IJRSET MARCH 2019 Volume 6, Issue 3 Pages: 19-26
ISSN 2394-739X
International Journal for Research in Science Engineering and Technology

EFFICIENT CLUSTERING AND ROUTING BASED SECURE DATA DISSEMINATION IN WIRELESS SENSOR NETWORKS

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ABSTRACT: In this framework, we approach aNovel scheme for improve networks efficiency and security. A hybrid technique named as Dynamic and Efficient Design Mechanism (DEDM) foroptimization. And also use a group key control for comfy transmission in WSN. A Machine Learning Algorithm having set of rules is a current nature inspired optimization set of rules that simulates the flash pattern and traits of fireflies. Grouping is a popular records analysis method to identify homogeneous groups of gadgets primarily based on the values in their attributes. Firefly algorithm is a swarm based set of rules that used for fixing optimization problems. This paper offers a new technique using firefly set of rules to cluster statistics. It's miles proven how firefly algorithm can be used to locate the centroid of the consumer distinctive number of clusters. We use the firefly algorithm to locate initial choicest cluster centroid after which optimized centroid to subtle them and improve clustering accuracy. And we advise an efficient cluster key control scheme for relaxed communication in dynamic WSNs characterized with the aid of node mobility. The GKM helps efficient key updates while a node leaves or joins a cluster and ensures forward and backward key secrecy. The protocol also supports green key revocation for compromised nodes and minimizes the impact of a node compromise on the safety of different communiqué hyperlinks. A security analysis of our scheme shows that our protocol is effective in defending towards various attacks.

Keywords: [energy efficiency, machine learningalgorithm, group key management, routing, wireless sensor networks.]

1. INTRODUCTION

In many wireless sensor networks (WSN) packages in recent times the whole community must have the potential to operate unattended in harsh environments in which pure human get admission to and monitoring cannot be easily scheduled or successfully controlled or it's even not possible in any respect.

Primarily based in this crucial expectation, in lots of full-size WSN applications the sensor nodes are often deployed randomly within the vicinity of interest by extraordinarily out of control way (i.e., dropped by means of a helicopter) and they form a network in an ad hoc way. Furthermore, thinking about the whole vicinity that has to be covered, the quick period of the battery strength of the sensors and the opportunity of getting broken nodes at some stage in deployment, large populations of sensors are anticipated; it's miles a natural possibility that loads or even lots of sensor nodes will be concerned.

Evidently, grouping sensor nodes into clusters has been extensively adopted by means of the studies community to fulfill the above scalability objective and typically reap high power performance and prolong network lifetime in massive-scale WSN environments.

The corresponding hierarchical routing and records collecting protocols imply cluster-based agency of the sensor nodes simply so facts fusion and aggregation are feasible, therefore leading to considerable power savings.

This observes, motivated through the hyperlink aware clustering approach, and proposes Dynamic and Efficient Design Mechanism (DEDM) to assist energy-green routing in WSNs. The main purpose of the DEDMis to set up a persistent and dependable routing direction by means of figuring out proper nodes to come to be cluster heads and gateways. In the DEDM, cluster head and gateway applicants use the node repute and hyperlink condition to determine a clustering metric, referred to as the firefly. The firefly algorithm is described as the wide variety of transmissions that cluster head and gateway applicants conducts. This metric may be decided with the aid of measuring the transmit power intake, residual energy, and link quality.

2. RELATED WORK

Toward Scalable Systems for Big Data Analytics: A Technology Tutorial - HAN HU, YONGGANG WEN - Recent technological advancements have led to a deluge of data from distinctive domains (e.g., health care and scientific sensors, user-generated data, Internet and financial companies, and supply chain systems) over the past two decades. The term big data was coined to capture the meaning of this emerging trend. In addition to its sheer volume, big data also exhibits other unique characteristics as compared with traditional data. For instance, big data is commonly unstructured and require more real-time analysis. This development calls for new system architectures for data acquisition, transmission, storage, and large-scale data processing mechanisms.

