Personality Assessment Tool Using Artificial Intelligence: A Review

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Abstract: The Internet of Things (IoT) is a computing radical transformation that seeks to engage almost everything on the world. Despite the small nature of connected devices, energy efficient routing would be critical to their successful implementation. Clustering techniques divide a program's nodes into groupings, each of which is led by a specified node known as the cluster head. Clustering techniques have been suggested in the context of WSN, but their use in the IOT may also handle similar difficulties (IoT). Clustering would facilitate energy efficient routing and topology management by delegating huge chunk of communication overhead to cluster head.

Key Words: —*Internet of Things, Clustering, Wireless Sensor Networks, Mobile Agent, Clustering.*

I. INTRODUCTION

The Internet of Things (IoT) is a new research area that encompasses a wide range of topics. The basic goal of IoT is to link everything to the Web, including home appliances, smart phones, cars, buildings, robots, and machinery. The aim is to create a virtual substitute for all serial interfaces that detect essential data from their circumstances in order supply advanced end development [1]. One of the primary concerns when using such devices is power efficient, as communication as well as calculations on the constricted device may rapidly deplete the device's poor battery assets. Devices in a WSN rely on a self-organizing multi-hoping connectivity mechanism that could function without a BS, and similar technologies can be used in IoT. An important research problem is the creation of dynamic routing approaches that could effectively identify routes among MN. Due to the obvious increased computing strain on MN, traditional methods cannot be used in large systems. While a message packet is being routed, the link strength & network architecture might change [2]. As a result, showing a consistent link necessitates frequent routing route computation & update. Clustering is widely regarded as an effective way for addressing the problem of ad hoc network management, as well as its application in the context of IoT is obvious given the same difficulties [3].

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The rest of this article is structured as obeys. Section II describes the Mobile Agent. Section III gives the introduction about clustering. Section IV presents the Cuckoo search. Section V represents the literature survey. Section VI shows the proposed Work. Section VII shows results. Section VIII gives the conclusion of the proposed work.

II. MOBILE AGENT

A mobile agent is a node or software that, once started, could roam around the system independently from node to node, completing different functions. Through analyzing information at the source & providing just the appropriate findings, mobile agents could minimize bandwidth consumption and path discovery. The characteristics of an MA: autonomous, mobile, perceptive, interactive, and main objective. In WSNs, MA are utilized to accomplish specific goals or resolve particular challenges that are critical to the network's correct working. Their mobility is advantageous for the given job that is completed on every node. There is main objective in the sense that they give users control over the MAs, and once they are configured in the WSN, they conduct their assigned tasks on their own to accomplish specific objective. The technicalities of MAs innovation reveal a number of potential target issues that could be effectively addressed in the WSNs application space. Their intellect can be used in a variety of situations. One example is a node limitation, which occurs when a climate change impacts a portion of many nodes in such a way that they react to the alteration as well as enable the WSN to work normally. Routing can be done with MAs, where the MAs establish and operate their own routes while roaming freely within a WSN. Mobile Agent could utilize for the following reasons [4]:

Persistence: When a mobile agent roams, it is no longer connected to its creator node and therefore is unaffected if that node goes down.

Efficiency: When an agent goes through the system to a node with resources, the amount of traffic that emerges is reduced because the agent can pre-process data locally and decide what is the most important data to convey.

Peer-to-peer (Peer-to-Peer) Interaction: The use of MA makes it simple to identify a node loss.

III. CLUSTERING

Clustering [5] is the method of exploring natural associations between certain nodes or groups of comparable things. Clustering networks have three different sorts of nodes: cluster heads, normal nodes, and gateway nodes. One CH serves as a local controller for every cluster. In a single hop cluster, the transmission range of the nodes determines the cluster size, while in a multi-hop cluster, the number of iterations defines the cluster size. The signal is obtained by the CH from a regular node and passed to the next hop. The gateway nodes provide as a link between two clusters of CH with distinct CH. Although the presence of a gateway node is not required, they collectively form the network's foundation [6]. In addition, the BS acts as a communication link between the sensor network and the user. By electing a cluster head and combining neighboring nodes, the number of information transferred is minimized. To prevent duplication & communications stress generated by multiple communications, data analysis is used.

