SURVEY OF CLUSTRING ALGORITHMS IN WSN

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Abstract:
Now a days, the importance of Internet of Things and big data technologies is increasing day by day. It is attracting researchers towards them as it contains many challenging aspects such as unstable network structure, constantly changing network topologies, intermittent connectivity between the nodes and constrained resources. Due to these challenges, majority of the researchers and industry persons wants to work in this area.
The main motive behind the Internet of Things (IoT) technology is to tie different things together to the existing network and to provide the comfortable environment to the human beings. The things can be Internet objects, various mobile devices, data analytics, household appliances, human wearable devices such as watch, shoes etc or private and transportation vehicles etc. IoT is prominently based on these upcoming technologies and its main motive is the enhancement of the communication and flexibility in human life [1].In this paper,we have survey different clustering algorithms in WSN.

Keywords:
Clustering,Energy Management,Network Lifetime,Cluster Head

1.INTRODUCTION

Today the world is at the point of reflection of the Internet of Things (IoT) with more things.The number of products that connect to its intelligence system through a wide range of connectivity. Wireless sensor networks (WSN) are very useful for IoT applications for data processing to the end user. However, there are limited battery power and network lifetime are some of the biggest challenges in the design process of any sensor network. Figure 1.shows the design of wireless sensor network with it's basic components.

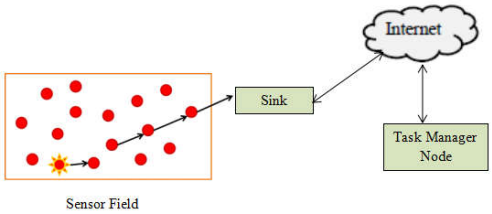

Figure 1. Wireless Sensor Network

WSN serves as a medium that brings the virtual digital world to the real world. Small sensor or actuator connected are responsible for sensing and transferring to each other internet values. The WSN has sensor nodes has deployed various physical and the network field environmental parameters.Emerging IoT has a diverse application look equipped with different categories of heterogeneous equipment[3].The routing path of the from the sensing node to the sink node or base station (BS) should be designed in an energy efficient manner since recharging sensor battery is practically impossible[4]. WSN stands for IoT application faces numerous challenges Sensor nodes, hardware, Sensors used in IoT image are assigned with additional functionality and new challenges QoS (quality of service), security and strength Management[5].Some of these factors have been taken into account adopting various technical changes to primitive protocols and plans used for WSN. QoS requirements in IoT based WSN faces significant challenges such as extreme resources content, redundancy in data, dynamic size of network, low reliable media, heterogeneous networks and multiple BS or sink nodes[6].Important security issues in WSN include authenticity and confidentiality , data integrity and freshness in data[7]. Recent research has yielded results with different ideas to reduce energy and expand the network Longevity for proper use of resources. Routing Algorithms play an important role in the process.

The Internet of Things (IoT) is an integration of existing and evolving internet with future network developments, such as self-configuring capabilities and enhanced network lifetime with proper energy management[1].There are three major types of local internet basic components designed like IoT integrative communication component. The first is hardware made up of Sensors, actuators and radio Frequency Identification (RFID), Wireless Sensor Network (WSN), etc.The second is a Middleware that provides on demand storage and computer tools for data for analytics.And the presentation and visualization of the last novel is easy to understand and discussion tools that can and will be widely accessed on a variety of platforms designed for a variety of applications[2].One of the main design criteria of WSN is data communication in IoT environment when trying to prolong the network lifetime.Clustering makes hierarchy of clusters or groups of collecting sensing nodes and transfers data to the respective cluster head (CH). The CH then splits the data and sends or fuses the sink node or Base station (BS) which acts as middleware during the end user and network.

2.RELATED WORK

T. **M. Behera, et al. (February 2019)**, proposed the algorithm to select CHs with important considerations parameters like initial energy, remaining energy of individual nodes and optimal number CH in the Network. Changes have been made to classic Leach protocol.After each round of the algorithm is completed, the residual energy of the non-CH nodes is checked and one with energy levels are higher than others possibility to select CH for the current round. It will prevent the network from dying out as soon as it grows network lifetime[8].

A. **Shankar, et al. (September 2018)**, proposed method raises concerns about the main difficulties related to distance, delay, energy and safety. They compared the performance of the proposed GGWSO with Many traditional algorithms such as Artificial Bee Colony (ABC), Fractional ABC, Group Search Optimization and Gray Wolf Optimization-based cluster head selection[9].

O. **Hassan, et al. (May 2017),** formulated energy-efficient in WSNs using Cluster-Based Approach Routing.This research work analyses the energy-efficiency using hierarchical cluster-based approach namely LEACH, for designing a novel method for enhancing the life-time of WSN. Their method is depending to enhancing the algorithm LEACH protocol, exactly to reduce the distance between BS and CH and reduced number of dead nods far than BS. Their strategy contains identifying the specific CHs of the nodes that are away from BS at half the topology of the network. The objectives is to eliminate the depletion of the node which is at distant from the BS and give luck to the node placed at the half of the topology and base station so that they will be converted into CHs. Their strategy is for the energy conservation whenever the data transmitted to the BS[10].

K. **Maraiya, et al. (2011),** Proposed new schemes related to clustering for data aggregation called “Efficient cluster head selection scheme for data aggregation in wireless sensor network ”(ECHSSDA). They also compared proposed scheme with LEACH clustering algorithm based on energy consumption, cluster head 8 selection and cluster creation.In this CH is selected from the same cluster in each round and contains data sent to CH on a multi-hop method to prolong network lifetime.They proposed the most favourable algorithm for efficient cluster head selection which does not require regular cluster head selection, so much energy is saved in wireless sensor networks. Through the simulation result they concluded that ECHSSDA is better than LEACH and LEACH-C protocols in the energy consumption in the cluster selection process[11].

