AN OVERVIEW OF ARTIFICIAL NEURAL NETWORK-BASED CLUSTERING IN WIRELESS SENSOR NETWORK

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ABSTRACT

Energy is limited in the Wireless Sensor Networks (WSN). Clustering, data aggregations and reducing data transfer are utilized to minimize energy usage in the network. Artificial Neural Networks (ANN) are among the most well-known artificial intelligence (AI) approaches for their excellent adaptability and simplicity. In wireless networks, ANNs are also used. The ANNs are very popular in classifying, learning and optimizing. Clustering-based routing protocols are established WSN lifespan techniques. This study proposes an overview of the various artificial neural network approach for WSN clustering and data aggregation.

Keywords— *Wireless Sensor Network, Artificial Neural Network, Cluster and data Aggregation.*

INTRODUCTION

A WSN is a system of nodes organized into a coordinated network. Each sensor node includes processing capacity, several memory types, a radio frequency transceiver, and a power supply. The nodes are wirelessly interacted with and organized after ad-hoc deployment. WSN integration with new technologies, such as the Internet of Things, the introduction of the cyber system requires a growing number of decision-making. The Neural Network application,, which is a form of machinery in WSN, has recently been enhanced. Learning algorithms for machine applications are remarkably versatile for numerous WSN applications [1].

The ANN Network has nodes that function together and are layered. The input information is received in the initial layer, and every consecutive layer receives the output from the preceding layer rather than the input level. The last layer produces the final result. The individual knowledge of each node is its own. Each layer node is very interconnected, with several nodes in different levels being linked. There drive several nodes in the output layer that generate and read the results. The neural network mainly learned or fed large volumes of information to the input level. Neural network training implies that the network is informed on what should be done [2].

Neural network learning is a technique that helps to advance the performance of the artificial neural network, and rules are often implemented across the network. In this procedure, weights and bias are adjusted until the goal result is the same as the changed value. A learning rule that decides how quickly the artificial network can be formed or how precisely. ANN ways of learning are often classed as supervised, unattended and strengthened [1] [3].

The notion of learning is supervised and the link between parameters of induction and output is learnt in the model. This technique resolves WSN's many concerns, such as query processing, localization, event detection, targeting of objects, media access controls and security. In unattended learning, the algorithm is presented with no output vectors or labels. The datasets are categorized by detecting their commonalities. These sorts of algorithms are utilized mostly for WSN clusters and data aggregation. Reinforcement learning enables the agent to learn from the environment through interactions. Sensor nodes here discover the optimum measurement [4].

CLUSTERING PROTOCOL IN WIRELESS SENSOR NETWORK BASED ON NEURAL NETWORK

The primary aim of the clustering protocol on the neural network is to enhance the life span of a sensor network to some standard. The main functions of neural networks include distributed processing and representation, generalization and education capabilities, intrinsic contextual information processing, huge parallelism, low calculation and tolerance for failures. [3].

Lynggaard et al. [5] developed a machine learning system, based on frequency domain characteristics derived from the channel of communication. This machine learning method forecasts the transmission power necessary over a preset range in order to overcome interferences. A real-world dataset indicates power savings of 35 – 83 percent, and the receiving rate for a package of at least 95 percent that permits the efficient follow-up of the communication channel parameter modifications has been used for extensive systems modeling.

Elhoseny et al. [6] Proposed for both single-hop and multi-Hop cluster models the novel GA based CH selection approach. The suggested technique is aimed to suit the requirements of dynamic situations by choosing the CH on six basic factors known as the remaining power, energy consumption, the number of neighbors, energy-conscious distance, node vulnerability and mobility levels.

Kulkarni et.al. [4] Presented a method meant to function on self-organizing map designs as an energy-oriented clustering procedure. Factors like energy level and node coordinate are examined using this technique and each node is grouped on the basis of these criteria. Compared with previous Low Energetic Adaptive Clustering Hierarchy (LEACH) protocol, simulation results have proven that the new methodology is capable of improving the network longevity.

Ullah et. al. [7] The suggested system of nodes aggregation and extreme learning machines (ELM) clusters is proposed which minimizes redundant and incorrect data effectively. The computer simulation with real data sets reveal that, in terms of clustering accurate data and energy efficiency, WSN is continuously outperforming current systems.

Mukherjee et al. [8] Addressed the problem of location identification for ITS applications of CHs for MIMO sensor networks. BPNN and the distributed gradient drop approach were utilized to detect CH for the MIMO sensor network to reduce the overall error in estimate. The dynamic node location in the cluster is determined with the distributed gradient in MIMO sensor networks. In this study, PSO is used to increase the quality of the original population; in the iterative process, the population quality (node positions) of the offspring is also enhanced and position accuracy is achieved. Compared to conventional approaches, the model offers energy efficient and high reaction time. It therefore assists

Wang et. al. [9] Proposed col algorithms based on Neural Networks and emphasis on cluster focuses. The energy consumption in LEACH is lower than in LEACH on the basis of NNs and Tab I below demonstrate that our suggested LeACH improves the power consumption performance of the network by roughly 11%. .

Chauhan et al. [9] proposed the work, to improve clustering performance, the combination of adaptive clustering resides in the affinery spreading method. The distance of medium data transmission may be lowered and the load balance routing effect is supplied. Simultaneous simulation results reveal that around 52.5%, 54.21 percent and 33.35% performed better when compared to LEACH-AP, EDDUCA and UCR-H algorithms, respectively, with a network life increase of 31.29 percent, 51.1 and 16.23%.

Britto et. al. [10] Recommended the use of WSN soft computing to assist cameras and microphones in the field of multimedia applications. With the aid of SGP the clusters are generated. Three layers are used to suggest an artificial neural network. The back propagation mechanism is also included in the algorithm proposed. The whole network, with the assistance of the suggested approach, turned into two clusters.

Saleh et. al. [11] Developed an energy-sensitive WSN clustering algorithm. This approach used neural network concepts to access static random-access memory. This approach aims to utilize less energy throughout the data dissemination process in data storage and transmission. They presented two innovative energy-efficient designs as an application in mobile healthcare applications The results of the simulations showed that the lifetime of WSN is increased.

CONCLUSION

Wireless sensor network application presently has a growing interest for present days. For energy efficiency, Wireless Sensor Network uses data aggregation to lower transmission numbers. To address the issues and constraints facing the network, WSN needs new solutions. The algorithm provides a set of approaches to enhance network ability to adapt to the dynamic environment. WSN has employed neural network techniques to locate optimum clusters. Neural networks are one of the most common methods of machine learning utilized for WSN. This report includes an examination of several algorithms used for the clustering and artificial neural networks

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