Advanced Science and Technology Letters
Vol.44 (Database 2013), pp.62-65
http://dx.doi.org/10.14257/astl.2013.44.15

Study and Analysis of an Efficient Power Consumption Application for Big Data Collection

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Abstract. The use of smartphones has increased recently, and because of the Global Positioning System (GPS) feature of smartphones, various services have also been increasing in number. However, the GPS function in smartphones consumes a large amount of battery power, a problem for which several methods have been studied, and that has yet to be solved. In this paper, we study the ability to utilize the cycle time required to collect GPS data in order to reduce battery consumption of mobile devices. Then, by reducing battery consumption, we expect this method to become an efficient way for collecting data [8].

Keywords: Big data, S-GPS, A-GPS, WPS, GSM, battery consumption

1 Introduction

One of the biggest challenges for 2013 in the field of Information & Communication Technology (ICT) is big data. Big data is a technique in which the atypical data set or fixed form of a large amount, to extract value from these data beyond the capacity of data collection · save · Management · analysis of database management tools existing, to analyze the results. As a result, interest in big data-related industries has been increasing. Consequently, it is expected that interest in big data from global ICT companies at home and abroad will grow significantly, as will the related market. Big data market worldwide is expected to reach $9.7 billion in 2013, which represents an increase of 42% from the $6.8 billion reported in 2012. Figure 1 is a graph of the prospect of big data market in the world for the year 2013. Gartner was estimated by dividing SW of big data companies, social media, IT services to big data IT-related expenditure, the relevant market is the fastest growing according to each field. Figure 2 is a graph that analyzes the worldwide IT spending in big data for the year 2013.

Big data technology is necessary in order to manage the data sent by many people. Global Positioning System (GPS) is a satellite navigation system that receives signals transmitted from GPS satellites to calculate the current location of a particular user [4]. However, the receiving state error range of GPS is large in some places, and battery consumption is also large [7]. As a consequence of this large battery consumption, the operating time of mobile devices is greatly reduced [1]. In order to solve these

ISSN: 2287-1233 ASTL

problems, Assisted GPS (A-GPS) systems have been developed. A-GPS is a satellite information system that operates by assisting with the server information of the nearest GPS satellite without communicating directly with the satellite; instead, A-GPS uses the help of wireless Internet and mobile communication networks to communicate within the region in which it is located. A-GPS is a system that records all the time. A-GPS provides improved results for obtaining any given position, even in poor reception environments, by utilizing the resources of the wireless network and a faster satellite signal. Then, it is possible to reduce the time-to-first-fix (TTFF), which is the time it takes to first determine the location of the GPS navigation device [2], [3].

However, the problem of battery consumption that occurs in the existing system has not been resolved, yet. Accordingly, following the cycle time server communication of an A-GPS system and the mobile device, this paper analyzes battery consumption, and from collecting necessary data, we studied the best way possible to lower batter consumption.

Fig. 1. Prospect of big data world market for the year 2013

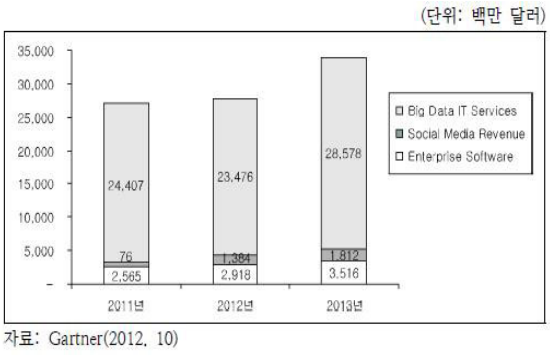

Fig. 2. Worldwide IT spending in big data for the year 2013

2 Experimental Design

In this study, we used a smartphone Application that has a function that allows a user to enter his or her information and saves it to obtain GPS data. The Application is a system that stores the GPS data of users and a large amount of other information. After the user executes the GPS function of the Application, the Application collects GPS data until it is finished. In this paper, we analyzed according to the cycle time by measuring the battery consumption utilized to collect GPS data [6]. The time period was set as shown in Table 1. Depending on the cycle time, GPS data is accumulated, GPS is completed, and the data is eventually stored as single data.

3 Results

Experiment measurements of the battery consumption of mobile equipment were as shown in Table 1. The experiment was carried out for 30 minutes, and the total distance was 2 km. Figure 3 is a diagram that shows a comparison graph of battery consumption due to the cycle time.

Table 1. Comparison of battery consumption due to the cycle time

Time period	Battery consumption
1 sec	20%
10 sec	18%
30 sec	13%
1 sec	10%
3 sec	7%
5 sec	5%

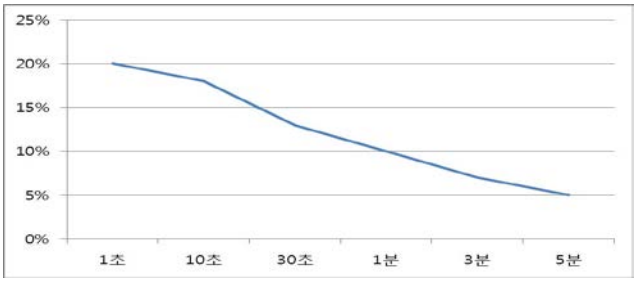

Fig. 3. Comparison graph of battery consumption due to the cycle time

Looking at the experiment results, it can be seen that the 5-minute period has the lowest battery consumption rate time. At 10 seconds and one second, the time period substantially matches the accuracy of the GPS data and the actual data. However, we

found that a large amount of battery power was used. At 30 seconds, there is a slight difference in the exact GPS data and the actual data, and the battery consumption is within acceptable levels. At one minute, three minutes, and five minutes, accuracy falls significantly, but battery consumption is low. These results indicate that the 30-second time period provided the best results.

4 Conclusion

In this paper, we performed an analysis of the results obtained from experiments to minimize the battery consumption that occurs by using the GPS function of mobile devices. By reducing the power consumption of the GPS sensor that collects big data, the intent is to support data collection more efficiently [5]. In future studies, we will present how to reduce the power consumption of the GPS under other conditions that influence the value of the GPS and time period, in order to obtain higher GPS reliability.

Acknowledgement. The research was supported by the Development Projects of Regional Specialization Industry (technology development / R & D) through the Ministry of Trade, Industry and Energy(2013-0355).

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