COMP90044 - Assignment B
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Research Paper Comparison

1. Introduction

This paper is to compare two previous research paper in the realm of fog computing, paper is structured as follows. Section 2 analyzes the motivations of two papers, section 3 lists what method are being made during research, section 4 compares the results being made in papers, respectively. Section 5 briefly described the ease of reading and finally ends with a conclusion in section 6.

2. Motivation

In research [1], researchers aim to solve the energy consumption for data storage and allocation from the end users (Fog nodes) by identifying which scene is more energy efficient. In research [2], author try to solve the energy consumption balance for the combination of Internet of Everything (IoE) and Fog Computing (FC).

These two papers have similar motivations in the realm of fog computing—save energy. As the development of Internet of Things (IoT) and mobile Internet (e.g. 5G) became rapid, people are increasingly relying on cloud computing. By combining FC and cloud computing, users can improve the performance of using applications relying on cloud servers. But more fog nodes mean more energy cost. The issue comes to how to decrease energy wastage in data transmission. For example, there are still many related open challenges presented by some emerging applications nowadays. E.g., build a middleware fogging platform based on the remote cloud servers to save data transmission energy resources is a considerable issue. To conclude, the intention of these two papers are well defined in the sphere of fog computing.

3. Methodology

Paper [1] first illustrated the model of distributed nano-data servers (e.g. Raspberry Pi) and the centralized data center. Next, compute the energy cost of uploading and downloading the same file to / from the same application – WordPress, figuring out the energy utilization ratio as well as the time latency. Finally, compare the energy consumption per download with additional constraints such as whether preload data and the file size for downloading.

Author in paper [2] try to build up a virtualized network computing platform that integrates FC and IoE, which is called Fog of Everything (FoE), to save energy and bandwidth. First, by using reusing energy instead of lithium battery on fog node devices, for example using solar energy for charging mobile devices, the energy consumption would experience a large reduction. Second, the FoE model contains the model that appears in paper [1], including the down and up offloading model. Personally thinking, the method used in paper [2] is more rigorous than that of paper [1], for reasons of comprehensive consideration not only focus on fog nodes to end user but also considered the energy consumption between fog nodes and cloud servers.

In addition, paper [2] gives multiple attempts and all experiments are based on previous studies. This made the research worth value and the data more precise.

4. Results

The results taken by paper [2] is more contributed than paper [1]. Multiple simulations and comparations of latency, latency jitter, package loss rate and bandwidth between Smart City, IoE, Industry 4.0 and Big Data Streaming bring benefits to emerging fog-assisted products, for storage applications such as storage Apple's iCloud, Google drive and real-time video platforms such as YouTube and SBS. These applications need attributes like stabilization and low latency, while the simulation in paper [2] can meet their requirements while saving energy cost.

However, in paper [1], the results given only concluded using nano-data centers might save energy depends on the design of systems. Though it proposed that low using frequency devices such as video surveillance is the best application for energy saving, the research area is restricted. Measurement in paper [1] is constrained with Raspberry Pi as nano-data centers and WordPress as application. Unlike aforementioned, by simulating various probabilities of applications rather than focusing on one specific application, paper [2] is more considerate. i.e., the result taken by paper [2] covers larger range in fog computing.

5.Clarity

Paper [1] is structured very clearly, begin with the introduction and the hypothesis for the energy consumption model, followed by the experiment data, description and data analysis. Then the body part use figures to distinguish different results caused by different variables and finish with a conclusion.

Compared to paper [1], paper [2] has expounded their motivation, goals at the beginning of the paper, followed by the overview and fog computing model. A large number of comparisons between applications using fog computing and without fog computing are made. At the end of the paper, authors raised some challenging problems for future studies, which made the whole paper looks proficient and valuable. Also, the continuous research area not only limited in the computing area but also can be continued in distributed secure problems or put the theory into practice.

6. Conclusion

To conclude, both papers have a good incentive in the realm of energy-saving fog computing and are structured clearly and correctly. Paper [2] use better methods and achieve more useful results compared to paper [1].

References

[1] Jalali, F., Hinton, K., Ayre, R., Alpcan, T. and Tucker, R. (2016). Fog Computing May Help to Save Energy in Cloud Computing. IEEE Journal on Selected Areas in Communications, 34(5), pp.1728-1739.

[2] Baccarelli, E., Naranjo, P., Scarpiniti, M., Shojafar, M. and Abawajy, J. (2017). Fog of Everything: Energy-Efficient Networked Computing Architectures, Research Challenges, and a Case Study. IEEE Access, 5, pp.9882-9910.