Why Smartphone Users Accessing Facebook Through Facebook Mobile Website? : Battery and Privacy Awareness

Priagung Khusumanegara, Rischan Mafrur, and Deokjai Choi

School of Electronics and Computer Engineering, Chonnam National University Gwangju, South Korea

{priagung.123, rischanlab}@gmail.com, dchoi@jnu.ac.kr

Abstract

Facebook has grown tremendously and becomes one of the most popular social networks in the world. Along development of smartphone, Facebook also provides Facebook application in order that smartphone users can easily to access Facebook using their smartphone. However, some of smartphone users prefer to access Facebook through Facebook mobile website rather than Facebook application. In this research, we want to investigate "Why smartphone users accessing Facebook through Facebook mobile website?". In this study, we collected smartphone data of 46 participants and analyzed factors affecting smartphone users prefer to access Facebook through Facebook mobile website rather than Facebook application. The results showed that battery and privacy awareness significantly affected the decision of smartphone users to access Facebook whether through Facebook mobile website or Facebook application.

Keywords: Facebook application, Facebook mobile website, Battery awareness, Privacy awareness

1. Introduction

Nowadays, the number of smartphone applications rapidly increase in around the world. According to statistics on July 2014, Android has 1.3 million applications that available for download from Google Play Store [1]. Along with the development of the number of smartphone applications, the number of applications in the social network category also increased. Based on Flurry's report on November 2012, accessing social networks was the second popular activity when smartphone users used smartphone, accounting for 26 percent of time spent on smartphone for accessing social network [2]. On August 2013, Weijing Zhu reported the ranking for the most-used smartphone application in the world, according to the report Facebook took first place in category of social network applications that most-used by smartphone users in Q2 2013 and arguably Facebook is the most popular social network [3]. Facebook has revealed in its Q4 2014, 1.39 billion users use Facebook every month, which marks a 13% year over year growth and monthly active users on mobile also grew up 26 % year over year [4]. Besides that Facebook also has released mobile-only monthly active users, from the statistic that shown in Figure 1 where from Q3 to Q4 in 2014, Facebook added 70 million mobile-only monthly active users [4]. They reported 526 of Facebook users access Facebook only on their mobile devices which mean it represents 37.8% of all monthly active users [4].
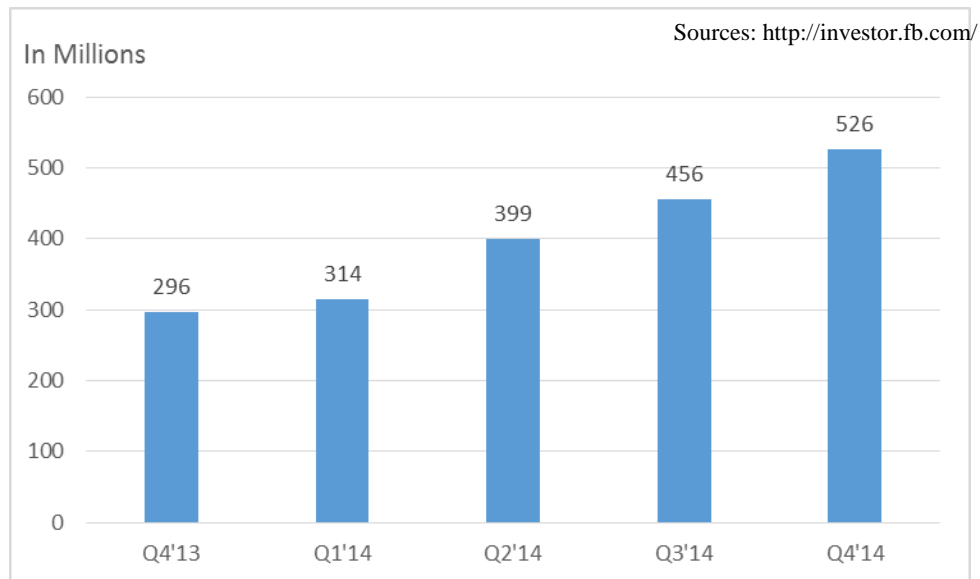
Figure 1. Mobile-Only Monthly Active Users (Mobile-Only MAUs)

