

Routing data using discrete particle aggregation on the internet of thing

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Abstract

The connection of objects to computer networks and the Internet is growing and humanity needs to manage its events and resources correctly to collect information from different sensors using these different objects and analyze these data. Based on these analyzes, Make a decision. Internet of Things is a new phenomenon in the world of technology and communications. In short, the Internet is a new technology, in which the ability to send data through communication networks, including the Internet or intranet, is provided. Wireless sensor networks are one of the basic parts of the Internet of Things, a popular field of research, such as monitoring, environmental control and body care, and military applications. This network has many challenges due to its small size and hardware and connectivity capabilities. Obviously, the inherent challenges of this type of network have been limited in the functions of aggregation, transmission and communication between the nodes and their routing. Due to the importance of saving time and cost, in this research, data routing of objects on the Internet is presented in a method based on the accumulation of discrete particles. Internet objects can be used for many applications in various industrial areas, including infrastructure, urban services, regulatory and security applications, and so on. However, collecting large amounts of data from such networks that contain images and videos often results in traffic congestion in the central network area. In order to solve this problem, we provide routing technology that determines routing by the discrete particle accumulation. By collecting roaming data related to intermediate nodes for processing, data collection can be achieved at a higher rate, hence the traffic in the network is effectively reduced. As a result, a significant reduction in latency can be achieved.

Keywords: Internet of Thing, Data routing, Particle Accumulation.

1. Introduction

There are many uses for the Internet technology, with only a few of these applications being operational. In the not-too-distant future, objects will be used in smart homes, smart factories, intelligent farms, intelligent offices, intelligent transportation systems, smart hospitals, smart universities, and so on. The connection of objects to computer networks and the Internet is growing and humanity needs to manage its events and resources properly to collect information from different sensors using these different objects and analyze these data. Based on these analyzes, Decide. Internet of Things is a new phenomenon in the world of technology and communications. In short, the Internet is a new technology, in which the ability to send data through communication networks, including the Internet or intranet, is provided. Wireless sensor networks are

one of the basic parts of the Internet of Things, a popular field of research, such as monitoring, environmental control and body care, and military applications. This network has many challenges due to its small size and hardware and connectivity capabilities. Obviously, the inherent challenges of this type of network have been limited in the functions of aggregation, transmission and communication between the nodes and their routing.

Every day, a new component is added inside or out of buildings, and in general it can be said that the buildings are moving towards smart. The intelligent lighting system, security, ventilation, heating and cooling will all go towards smart. Today, the concept of smart buildings has gone beyond the interior of the house and the building, and is drawn to the outside world and the surrounding world, meaning space around the environment, the environment and electronic and Internet networks. In addition to these, the useful life of buildings will also increase, and the cost of building

depreciation will be reduced. In smart buildings, the best service can be received, while costs have fallen sharply, and this is very important in today's world. Intelligent home, smart locks, smart kitchens are the words about the new generation of homes. And represent a new and efficient technology of intelligence in the shadows of the Internet objects [1].

2. Research background

Atefeh Farazmand and Soroush Ahmadi, in research entitled "Internet of Things and Applications" in 1394, stated that the most important factor in the Internet of Things is the integration of several technologies and communication. Identification and tracking technologies, wired and wireless sensors and active networks, communication protocols (part of the next generation of communications), and intelligence of objects are the most important parts of the Internet of Things. In this study, various views of the Internet of Things are expressed [2]. Adheshir Bahraininejad and Salman Taherizadeh in research entitled Internet Solutions for 2007 stated that solutions to integrate RFID with wireless sensor networks with an innovative algorithm and the integration of Mobile RFID with sensor technology have been proposed that can Improve the quality of life through internet with ease. These solutions, while complementing each other, help to communicate with anything at anytime, anywhere, and to environmental information and status. Finally, a combination of these solutions is introduced for better use of existing features. These technologies, as useful and necessary topics, provide new opportunities for humankind and will have an important impact on our lives, and will make our systems management easy and changeable [3].

In 2009, Rahnavard and Mohammadian also introduced the KM system to cover the process of creating, collecting, organizing, disseminating, and applying knowledge in the organization or art of creating value from the intangible assets of the organization, and supporting the senior manager, modeling, knowledge architecture, people engagement, Information system infrastructure, strategy and goals, knowledge measurement, organizational infrastructure, training, human resources, motivation, organizational culture, and teamwork are key factors for the success of any knowledge management system [4].

To implement Internet applications, a horizontal and flexible approach is used that manages a shared network and service operating platform and uses a variety of data sources to implement an application [5].

