Fault Detection based Connected Dominating Set (FDCDS) in Fog Computing

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Abstract

The meaning of cloud computing is providing services by using the internet. From the Cloud Data Centres (CDC) the services are utilized by the cloud users. Presently (Internet of things) IOT playing the key role to improve the performance of the fog computing enabled applications. Migrating the wireless sensor networks with IOT becomes the most powerful and error free application based on the availability of the services, cloud storage, computation and these are transferred efficiently between server and cloud. Health domain is most widely affecting system in cloud computing as well as by using fog computing with IOT. The system causes various failures for providing the service continuously. Enabling the fog computing with the integration of cloud for the medical devices to transmit the patient information to the cloud storage has become the complicated for the IOT sensors continuously. This may cause the data loss and also reduce the performance of the medical device. To improve the continuous services within the cloud server. In this paper, the Fault detection based Connected Dominating Set (FDCDS) which provides the continuous services with the integration of fog computing and IOT devices with wireless sensor networks. Simulation shows the performance of the proposed system.

Keywords

CDC, Fault Detection, Connected Dominating.

Introduction

In fog computing, it is known that this will reduce the amount of data sent to the cloud and hence improve the efficiency. Fast development of smart devices is applicable to

develop the smart vehicles, smart home/city, and all the sensor network devices are connected with the Internet of Things (IoT). In the year, 2015 the International Data Corporation has estimated that the IOT will support and extend the traditional IT industry up to 14% form 2014. Many smart devices face the various difficulties began with calculation power, battery, stockpiling and data transmission, which consequently upset the character of administrations (QoS) and client experience. To mitigate the load of restricted assets on brilliant gadgets, distributed computing is taken into account as a promising figuring worldview, which may convey administrations to finish clients regarding foundation, stage and programming, and gracefully applications with flexible assets easily. to stay up the load for the confined resources on savvy gadgets, disseminated figuring is taken into account as a promising enlisting perspective, which may expire organizations to finish customers with regard to system, stage and programming, and gracefully applications with adaptable resources expecting almost no effort.

Fast advancement of computational resources will engage the recognizing, getting, assembling, and planning of steady data from billions of related contraptions, and may be considered to serve a good scope of employments including wearable preparing, wise metering, clever home/city, related vehicles and massive scope distant sensor mastermind [1]. It makes everything related and more keen, and named the web of things (IoT) [2]. IoT is depended upon to make generous volumes of sensor data [3]. On account of notoriety of massive Data developments, handling these immense volumes of knowledge has ended up being less requesting than at another time. Nevertheless, regardless there are a few of challenges. On one hand, wise devices went up against difficulties built up from estimation control, battery, accumulating and bandwidth, which subsequently nature of administration (QoS) and customer experience. To facilitate the heaviness of confined resources on savvy gadgets, appropriated figuring is taken into account as a promising handling perspective, which may expire organizations to finish customers to the extent establishment, stage and programming, and gracefully applications with adaptable resources expecting almost no exertion [4]. With the conspicuousness of utility-based circulated figuring, the affinity to accumulate plenty of knowledge has been growing over the span of the newest few years [5].

Related Work

Recently many researchers have created the thought of IoT that associations billions of things over the world to the net and empowers machine to machine (M2M) transactions among these devices [6]. IoT system could be a dynamic and potent stage for info

warehousing, calculation, and administration [7]. Various IoT arrangements are projected within the writing [8]. The larger a part of them area unit focused round the sensible home/city areas. varied bland stages area unit being created (e.g. Ninja Blocks [9] and SmartThings [10]) to assist applications within the areas of the shrewd home and also the keen town. Urban communities likewise have immense groupings of assets and offices [11]. ParkSight [12] is the smart parking application developed for the dynamic parking. Actual information is recovered through sensors (i.e. magnetometers) put in stopping areas. Streetbump [13] could be a cluster sourcing venture that causes occupants to reinforce their neighborhood lanes. Volunteers utilize the Street bump transportable application to collect street condition info whereas they drive. The knowledge area unit visualised on a guide to alarm inhabitants with reference to continuous street conditions. The gathered info offer government's constant information with that to settle problems and arrange long-standing time speculations.

Luby [14, 15] projected randomised confiscated calculations for vertex shading and MIS development in subjective purposeless charts. Our confiscated calculations area unit roused by Luby's calculations that were at first implicit for a briefing of parallel processors. Our changes that area unit supposed for remote specially appointed systems area unit in addition obligated by the manner that messages are often lost due to impacts.

Incontestable that this arranges creates a CDS with consistent stretch, steady degree and size within a gentle issue of the best. Totally different variations of this arrange exchange off the scale, degree and stretch certifications: for instance, Fabricates a CDS with bring down most pessimistic state of affairs degree and size proportion whereas yielding the steady stretch assurance. As noted before, our disseminated calculations area unit sent usage of this plan; be that because it might, our methods are often effortlessly altered to execute many totally different variations of this arrange too, so yielding the desired tradeoffs.