Big Data Based Retail Recommender System of Non E-Commerce - Chen Sun, Rong Gao, Hongsheng -Recommender system, as a means of achieving precision marketing, has been widely used and brought about significant benefits in modern ecommerce systems. However, there is a lack of study on the applying of recommender system to traditional non e-commerce retailing mode. This paper presents a retail recommender model based on collaborative filtering, and designs the corresponding distributed computing algorithm on Map Reduce, so as to implement a big data based retail recommender system. The big data mechanism helps the system do scalable data processing easily.

Leveraging Distributed Data over Big Data Analytics Platform for Healthcare Services - Ramesh Mande, G.JayaLakshmi, Kalyan Chakravarti Yelavarti - In healthcare, large volumes of heterogeneous medical data have become accessible in various healthcare organizations. This data could be an enabling source for deriving insights for improving care deliverance and reducing costs. The vastness and complexity of these datasets present issues like data aggregation, maintenance, integration, transformation, analysis, accuracy and performance in analysis and successive applications to a practical clinical environment. Big data analytics (BDA) plays an important role to reduce healthcare costs, identify the risks.

Data Collection in Sensor Networks with Data Mules: an Integrated Simulation Analysis - Giuseppe Anastasi, Marco Conti, Mario Di Francesco - Wireless sensor networks (WSNs) have emerged as the enabling technology for a wide range of applications. In the context of environmental monitoring, especially in urban scenarios, a mobile data collector (data mule) can be exploited to get data sensed by a number of nodes sparsely deployed in the sensing field. In this paper we describe and analyze protocols for reliable and energy-efficient data collection in WSNs with data mules. Our main contribution is the joint performance analysis of the discovery and the data transfer phases of the data collection process.

Data MULEs: Modeling a Threetier Architecture for Sparse Sensor Networks - Rahul C. Shah Sumit Roy Sushant Jain, Waylon Brunette – This paper presents and analyses an architecture to collect sensor data in sparse sensor networks. Our approach exploits the p m n c e of mobile entities (called MULES) present in the environment. MULEs pick up data from the sensors when in close range, buffer it, and drop off the data to wired access points. This can lead to substantial power the sensors BS they only have to transmit over a short range. This paper focuses an a simple analytical model for understanding performances system parameter are scaled. Our model assumes two dimensional random walk for mobility and incorporates key system variables such as number of MULEs, sensors and access points.

3. PROPOSED METHODOLOGIES

In this framework, we approach a Novel scheme for improve networks efficiency and security. A hybrid technique named as Dynamic and Efficient Design Mechanism (DEDM) for optimization. And also use a group key control for comfy transmission in WSN. A Machine Learning Algorithm having set of rules is a current nature inspired optimization set of rules that simulates the flash pattern and traits of fireflies. Grouping is a popular records analysis method to identify homogeneous groups of gadgets primarily based on the values in their attributes. Firefly algorithm is a swarm based set of rules that used for fixing optimization problems.

This paper offers a new technique using firefly set of rules to cluster statistics. It's miles proven how firefly algorithm can be used to locate the centroid of the consumer distinctive number of clusters. We use the firefly algorithm to locate initial choicest cluster centroid after which optimized centroid to subtle them and improve clustering accuracy. And we advise an efficient cluster key control scheme for relaxed communication in dynamic WSNs characterized with the aid of node mobility.

The GKM helps efficient key updates while a node leaves or joins a cluster and ensures forward and backward key secrecy. The protocol also supports green key revocation for compromised nodes and minimizes the impact of a node compromise on the safety of different communiqué hyperlinks. A security analysis of our scheme shows that our protocol is effective in defending towards various attacks.

