

Command Transition Probability Analysis on Mobile Internet Command Sequences

Toshihiko Yamakami

¹ ACCESS, 2-8-16 Sarugaku-cho, Chiyoda-ku, Tokyo, 101-0064 Japan
Toshihiko.Yamakami@access-company.com

² Graduate School of Engineering, Kagawa University, 2217-20 Hayashi-cho,
Takamatsu-city, Kagawa, 761-0396 Japan

Abstract. We have witnessed rapid growth of mobile Internet capabilities in the mobile handsets. The penetration of the user life increases the need to establish a methodology to capture the user behavior patterns in order to improve satisfaction of the mobile web users. In order to cope with the design evaluation needs, the author proposes a long-term command transition probability analysis on mobile clickstreams. The observation showed that the first command ratio did not depend on the menu order, but that the ratio to terminate the command sequence depended on the order. This gives a positive outcome from the command transition analysis in the mobile clickstream.

1 Introduction

We have witnessed explosive growth of mobile handsets capable of Internet access. The Internet access from mobile handsets exceeded that from PC in Japan. The number of wireless IP-connected users reached 85.2 million users in Japan in May 2007, which was 89.1 % of total wireless subscribers. This high penetration demands content providers to improve their capability to design and evaluate mobile web. The mobile Internet users are characterized as *easy-come and easy-go*. With the user interface limitation, it is difficult to ask users why they came and why they are leaving. This prompts the need to develop some methodologies to complement the lack of the direct user feedbacks. The author assumes the long-term mobile clickstream can be a source to obtain implications of the mobile web menu structure to improve the user interface design. The user identifiers provided by wireless carriers enables the long-term observation. In order to facilitate user feedbacks to the mobile web menu structures, the author proposes a command transition analysis using long-term mobile clickstream logs. The paper describes the method to identify the command transition patterns and implications from the exploratory analysis.

2 Purpose of the Research and Related Works

2.1 Purpose of the Research

The aim of this study is to identify a methodology to extract the feedbacks for user interface design using real mobile clickstream logs to facilitate efficient design-implement-feedback cycle in the mobile Internet.

2.2 Related Works

The mobile clickstream catches researchers' attention with the advance of the wireless Internet. Yamakami performed the regularity analysis in the mobile Internet with time slot count [1]. Halvey presented the significance of time of day in mobile clickstreams [2] to indicate the weekday/weekend user behavior differences. Halvey showed that the day-of-week-based Markov models explain WAP logs better than the models without day-of-week considerations [3]. The mobile web design evaluation using user trackable long-term logs was unexplored in the past literature. It should be noted that the mobile clickstream analysis is obscured due to widespread WML 1.x use with multiple cards per page. The widespread use of Compact HTML enabled detailed user interaction analysis in Japan.

3 Method

In order to improve the mobile web design, it is critical to get the user feedbacks for the web design. The mobile clickstream is a resource that is available in most of the web services. The unique characteristics of the mobile Internet include the user identifiers provided by the wireless carriers to enable content charging. The author considers this long-term user-trackable clickstream log can be used to identify the implicit user feedbacks to the mobile web design.

The author proposes a transition probability comparison method to identify long-term transitions of user navigation to obtain user behavior characteristics to a specific mobile web. The processing flow for monthly transition probability analysis is depicted in Fig. 1.

The detailed flow in the preprocessing part is outlined in Fig. 2. The preprocessing program can support two levels of threshold values to identify sessions: 500 seconds and 14400 seconds (4 hours). In this research, the author uses only the short-term sessions with 500-second timeout values. In the drawing part, the command groups are split into news article groups with labels (c_n : where n is 1, 2, ...) and other groups with label *misc*. Each label denotes a separate news category. The *misc* groups include subscribing, unsubscribing and other services. Other services include quiz, keyword alert registration, and weekly keyword ranking news. In this article, the author uses the P notation: $P(c_i \rightarrow c_k)$ denotes the probability from the c_i command groups to the c_k command groups when a user performs one of the c_i command groups. The transitions within the same command groups are illustrated with circles with arrows.