.
[12]. T.Yu, A.Akhtar, A.Shami and X.Wang, ”Energy-Efficient Scheduling Mechanism for Indoor Wireless Sensor Networks,” in Proc. IEEE VTC Spring, May 2015.
[13]. HaleemFarman,HumaJaved,BartolomeoMontrucchio,MuradKhan,and Shaukat Ali,”Energy Efficient Hierarchical Clustering Approaches in Wireless Sensor Networks: A Survey”, Published29 Oct 2017.
[14]. N. Nokhanji, Z. M. Hanapi, S. Subramaniam, and M. A. Mohamed, “A scheduled activity energy aware distributed clustering algorithm for wireless sensor networks with nonuniform node distribution,” International Journal of Distributed Sensor Networks, vol. 10, no. 7, Article ID 218678, 2014.View at: Publisher Site | Google Scholar.
[15]. M. R. Majma, H. Pedram, and M. Dehghan, “IGBDD: Intelligent grid based data dissemination protocol for mobile sink in wireless sensor networks,” Wireless Personal Communications, vol. 78, no. 1, pp. 687–714, 2014.