Facebook has defined three kinds of smartphone users who accessed Facebook from mobile-only monthly active users. The first is smartphone users who access Facebook through Facebook application, the second is smartphone users who access Facebook through mobile versions of Facebook website, and the third is who access Facebook used Facebook messenger application. In this research, we focus on the question "Why smartphone users access Facebook through mobile versions of Facebook website while Facebook has provided Facebook application in order to smartphone users can easily for accessing Facebook?". There are many studies and reports that investigated shortage of Facebook application with the issue of battery usage and privacy. They mentioned that Facebook is the one of application that uses more energy than an average application [5]. AVG reported that Facebook took the third position of battery draining applications [6]. They concerned about number of Facebook application permission, they have found that only five important permissions requests for Facebook application [7]. Smartphone users feel very uncomfortable with contact permission where Facebook were found uploading user's contact list to their server [8]. Therefore, in this study we focus on the reasons why smartphone users prefer to access Facebook through Facebook mobile website rather than Facebook application: battery and privacy awareness. The reminder of this paper is structured as follows. Section 2 describes our literature and hypotheses. The methodology and data extraction of our research are presented in Section 3. We provide data analysis in Section 4. We discuss and conclude our findings and suggestions for future research in Section 5.

2. Literature and Research Hypotheses

2.1. Mobile Website and Mobile Application

They explained about the difference between mobile website and mobile application [9]. Mobile website is almost same with any other website that consists of the HTML pages to display text content, data, images and video [9]. Smartphone users can access mobile website using their browser application which is has available on their smartphones. By contrast, for accessing mobile application, smartphone users should download applications in mobile market and after that install them on their smartphone [9]. Based on their survey, 85 % smartphone users prefer to use mobile application rather

than mobile website with the reasons that mobile applications is more convenient (55 percent), faster (48 percent) and easier to browse (40 percent) [9]. Facebook is one of the companies that maintain both mobile website and mobile application. However, based on the James Pearce's report, who works in Developer Relations at Facebook, Facebook gets more traffic via the mobile web than from both iOS and Android application which means that smartphone users prefer to access Facebook through Facebook mobile website rather than Facebook application [10].

2.2. Battery Awareness and the Decision of Smartphone Users to Access Facebook

Battery is one of the most important smartphone's features. They mentioned one of the features that makes the users are satisfied with their smartphone is battery capacity [11]. Smartphone users want to their batteries last longer without having to charge their device more than once a day. Often, smartphone users don't pay attention to the factors that may drain their smartphone battery. There are many researches that concerned in analyzing factor that can drain smartphone battery. Carat community has classified two kinds of applications that can drain smartphone battery, namely: (a) Hogs, the applications that use more energy than an average application because it need to use energy-consuming features of mobile device to work such as GPS, WiFi, camera, *etc.*, (b) Bug, the applications that use more battery than average on a specific device for some reason [5]. Carat application classified Facebook applications into hogs [5]. They mentioned that Facebook is one of smartphone application that can drain smartphone battery due to resource overuse (Wakelock) [12]. Based on the previous studies, we have a hypothesis that smartphone users who prefer to access Facebook through Facebook mobile website rather than Facebook application since they are more aware with their battery usage.

H1: Battery Awareness has a Relation with the Decision of Smartphone Users to Access Facebook

2.3. Privacy Awareness and the Decision of Smartphone Users to Access Facebook

In recent times, numbers of Android applications have grown rapidly. As report of July 2014, Android has 1.3 million applications in play store that can be downloaded by Android users [1]. Unfortunately, growth in the number of applications not accompanied by increased attention in user privacy. Instead of concentrating in the privacy, on the contrary Android uses the permission to access the privacy of users [13]. Android has 17 number of permissions group where 11 of them may be dangerous for our privacy because they can get our personal data such as communication data, sensor data, location data, external storage data, contact data, history/usage data, calendar data, identity data, and credentials [14] [15]. Facebook application is one of the application that has many number of application permissions which has 12 number of permission groups consisting of device & app history, identity, calendar, contacts, location, SMS, phone, photos/media/files, camera, microphone, Wi-Fi Connection Information, and Device ID & call information. Based on their research, they found only five important permissions requests for Facebook application that suffice to cover the requested permissions for Facebook application [7]. They conducted a survey about do permissions influence smartphone users 'installation decisions', based on their survey of 307 respondents, 56.7% of respondents claimed they did not install an application due to permissions where 32.6 % did not like permissions, 16.0% caused too many permissions and 8.1% both of them [13]. Their survey indicated some of smartphone users have paid attention to the application permissions. Therefore, the second hypothesis in our research is the reason

why smartphone users prefer to access Facebook through Facebook mobile website rather than Facebook application since they pay more attention to their privacy.