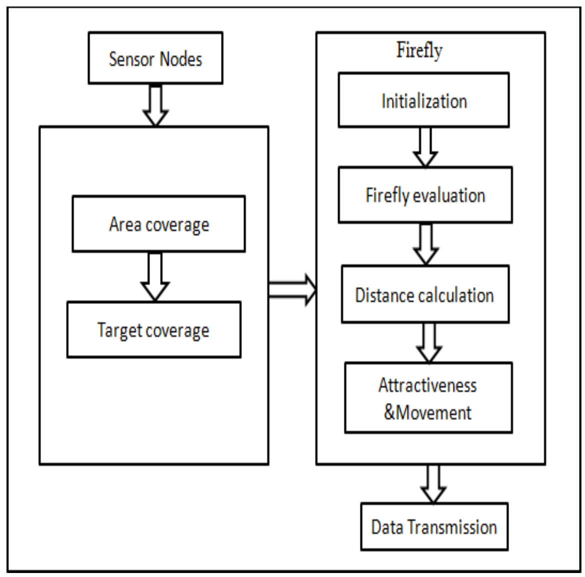


Figure.1: Architecture Design

A. Machine Learning algorithm

In this work, we use firefly set of rules; a firefly set of rules (FA) is a latest nature stimulated optimization set of rules that simulates the flash sample and characteristics of fireflies. Clustering is a popular records evaluation technique to become aware of homogeneous agencies of items based totally on the values of their attributes. We use the firefly algorithm to locate preliminary most desirable cluster centroid after which optimized centroid to refined them and enhance clustering accuracy. Easy and green implementation, clean to recognize and parallel implementation. This approach enables to prolong the network lifetime.

B. Initialization

The first step in the algorithm is the initialization of the population of N fireflies where each firefly represents a candidate solution. Population size (N) represents the number of solutions or the size of the search space. An objective function is associated with the brightness of the firefly and is directlyproportional to the brightness. The aim is to maximize the objective function value.

C. Firefly evaluation

Firefly algorithm is based upon idealizing the flashing characteristic of fireflies. The idealized three rules are:-All fireflies are considered as unisex and irrespective of the sex one firefly is attracted to other fireflies.

The Attractiveness is proportional to their brightness, which means for any two flashing fireflies, the movement of firefly is from less bright towards the brighter one and if no one is brighter than other it will move randomly. Furthermore they both decrease as their distance increases.

D. Distance calculation

The distance between any two fireflies i and j at xi and xj respectively, the Cartesian distance is determined by equation where xi, k is the k th component of the spatial coordinate xi of the i th firefly and d is the number of dimensions.

$$d_{i,j} = \text{Distance}(\mathbf{x}^i, \mathbf{x}^j) = \sqrt{\sum_{k=1}^{n} (x_k^i - x_k^j)^2}$$

E. Attractiveness

In the Firefly algorithm, there are two important issues: the variation of the light intensity and the formulation of the attractiveness. We know, the light intensity varies according to the inverse square law.

Suppose it is absolute darkness.

Light intensity of each firefly is proportional to quality of solution.

Each firefly needs to move towards the brighter fireflies.

Light intensity reduction abides the law:

$(I\_0, d)=I\_0/d^2$

I_0 is the light intensity at zero distanced

d is the observer's distance from source

If we take absorption coefficient "ɣ" into account:

Attractiveness $(I\_0, d, \text{"ɣ"}) = I\_0\ e^{(-\text{"ɣ"}\ d^2)}$

$Ir = Isr\ 2$ (1)

Where I(r) is the light intensity at a distance r and Isis the intensity at the source.

When the medium is given the light intensity can be determined as follows:

$Ir = I0e\ -\gamma r$(2)

To avoid the singularity at r=0 in (1), the equations can be approximated in the following Gaussian form:

$Ir = I0e\ -\gamma r\ 2$ (3)

As we know, that a firefly's attractiveness is proportional to the light intensity seen by adjacent fireflies and thus the attractiveness β of a firefly is determined by equation (4) where β0 is the attractiveness

atr=0. $\beta = \beta 0e{-}\gamma rm$(m≥1) (4)

F. Movement

The movement of a firefly i is attracted to another more attractive (brighter) firefly j is determined by

$$xi = xi + \beta 0e\ -\gamma rij\ 2\ xj - xi + \alpha E$$

Movement consist two elements

Approach to better solutions

Move randomly

G. Group Key Management

We bear in mind a dynamic wireless sensor networks the community includes a number of desk bound or cell sensor nodes and a bs that manages the network and collects statistics from the sensors. Sensor nodes may be of kinds: (i) nodes withhigh processing talents, referred to as h-sensors, and (ii) nodes with low processing talents, known as l-sensors. Nodes can also be part of and depart the community, and therefore the community size can also dynamically exchange. The h-sensors act ascluster headswhilel-sensors act as cluster individuals. They are linked to the bs without delay or by way of a multi-hop direction through otherh-sensors.h-sensors andl-sensors may be stationary or cell.