By definition, the Intelligent Building Institute of America is an intelligent building building that provides cost- effective environments and productivity through optimizing structures, systems, services and management, as well as the interrelationship between them. On the other hand, the Intelligent Building Group of Europe, based in the United Kingdom, has said that building intelligent environments that maximize the effectiveness of building residents while also providing optimal resource management with the lowest cost, hardware, and facilities [6].

Using the Internet of things in the supply chain by Chen et al. (2015); Today the supply chain has been widespread and

sophisticated. This chain has a large geographic scale, complex operating processes, and many stakeholders. Internet technologies offer many potentialities for tracking, viewing and managing the challenges of this field. Internet technology can collect, process, and distribute data related to the whole chain [7].

Using the Internet to make things safer in mines; Mine safety has been one of the big concerns over the last few centuries. By using Internet technology, things can make sense of the incident in mines and provide the necessary warnings. On the other hand, data from mining incidents can predict the incident and improve the security of mines [8].

3. The proposed method

Our proposed method will be based on random population generation. In this method, which is based on the modeling and simulation of the collective (bird) group or collective movement of fish, each member in this group is defined by the vector of velocity and position vector in the search space. In each repetition, the new particle position is defined according to the velocity and position vector in the search space. At each time interval, the new particle position is updated according to the current velocity vector, the best position found by that particle, and the best position found by the best particle in the group. The particle swarm algorithm was initially defined for continuous parameters, but in view of the fact that in some applications we deal with discrete parameters, this algorithm will be disconnected in this research. Particle swarm in a discrete state (BPSO) is introduced. In this algorithm, the position of each particle is defined by the value of one. In this algorithm, the position of each particle is represented by zero or one binary value. In BPSO, the amount of each particle can be varied from zero to one or from one to zero. The velocity of each particle is also defined as the probability of changing each particle to a value. In this chapter, different sections of this algorithm will be introduced and reviewed.

$$\bar{v}_i(t) = \begin{cases} 0 & \text{if } r_i(t) \geq f(v_i(t)) \\ 1 & \text{if } r_i(t) < f(v_i(t)) \end{cases}$$

$$f(v_i(t)) = \frac{1}{1 + e^{-v_i(t)}} \quad r_i(t) \in U(0,1)$$

Figure (1-1) How to use the congestion of particles in the proposed method

In our proposed method, unlike other methods, we have made changes to the initial values in order to obtain faster speed and accuracy, as well as a good convergence rate. For this purpose, we set the number of particles (N = 60) and the number of

repetitions to a reasonable level in We also considered our personal learning coefficient ($c1 = 2$) and collective learning coefficient ($c2 = 2$) in our method. In this method, we set the minimum particle jump ($w_min = 0.1$) to 0.1 and maximum mutation ($w_max = 0.6$) to achieve good convergence and obtain acceptable results. In this paper, scenarios are created in the MATLAB simulation software. By running the algorithm in these scenarios and simulating the proposed method, the results are obtained.

4. Results

The purpose of this study is to provide a solution within a reasonable time frame that is appropriate for solving the problem, our proposed method may be the closest to the best solution. Exploratory algorithms can be combined with optimization algorithms to improve the efficiency of the algorithm. The meta-exploratory algorithm is a combination of exploratory algorithms that are designed to find, generate, or select each exploration in each step, and provides a good solution to problems that are optimizing.

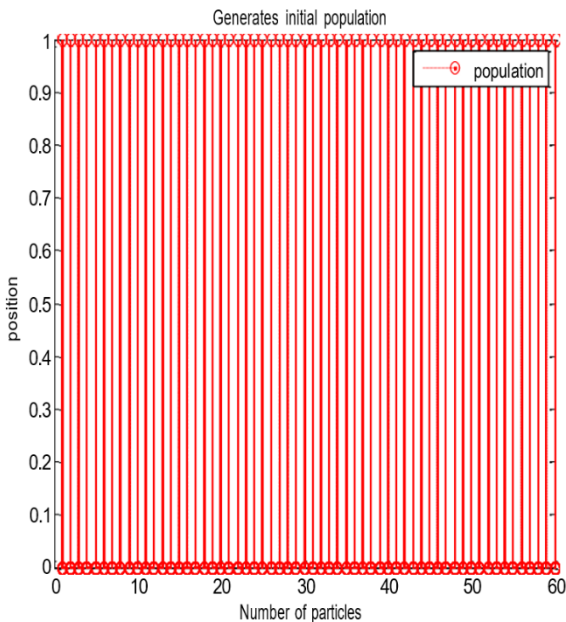


Figure (1-2) Random generation of initial population (particles)

This chart shows the population generated or the initial generated particles. In this chart, the x-axis represents the number of particles that we have 60 particles and the axis of wave's shows the position of each particle, which is between 0 and 1.