H2: Privacy Awareness has a Relation with Decision of Smartphone Users to Access Facebook

3. Methodology and Data Extraction

In this Section, we describe our methodology and data extraction in this study. In our research, we collected smartphone data of 46 participants who are university students with aged 19-22. The smartphone data is collected during 2 months continuously. Each participant was equipped with an Android smartphone running a data collection application. The application collected four probes from smartphone of participants which consisting of Battery Probe, Installed Application Probe, Browser Searches Probe, and Hardware Info Probe as shown in Table 1. Battery probe contains battery information such as battery level, battery health, and status of charging or discharging, installed application probe contains information about the application that participants have installed on their smartphone such as package name and data directory, browser searches probe contains the information about search activity, and hardware information probe contains information about the device such as brand and model. Of installed application probe and browser searches probe of 46 participants, we have found that 17 participants accessed Facebook through Facebook mobile website using browser applications and 29 participants accessed Facebook using Facebook application.

Table 1. Example of Collected Data

Probe	Interval (s)	Example of Data
Battery Probe	300	level: 89 % health : 2 (Good) status: 3 (Discharging) timestamp: 1403476991.281
Applications Probe	86400	packageName: com.lifevibes.trimapp dataDir: /data/data/com.lifevibes.trimapp timestamp: 1403476969.264
Browser Searches Probe	86400	search: facebook timestamp: 1403489373.257
Hardware Info Probe	86400	brand: samsung model: SHVE250K

In this study, average battery usage (daily) and average number of installed application permissions are assigned as indicator of battery awareness and privacy awareness respectively. High value of average battery usage (daily) indicates decreasing battery awareness of smartphone users and vice versa low value of average battery usage (daily) indicates increasing battery awareness of smartphone users. High value of average number of installed application permissions indicates decreasing privacy awareness of smartphone users and vice versa low value of average number of installed application permissions indicates increasing privacy awareness of smartphone users. For calculating daily battery usage of smartphone users, we used formula following below.

$$Daily\ Battery\ Usage\ (mAh) = \frac{\sum_{i=1}^{N} x_i - x_{i-1}}{100\%} x\ Battery\ Capacity\ (mAh) \tag{1}$$

In the equation (1), x_i represents the i-th battery level feature which is extracted from Battery Probe. Daily battery level usage is calculated as the summation of the difference between previous value x_{i-1} and current value x_i in one day. We

extracted brand and model features from Hardware Info to obtain information about battery capacity. In our application, we define two conditions of status in Battery Probe where status equal to 3 for discharging and status equal to 2 for charging condition because we only calculate daily battery usage when the phone in discharging condition (status equal to 3). For calculating average number of installed application permissions, we extracted timestamp and package name of application features from Application Probe to investigate the name of applications that they have installed during 2 months and then identify number of permissions each applications. Average number of installed application permissions is calculated as,

$$Avg.\ num\ of\ installed\ app\ permissions = \frac{\sum_{i=1}^{N} x_i}{N} \qquad (2)$$

In the equation (2), x_i represents number of installed application permissions of the i-th application and N represents the number of installed applications. A visualization of the theoretical model that guided data collection and analysis for this study is shown in Figure 2. In this research, data analysis was conducted using IPython version 3.0.0.
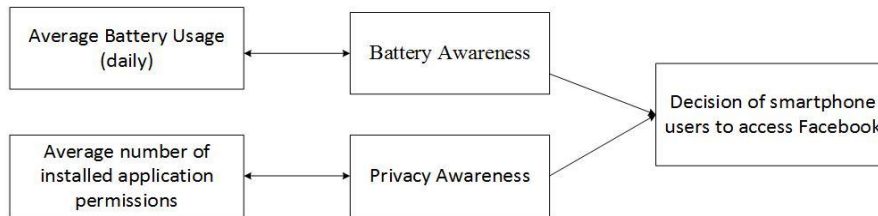

Figure 2. Visualization of Research Model

4. Data Analysis and Results

4.1. Point-Biserial Correlation Analysis

In our research, we use point-biserial correlation to analyze relationships between two variables as statistical evidence. Point-biserial correlation is a correlation measure between two variables where one of variables is a binary variable (*e.g.* Y) which has only two possible values codes 0 or 1, and the other variable is ratio or interval data [16]. In this paper, binary variable 0 refers to participants who accessed Facebook through Facebook mobile website and binary variable 1 refers to participants who accessed Facebook using Facebook application. For the other variables, we used average battery usage and average number of installed application permissions as indicator of battery awareness and privacy awareness respectively. We determined significant by $p < 0.05$. Significant correlations were found between average battery usage and average number of installed app permissions with the decision of smartphone users to access Facebook. The results of coefficient of correlation are shown in Table 2.