Starting from a subjective introductory specific, the calculation finds associate degree associated ruling set in O (N2) time, wherever N is that the number of hubs [16]. They likewise in contestible nitty gritty copy results to indicate that the calculation discovers very little calculable associated overwhelming sets during a transient span.

To do this, they show the work method as a hyper graph and with a hyper graph-dividing primarily based particularization they propose a heuristic that produces info position and enterprise task conspires all the whereas [17]. The re-enactment results on varied reality and unnaturally created logical work processes demonstrate that the projected heuristic is

fast, and may discover mappings and assignments that diminish document exchanges, whereas relating to the target weights.

A remaining burden is a briefing of procedures with handling wants and shared correspondence stipulations [18]. The remaining tasks at hand arrive and leave when a while, and also the plus authority should guide each outstanding burden upon landing to the physical system. They have faith in the goal of limiting the blockage. They demonstrate that illuminating a sub-problem (SingleMap) regarding mapping a solitary outstanding task at hand to the physical chart essentially gets the work done to require care of the overall issue.

Fault Detection based Connected Dominating Set (FDCDS)

- Fault detection based Connected Dominating Set (FDCDS) is the proposed algorithm which maintains the continuous services for the IOT health networking system without any faults in the cloud side.
- The connected dominate set maintains the power consistency at any node to maintain the continuity of the serious to provide by the user.
- The power consumption at every server remains constant according to the equation given as

$$E_{(\frac{kwh}{day})} = \frac{P_w \times t_{(\frac{h}{day})}}{1000(\frac{W}{kW})} \rightarrow Equation - 1$$

Where,
E is energy in kilowatt-hours (kWh),
P is power in Watts,
t is hours per day.

- Using equation-1 the energy is calculated at every sensor nodes for efficient data transfer.
- The graph G= (A, B) such that the dominating set of G, and the child graph introduced is connected.
- The connected dominating set is connected DS, that is then is a path between two nodes in CDS that does not.
- The system has constant volume ($\Delta V=0$) the term -$P\Delta V=0$ and work is equal to zero.

- Thus, in the equation ΔU=x+y x=0 and ΔU=x.

Algorithm

Step: 1 The data processing is started.

Step: 2 The medical devices are started.

Step: 3 the sensor nodes are maintains the energy constantly.

Step: 4 the services are available continuously with the help of connected dominating set.

Step: 5 for the sensors and cloud the fog plays as medium.

Step: 6 chances of failure occurs at nodes.

Step: 7 the proposed system is implemented.

Simulation and Analysis

The experimental results are implemented by using java as programming language, NetBeans 8.0.2 as IDE and MySQL as database. The system is with the configuration of 8 GB Ram and 1 TB hard disk. In table-1 shows the use case classes with their properties

Table 1 Use case classes after using the proposed system.

Use Case	Computing	Real Time	Critical	Feedback
BBCC	No	No	No	No
BBCA	No	Yes	No	No
BBDL	Yes	Yes	No	Yes
BBM	Yes	Yes	Yes	Yes

Table 2 Performance of the proposed system with energy saved, factors, data format