After the community deployment, eachh-sensor bureaucracy a cluster by means of coming across the neighboring l-sensors through beaconmessage exchanges. Thel-sensors can be a part of a cluster, pass to different clusters and also re-join the previous clusters. To keep the updated list of associates and connectivity, the nodes in a cluster periodically exchange very light-weight beaconmessages.

Theh-sensors document any changes of their clusters to the bs, for example, whilst a l-sensor leaves or joins the cluster. The bs creates a listing of valid nodes, m, and updates the fame of the nodes while an anomaly node or node failure is detected. The bs assigns every node a completely unique identifier. A l-sensor nli is uniquely recognized by way of node idli while ah-sensornhj is assigned a node id hj.

A key era center, hosted on the bs, generates public device parameters used for key control via the bs and issues certificateless public/personal key pairs for each node within the community. In our key management machine, a completely unique character key, shared best between the node and the bs is assigned to each node. The certificateless public/non-public key of a node is used to establishpairwise keys among any two nodes. Acluster keyis shared many of the nodes in a cluster.

On this segment, we propose a cluster key management scheme (ckm) that helps the status quo of four types of keys, specifically: a certificateless public/personal key pair, an individual key, a pairwise key, and a cluster key. This scheme also makes use of the primary algorithms of the ckm scheme in deriving certificateless public/private keys and pairwise keys.

Types of keys

• certificateless public/private key: earlier than a node is deployed, the kgc at the bs generates a unique certificateless private/public key pair and installs the keys inside the node. This key pair is used to generate a collectively authenticated pairwise key.

• individual key: each node stocks a completely unique person key with bs. For example, a l-sensor can use the person key to encrypt an alert message despatched to the bs, or if it fails to speak with the h-sensor. Anh-sensor can use its individual key to encrypt the message similar to adjustments inside the cluster. The bs can also use this key to encrypt any sensitive information, inclusive of compromised node records or instructions. Earlier than a node is deployed, the bs assigns the node the man or woman key.

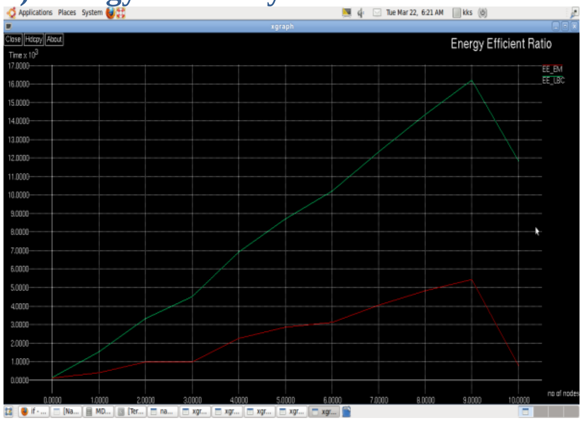
• pairwise key:each node stocks a special pairwise key with each of its neighboring nodes for cozy communications and authentication of these nodes. For instance, so that it will join a cluster, al-sensor must percentage a pairwise key with theh-sensor. Then, the h-sensor can securely encrypt and distribute its cluster key to the l-sensor by means of the usage of the pairwise key. In an aggregation supportive wsn, thel-sensor can use its pairwise key to securely transmit the sensed facts to the h-sensor. Each node can dynamically set up the pairwise key among itself and every other node the usage of their respective certificateless public/non-public key pairs.

• cluster key:all nodes in a cluster proportion a key, named as cluster key. The cluster secret's specifically used for securing broadcast messages in a cluster, e.g., touchy commands or the trade of member reputation in a cluster. Best the cluster head can update the cluster key whilst al-sensor leaves or joins the cluster.