Hu Junping, et al. (2008), proposed Time-based Cluster-Head Selection Algorithm for LEACH. Here, they research on the subject that, without global information, how to create a well-distributed cluster with consistent CHs numbers and ensure almost optimal selection of CH to

ensure the total energy loss of the sensor is balanced and at least.It focuses on setting well distributed clusters.To maximize the life of the network the protocol must ensure the division of the cluster is balanced and uniform. To achieve this goal the number of CHs must be dominant, and the network requires an optimal CHs amount.To prepare constant number of clusters, TB-LEACH constructs the cluster by using based algorithms Random-timer, which does not require any global information.The proposed TB-Leach provides more energy efficiency and network efficiency than LEACH[12].

W. **Heinzelman, et al. (January 2000)**, proposed Leach (Low-Energy Adaptive Clustering Hierarchy), a clustering-based protocol that uses random rotation of a local cluster-based station (cluster-head) to distribute energy loads evenly across sensors in a network. LEACH uses localized coordination to enable scalability and consolidation for dynamic networks and incorporates data fusion into routing protocols to reduce the amount of information sent to the base station. LEACH brings out static clustering algorithms by requiring nodes to volunteer as high-energy cluster-heads optimize the corresponding clusters based on the nodes select the cluster heads at the selected time. At different times, each node has a load to receive data nodes in a cluster by fusing data to merge signal and transmits this total signal to the base station.LEACH is fully distributed and requires no control information from base stations,and knowledge of global networks is not required to nodes to operate the LEACH. LEACH will overtake traditional communications in terms of protocol, energy dissipation, ease of configuration and lifetime of the system / network quality. Providing such low-energy, ad hoc, distributed protocols will help pave the way for future microsensor networks[13].

2. CONCLUSION

The Wireless Sensor Network (WSN) has made a growing list of attention forces over the last few years. And civic applications can use WSN for growth effectiveness; Especially in remote and unfavorable conditions.Examples include battlefield surveillance, borders Defense, disaster management. Clustering has become one of the most popular method of gaining scalability in WSN.In this paper, we surveyed a number of research works based on clustering for energy management in WSN.

References

*[1]J. Chase, "The evolution of the internet of things," Texas Instruments, **2013**.*

*[2]J. Gubbi, R. Buyya, S. Marusic, and M. Palaniswami, "Internet of Things (IoT): A vision, architectural elements, and future directions," Futur. Gener. Comput. Syst., vol. 29, no. 7, pp. 1645–1660, **2013**.*

*[3] P. Bellavista, G. Cardone, A. Corradi, and L. Foschini, "Convergence of MANET and WSN in IoT urban scenarios," IEEE Sens. J., vol. 13, no. 10, pp. 3558–3567, **2013**.*

*[4] W. B. Heinzelman, A. P. Chandrakasan, and H. Balakrishnan, "An application-specific protocol architecture for wireless microsensor networks," IEEE Trans. Wirel. Commun., vol. 1, no. 4, pp. 660–670, **2002**.*

*[5] J. Gubbi, R. Buyya, S. Marusic, and M. Palaniswami, "Internet of Things (IoT): A vision, architectural elements, and future directions," Futur. Gener. Comput. Syst., vol. 29, no. 7, pp. 1645–1660, **2013**.*

*[6] B. Bhuyan, H. K. D. Sarma, N. Sarma, A. Kar, and R. Mall, "Quality of service (QoS) provisions in wireless sensor networks and related challenges," Wirel. Sens. Netw., vol. 2, no. 11, p. 861, **2010**.*

*[7] Q. Jing, A. V Vasilakos, J. Wan, J. Lu, and D. Qiu, "Security of the Internet of Things: perspectives and challenges," Wirel. Networks, vol. 20, no. 8, pp. 2481–2501, **2014**.*

*[8]T.M. Behera, S.K.Mohapatra, U.C. Samal, M. S. Khan, M. Daneshmand, and A. H. Gandomi, "Residual Energy Based Cluster-head Selection in WSNs for IoT Application", IEEE Internet of Things Journal, vol.6, issue 3,Feb. **2019** .*

*[9] A. Shankar, N. Jaisankar, M. S. Khan, R. Patan, and B. Balamurugan, "Hybrid model for security-aware cluster head selection in wireless sensor networks," IET Wirel. Sens. Syst., **2018**.*

*[10]Hassan Oudani, Salahddine Krit, Mustapha Kabrane, Kaoutar Bandaoud, Mohamed Elaskri, Khaoula Karimi, Hicham Elbousty, Lahoucine Elmaimouni, ―Energy Efficient in Wireless Sensor Networks Using Cluster - Based Approach Routing‖ International Journal of Sensors and Sensor Networks **2017**;5(5 - 1): pages6 - 12*

*[11] K. Maraiya, K. Kant, and N. Gupta, "Efficient cluster head selection scheme for data aggregation in wireless sensor network," Int. J. Comput. Appl., vol. 23, no. 9, pp. 10–18, **2011**.*

*[12] H. Junping, J. Yuhui, and D. Liang, "A time-based cluster-head selection algorithm for LEACH," in Computers and Communications, 2008. ISCC 2008. IEEE Symposium on, **2008**, pp. 1172–1176.*

[13] W. Heinzelman, A. Chandrakasan, and H. balakrishnan, "Energy Efficient Communication

*Protocol for Wireless Microsensor Networks", Proceedings of the Hawaii International Conference on System Sciences, January 2000 © **2000** IEEE.*