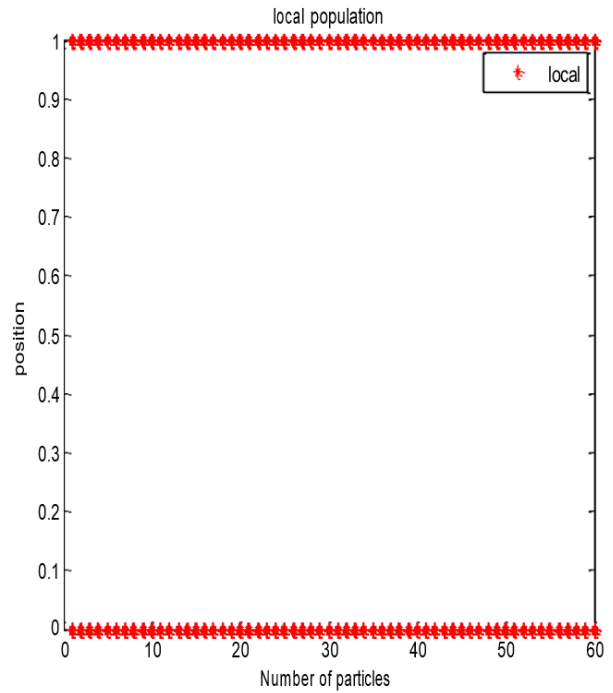


Figure (1-3) Local population

This diagram shows the local particle production. In this chart, the x-axis represents the number of particles that we have 60 particles and the axis of the waves shows the position of each particle.

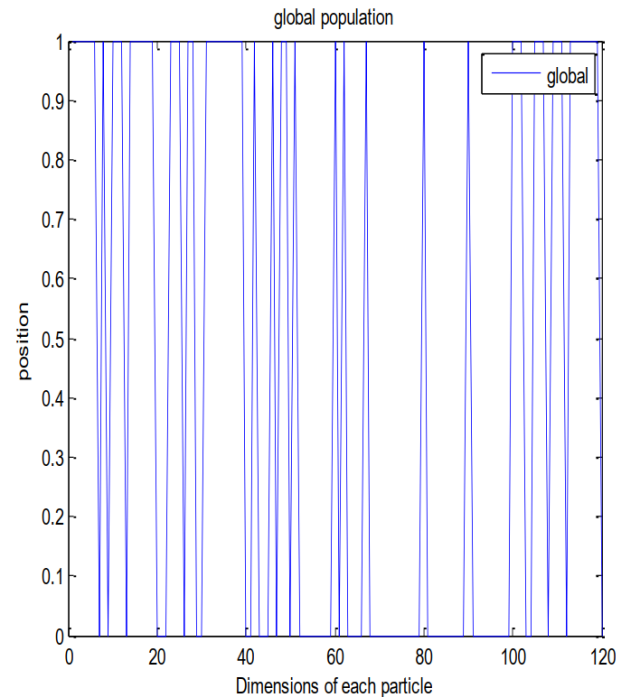


Figure (1-4) Global population

This diagram shows the global population. In this chart, the x-axis represents the dimensions of each particle, which is 120, and the horizontal axis represents the position of each particle.

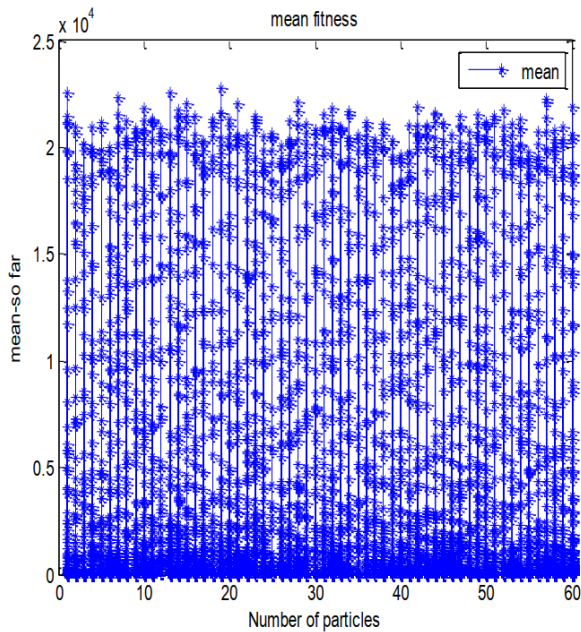


Figure (1-5) the mean of fitness

We calculated the average gradient using the initial values as well as the local and global particle gamma gradients, and this graph shows the average particle size. In this chart, the x-axis represents the number of particles, and the axis of the waves is the mean value obtained for each particle. And its fitness is between 0 and 2.5. The results show that the average of the fitness of most particles is in the range of 0 and 0.1, in other words, we have reached a certain convergence in this range and, over time, the average of fitness in this interval will remain constant and will not change with more repetitions and fitness So the results will reflect the superiority of our proposed approach to convergence and fitness.