IV. CUCKOO SEARCH APPROACH

The Cuckoo Optimization Concept is derived by the life of a 'cuckoo' bird [6]. This innovative efficiency approach is based on the bird's specific breeding and egg laying behavior. This modeling was done with adult cuckoos & eggs. Adult cuckoos lay their eggs in the nests of other birds. If the eggs are not discovered and destroyed by the host birds, they will grow into a full cuckoo. Cuckoo migration and external conditions should hopefully drive them to meet and find the best location for reproduction and breeding. This is the optimum location for the optimization problem. Yang & Deb created Cuckoo Optimization in 2009, which was influenced by nature. Rajabioun created the Cuckoo Optimization Technique in 2011. The Cuckoo Optimization Technique (COA) is a brand-new continuously all-aware search method inspired by the life of a cuckoo bird. COA, like other meta heuristics, starts with a core community of cuckoos. Other host birds' habitats are used by these cuckoos to lay their eggs. The habitat in COA is represented by a random assortment of appropriate solutions.

Three idealized principles underpin the CS approach:

- Each cuckoo lays one egg at a time and deposits it in a nest.
- The best nests with the highest quality eggs (solutions) would be passed down to future generations.
- The list of available host nests is constant, as well as a host has a probability of pa [0,1] of discovering an alien egg. In this instance, the host bird has the option of either discarding the egg or abandoning the nest & starting over in a new site.

V. LITERATURE SURVEY

Eappen et al., (2019) A method for clustering & routing that uses less energy has been developed. For optimal CH selection, an enhanced CS method with a novel multiobjective fitness function has been developed. Simulations were run, and one of the variables, the number of alive nodes after a particular number of cycles, was determined to be the highest in the case of the suggested algorithm. The increased number of nodes indicates that the WSN lifetime is improving [7].

Rath et al., (2016) A Mobile Agent based QoS (MAQ) method using a clustering method for real-time data transmission has been devised in this study to provide safe and effective regular activities in cluster based MANETs. When real-time apps in these clusters are informed, the suggested reaction is initiated to provide prioritized service to these apps, comprising monitoring and analyzing the flow characteristics for real world applications. In the proposed system, a priority approach based on JADE (Java Agent Development Environment) has been developed at the MA Because this is a software strategy, overall network efficiency dramatically improves, leading to increased throughput and PDR. Operational modules provided in the MA [8] regulate prioritized features such as E2E latency, jitter in video streaming, or battery saving rules while real-time data transfer.

Amine et al., (2015) presented EECMA, a new energy strategy based on integrating the client/server and MA paradigms to

accomplish a trade-off among enhancing network life & minimize data delivery latency. In order to improve performance of this method, authors also provide a multidimensional model to analyze incoming data from sinks [9].

Hashimoto et al., (2016) In a heterogeneous wireless connection that combines a cellular network and a MANET, present an information dissemination system employing mobile agents. Initially, the suggested system distributes transmitted data to a certain selected mobile node in the cellular network using a smaller number of cellular BS. The data packets from the designated nodes are then disseminated to all nodes in the MANET by mobile agents [10].

Egwuche et al., (2020) Through creating the spanning tree of WSN, a routing itinerary strategy for multi-mobile agent itinerary planning for energy efficiency in wireless sensor networks is established. The sensor network is organized into numerous clusters in this architecture. The platform's cluster creation consists of n SN separated into m disjoint clusters, with the gathered data sequence fused using a fusion factor. The minimal spanning tree is used to determine the MA's itinerary routes. The sink node is believed to have all of the knowledge about the SNs required to determine the weights among cluster heads. The suggested Energy-Aware Mobile Agent Based (EAMB) model outperformed superior as compared to the LEACH, Local Closest First (LCF), Global Closest First (GCF) were all [11].

Behera et al., (2019) focused on a precise Ch election method that switches the CH placement among several nodes with faster speeds than others. The method evaluates remaining energy, power consumption, and an average value of CH to select the next group of CH for the platform that is suited for IoT apps like environmental watching, smart cities, devices. According to simulation data, the modified version beats the LEACH technique by boosting throughput by 60%, lifespan by 66%, and RE by 64% [12].

Zhao et al., (2019) suggested a better CH characteristic for picking the CH of each cluster in each loop, as well as the best CH feature is built utilizing the RE and node roles. Finally, based on the network architecture, a few parameters of the ideal CH feature are determined in order to maximize the CH economic plan. The modeling results show that the suggested routing strategy outperforms four other methods in terms of reliability, which is critical for the app. in the observation of the atmosphere in three dimensions [13].