4. EXPERIMENTAL RESULT AND DISCUSSION

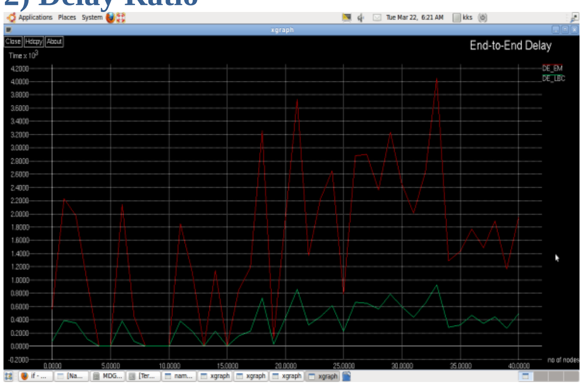
This study used ns-2 as the network simulator and conducted numerous simulations to evaluate the DEDMperformance. All sensor nodes are randomly scattered with a uniform distribution. Randomly select one of the deployed nodes as the source node. The location of the sink is randomly determined. This study evaluates the routing performance under scenarios with different numbers of sensor nodes.

1) Energy Efficiency ratio



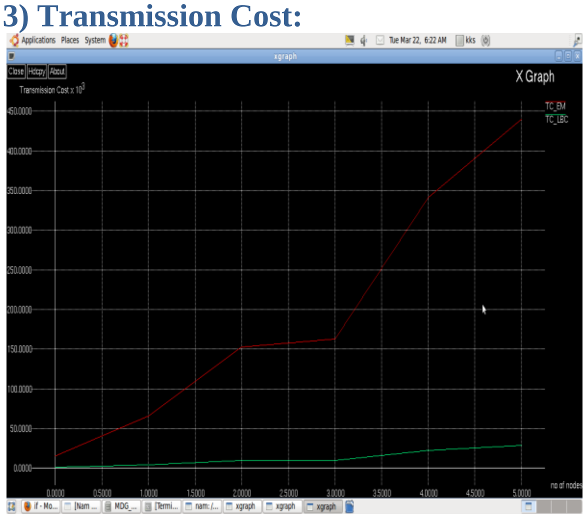
Above graph compares the simulation results of message energy.

2) Delay Ratio



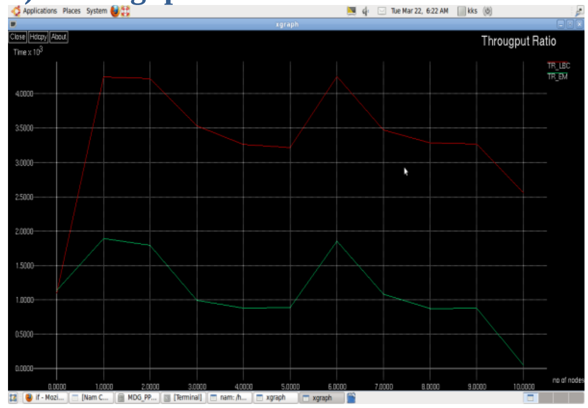
Above graph compares the simulation results of delay ratio.

3) Transmission Cost:



Above graph compares the simulation results of transmission cost ratio.

4) Throughput Ratio:



Above graph compares the simulation results of Throughput ratio.

CONCLUSION

In this framework, we approach a Novel scheme for improve networks efficiency and security. A hybrid technique named as Dynamic and Efficient Design Mechanism (DEDM) for optimization. And also use a group key control for comfy transmission in WSN. A Machine Learning Algorithm having set of rules is a current nature inspired optimization set of rules that simulates the flash pattern and traits of fireflies.

This paper offers a new technique using firefly set of rules to cluster statistics. It's miles proven how firefly algorithm can be used to locate the centroid of the consumer distinctive number of clusters. We use the firefly algorithm to locate initial choicest cluster centroid after which optimized centroid to subtle them and improve clustering accuracy.

This technique facilitates to prolong the community lifetime. We obtain better link quality and residual energy in the packet transport ratio,lessenergy consumption, delivery latency and more flexible, enormously accurate.

Finally, we would like to point out that there are some interesting problems that may be studied in our future work. The first problem is how to find transmission and compatible pairs for each node. A scheme should be developed to partition the continuous space to locate the optimal delivery for each cluster.

Then finding the compatible pairs becomes a matching problem to achieve optimal overall spatial diversity. The second problem is how to schedule end-to-end delivery from multiple clusters. An algorithm that adapts to the current system-based transmission scheduling algorithms should be studied in future.

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