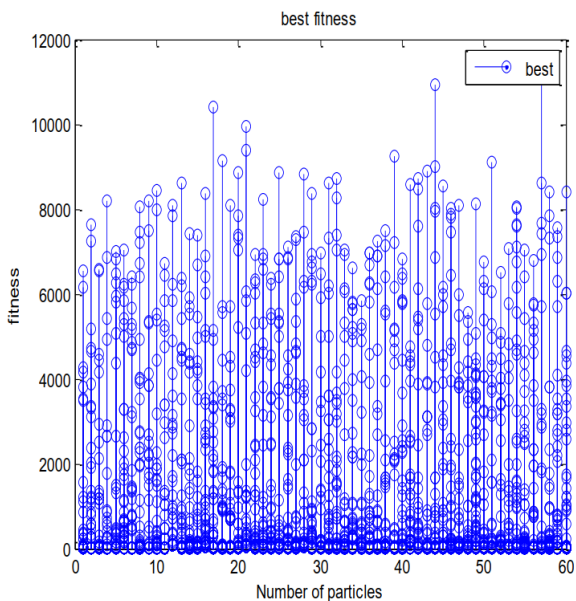


Figure (1-6) best fit

This graph shows the best fit for all particles. We used the initial values as well as the local and global particle gaming to calculate the best fit, and in this chart, the x-axis represents the number of particles, and the axis of the waves represents the best fit for each the particle is between 0- 120000. The results

show that the best fit of most particles is in the range of 0 and converge in this range. Over time, fitness will remain constant over the same period and will not change with more repetitions. The results show the superiority of our proposed method in terms of the best fit achieved than other methods.

4.1 Analyze the results

The results show that the proposed method is more flexible than other optimization strategies by using a large number of overwhelming particles against the local optimal problem. Also, population size of the proposed method is less, so initial population initialization in using this algorithm is simpler than other intelligent optimization algorithms. The proposed method can be easily implemented and can be used to solve many discrete optimization problems. Due to fast convergence with other optimization algorithms, the proposed method can be used in various applications. The results show that the best fit of most particles is zero and, in this range, we reach convergence. Over time, fitness will remain constant over the same period, and will not change with more repetitions, and the results also indicate that our proposed method is acceptable in terms of fitness versus other methods.

Considering the importance of routing data on the Internet, objects are the process of choosing the best path in internal and external networks, and has an effective role in transmitting data in a network, and also considering that routing can be established between different types of networks, such as the telephone network and the Internet. And this routing can be the source of logical packets from the source to the destination, in this realization, for the routing of data on the Internet objects using particle aggregation, a discrete method is presented that results from such as binary search and optimal performance of this method. In different fields. Based on the results obtained, which indicates the acceptability of this method, this method can be used to better data routing in the context of the network and the Internet of objects. Considering the model hypotheses and the results obtained from the proposed method, we conclude that routing the data on the Internet is very important and the time and cost of the implementation in the data routing varies.

5. Discussion and Conclusion

The main problem of the optimization algorithm is the swarm of particle convergence prematurely. In this algorithm, particles gradually travel in the search space near the best general optimum point and do not explore the rest of the space, in other words particles converge. Because the particle velocity decreases with increasing frequency, therefore, the algorithm has to converge to the best that has been discovered so far and is not guaranteed to be the best global solution. This is the result of an inappropriate balance between local and global searches. In the particle swarm optimization algorithm, it is preferred in the first repetitions of global search, which helps to improve performance, and in the last iterations, global searches are reduced, and to maximize the information obtained, local search is preferred given. In our proposed method, we tried to solve the problem of early convergence and search.

The proposed method of discrete particles shows more flexibility than other optimization strategies using the number of particles to overcome the local optimal problem. Also, population size of the proposed method is less than genetic algorithm. Therefore, initialization of population in using this algorithm is simpler than other intelligent optimization algorithms. The proposed particle swarm approach can be easily implemented and can be used to solve many discrete optimization problems. Because of the benefits such as simple concept, easy implementation and fast convergence than other optimization algorithms, the proposed method can be used in certain fields, thus, this method, while spending less time, costs less.

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