Table 2. Results of Point Biserial Correlation Analysis

Variables	Coefficient of Correlation
Average battery usage	0.535***
Average number of installed app permissions	0.481**

*p<0.1, **p<0.05, ***p<0.01

4.2. Logistic Regression Analysis

Logistic Regression is a model that used to predict relationship dichotomous variable (dependent variable) with one or more predictor variable (independent variable). In this research, we conducted a logistic regression analysis to predict relationships between average battery usage (daily) and average number of installed app permissions as predictor variable with the decision of participations for accessing Facebook as a dichotomous outcome variable, coded as Y = 1 for accessing Facebook using Facebook application and Y = 0 for accessing Facebook through Facebook mobile website. The results of logistic regression are shown in Table 3.

Table 3. Results of Logistic Regression Analysis

Variables	coef	Std err	z	P > |z|	[95.0% Conf. Int.]	Odds Ratio
Average battery usage (daily)	1.7864	0.639	2.794***	0.005	0.232 2.231	5.967927
Average number of installed app permissions	1.2318	0.510	2.416**	0.016	0.181 2.356	3.427279
Intercept	1.2688	0.555	2.287	0.022	0.181 2.356	3.556449

*p<0.1, **p<0.05, ***p<0.01

Based on the result in Table 3, the coefficients for average battery usage (daily) and average number of installed app permissions are statistically significant for supporting the hypothesis 1 and hypothesis 2. The coefficients returned from a logistic regression are log-odds ratio. The log-odds ratio tells us how the log-odds of outcome change with a one unit change in the independent variables. For every one unit increase in average battery usage, the log-odds of decision of smartphone users to access Facebook change 1.7864 and for every one unit increase in average number of installed application permissions, the log-odds of decision of smartphone users to access Facebook change 1.2318. The results showed if average battery usage (daily) and average number of installed application permissions increase, the probability of smartphone users for accessing Facebook using Facebook application increase which means decreasing of battery awareness and privacy awareness of smartphone users and vice versa if average battery usage (daily) and average number of installed application permissions decrease, the probability of smartphone users for accessing Facebook using Facebook application decrease which means increasing of battery awareness and privacy awareness of smartphone users.

5. Conclusion and Discussions

The purpose of this research is to investigate "Why smartphone users prefer to access Facebook through Facebook mobile website rather than Facebook application?". The results of this study showed that average battery usage (daily) and average number of installed application permission which are associated with battery awareness and privacy awareness significantly effect on the decision of smartphone users to access Facebook. The results proved that the hypothesis 1 and hypothesis 2 are true, the smartphone users who prefer to access Facebook through Facebook mobile website are more concerned with their battery usage and privacy rather than who accessing Facebook using Facebook application. This research is limited by the small number of participants and also limited to areas, where only

conducted in South Korea with 46 participants. In the future, this research needs more number of participants and also conducted in other countries.

Acknowledgements

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Authors

Priagung Khusumanegara, he received the B.Eng in Computer Engineering from University of Indonesia in early 2014. Since September 2014, he has been with the Network Systems Lab, Chonnam National University, Gwangju, Korea, pursuing a Master degree in Electronics & Computer Engineering. His main research interests include ubiquitous computing, data mining, human computer interaction, and data processing and analysis.

Rischan Mafrur, he received the B.Eng in Computer Engineering from Sunan Kalijaga State Islamic University Indonesia in 2013. Since September 2013, he has been with the Network Systems Lab, Chonnam National University, Gwangju, Korea, pursuing a Master degree in Electronics & Computer Engineering. His main research interests include ubiquitous computing, data processing and analysis, data mining and web mining.

Deokjai Choi, he received the B.S., M.S in Computer Science from Seoul National University, Korea in 1982 and from KAIST 1984 respectively and also received Ph.D. in Computer Science and telecommunication from University of Missouri-Kansas City, USA in 1995. Since 1996 until now, he has been serving as Professor in School of Electronics and Computer Engineering, Chonnam National University, Korea.