VI. PROPOSED OBJECTIVES

6.1 Research Gaps:

The current system chooses cluster heads solely on the basis of a fitness function that calculates node fitness based on residual energy and communication generation costs. Other node factors, such as number of neighbors or cluster size, could be included in this manner while optimizing the CH. Because the selected CH may spend more power if the cluster size is very large, this is the case. This procedure can also be carried out using some optimization techniques. One aspect to note is that the scientists collected data from the cluster heads using a mobile agent. The mobile agents have various difficulties, such as bloating or excessive energy use. In certain instances, the data gathered from the cluster heads may be lost by the MA. As a result, this multi-hop data collection strategy could be adjusted.

6.2 Objectives:

- To review the existing studies which focus on improving lifetime of WSN assisted IoT networks.
- To optimize the cluster head selecting using cuckoo search algorithm and implement it in MATLAB.
- To compare the performance of MAI-LEACH and proposed protocol based on number of alive nodes, number of dead nodes, remaining energy and throughput of the network.

6.3 Research Methodology:

The CH were chosen in past efforts using a fitness value that considers the nodes' remaining energy and energy cost of communication as variables. Authors recommended, however, that the CH be chosen using the cuckoo search optimization method, which employs Levy's fly to find the best global solution. The fitness function used to evaluate the solution's optimum will be determined by the node's RE and cluster density.

Cluster members will aggregate data at the CH once the clusters have been established. The idea of a MA has been used in the present scheme to replace direct connection among cluster head and BS with multihop communication. Authors propose employing a modified dynamic source routing system for data transfer among these two organizations, as mentioned above about the disadvantages of deploying mobile agents. The DSR routing will be used by each CH to create the routes. The routes in the typical DSR routing algorithm are chosen based on the least hop count;

however, the routes in the presented design would be chosen based on the RE of intermediary nodes and their distance. After selecting the optimal route, the cluster heads will forward data to the base station.

VII. RESULTS

The results of the suggested Cuckoo search strategy are shown in this chapter. The energy conversion efficiency as well as clusters transmitted to BS are selected as output metrics to test the recommended method. In the aforementioned sensor area, where BS is anticipated to be, all SN are evenly dispersed. The recommended method was created in the Matlab software. The mixture of live or dead nodes defines the energy saving factor. 100 randomly distributed network elements were utilized to simulate four different scenarios. The network's effectiveness was evaluated using the average RE consumed, the amount of active and inactive nodes, and the throughput of the platform.

Number of Alive Nodes: The device's energy consumption was calculated for each round based on the set of living nodes. The set of rounds for the proposed task are [200,400,600,800,1000,1200,1400,1600,1800,2000.

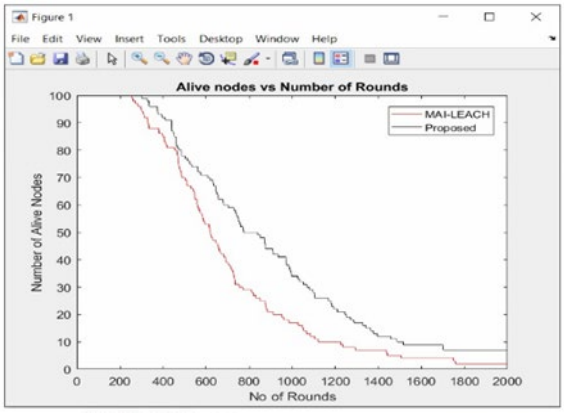

Fig.1. Comparison of Alive Nodes

Table.1. Alive Nodes

Technique	Set of Rounds
MA-I-LEACH	1100
Proposed	1500

Figure 1 demonstrates that the first node in the present study dies after 1100 rounds, but the first node in the suggested technique dies after 1500 rounds. Since CH are correctly selected using the offered methodology CSA, it follows that the provided method enhances system reliability.

Number of Dead Nodes: The device's energy usage was determined for every cycle based on the number of dead nodes. The proposed task has [200,400,600,800,1000,1200,1400,600,1800,2000] dead rounds.