| Algorithm	Energy Saved	Factors Considered	Data Format from Sensors to Cloud
Manual	--	Time, Energy and Cost	No
Round Robin Algorithm	70%	Time, Energy and Cost	Text Data
Dynamic Buffering Algorithm	90%	Time, Energy and Cost	Text data, image data and any other formatted data.
Fault detection based Connected Dominating Set (FDCDS)	95%	Time, Energy, Cost, accuracy	Text data, image data and any other formatted data.
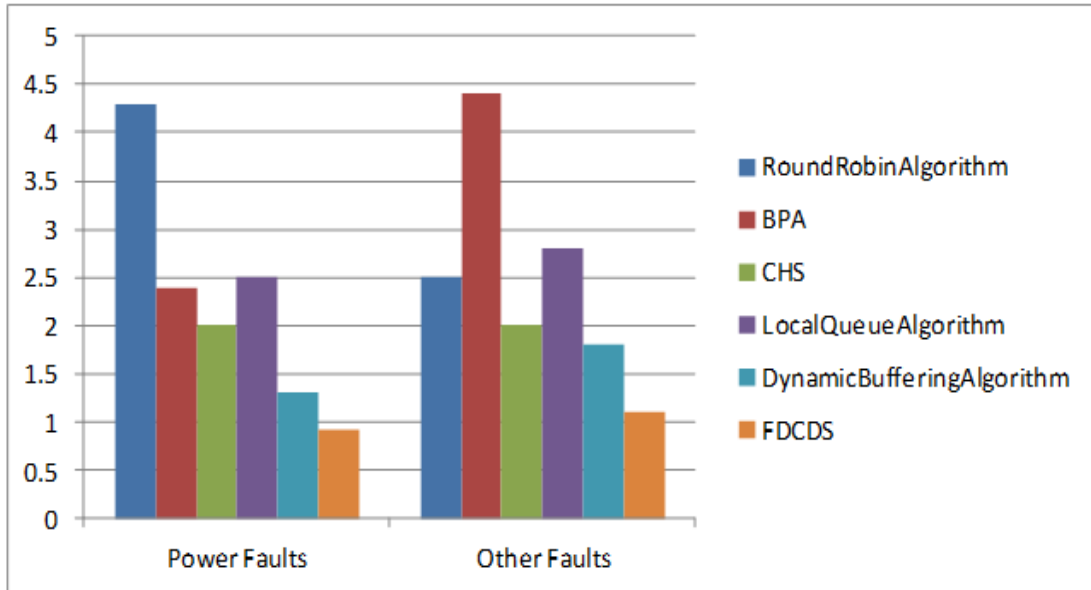
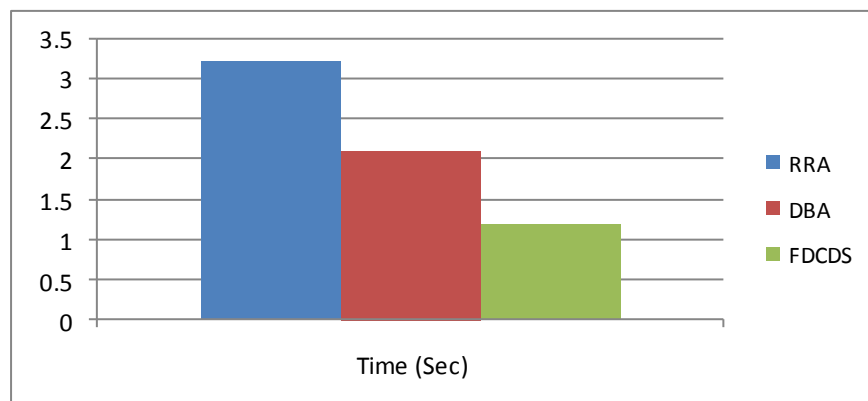**Figure 1 Performance of the algorithms**

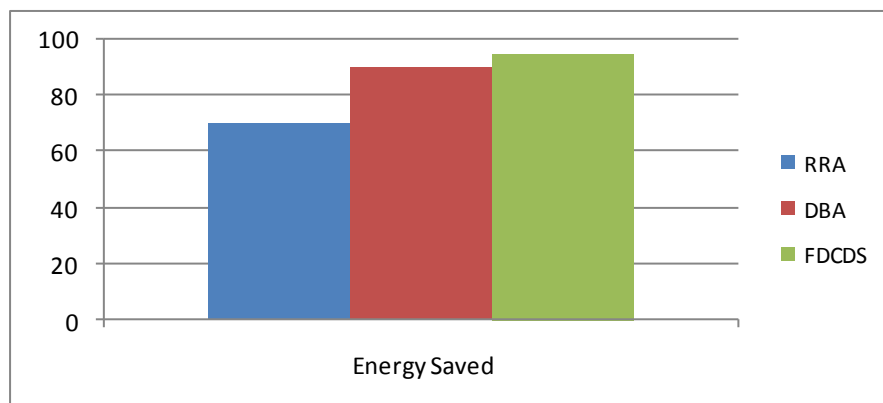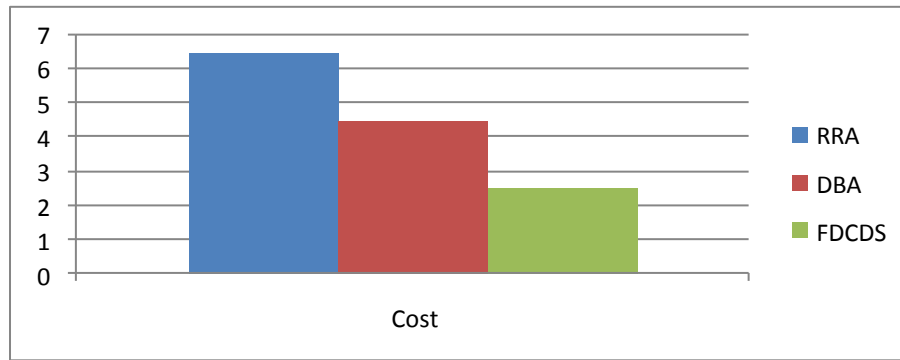**Figure 2 Time taken for the total processing**

Figure 3 Energy saved for the total processing

Figure 4 Cost based on usage for the total processing

The experimental results shows the various power faults and other faults based on the performance of the proposed system which is shown in figure-6. Fog computing is used to find the faults in terms of data transfer and maintaining the faults in the queue. Figure-7,8,9 shows the performance of exiting and proposed systems.

Conclusion

In this paper, the Fault detection based Connected Dominating Set (FDCDS) is implemented to find the power faults and manage the power scheme and better queue for the users who are using this. With the adopting of sensor technologies the performance of the FDCDS improves by preventing the various faults. Among the other approaches this is the first approach that can integrate into the health with the fog computing and maintains the smooth automated data transitions.

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