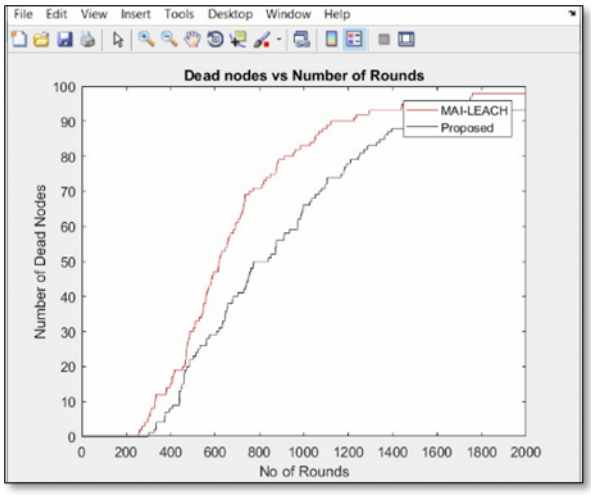

Fig.2. Dead Nodes

Table.3. Comparison of Dead Nodes

Technique	Number of Rounds
MA-I-LEACH	300
Proposed	800

- Since live nodes in the network for a longer time provide a superior capacity, the capacity of a recommended CSA approach increased to 800 packets actually delivered, which is higher than the current method MA-I- LEACH's 800 packets effectively transferred.
- *Throughput:* Throughput is a term used to describe the amount of successful data transmission in a network. In this case, the previously indicated formula is designed to estimate throughput:

$$\textbf{Throughput} = \frac{\text{Total Number of packets successfully transferred}}{Total\ Number\ of\ \ packets\ \ transferred}$$

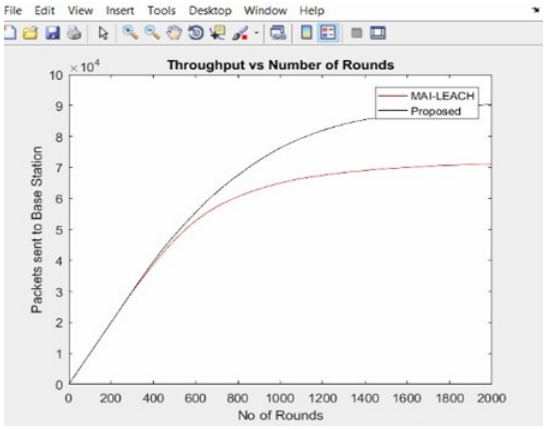

Fig.3. Throughput

According to Fig 3, the throughput of a suggested CSA method improved packets successfully sent, which is higher than the existing method MA-I-LEACH packets transferred directly, since alive nodes in the system for a longer length of time present a better bandwidth.

Average Residual Energy: The major resource of WSN nodes is energy, which defines the network's longevity.

Figure 4 demonstrates that the existing I-Sep has steeper reductions in average RE than the proposed CSA method, indicating that the steeper declines indicate faster energy depletion

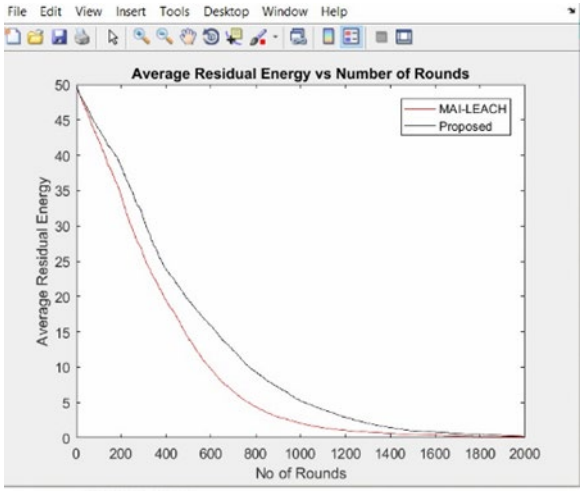

Fig.4. Remaining Energy

The suggested technique enhances the numbers for all four metrics, including RE, throughput, and the number of alive nodes. Additionally, because a single route is not employed, the strain on the CH building the route is raised. In comparison to previous ways, the CH would send data to the BS via an adjacent CH or directly to the BS (if the BS could be extended immediately).

VIII. Conclusion

A mobile agent is a different way of putting together a respectable distributed network. The mobile agent strategy builds on the applet approach by transporting code and data settings from one host to the next. The agents migrate from one host to another, bringing their information with them, and the operation is prolonged at that host. LEACH is a fundamental mechanism that improves node performance. Leach descendant technologies increase reliability as well. As a result, this study recommends that data be processed successfully utilizing a mobile agent technique based on CSA. As a result, we will be able to meet the goal of energy conservation with dependable information. The computing results revealed that the proposed method used less energy and functioned better than previous studies.

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