

Dynamically Personalized Web Service System to Mobile Devices^{*}

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Abstract. We introduce a novel personalized web service system through mobile devices. By providing only users' preferred web pages or smaller readable sections, service elements, the problem of the limitation of resource of mobile devices can be solved. In this paper, the preferred service elements are obtained from the statistical preference transactions among web pages for each web site. In computing the preference, we consider the ratio of the length of each web page and users' staying time on it. Also, our system dynamically provides the personalized web service according to the different three cases such as the beginning stage, the positive feedback, and the negative feedback. In the experimental section, we demonstrate our personalized web service system and show how much the resource of mobile devices can be saved.

1 Introduction

Using web services has already become an essential part of our everyday life. Because of development and popularization of mobile devices characterized with mobility and ubiquity, the existing wire internet service is rapidly expanding to the wireless internet service through the mobile devices. In order to enable to provide web services to mobile devices, it is needed to transfer web pages to a suitable format. However, it is challenge because of the limitation of the monitor size of mobile devices and their resources. As a try to solve the problems, some researchers render a web page on a small display with various techniques such as four-way scrolling [1], web-clipping [2], and miniaturization of web pages [3, 4]. However, those techniques can not overcome the limitation of resources of mobile devices because all contents of a web site have to be delivered to users once the users request the web service.

In order to solve the problem, we provide a personalized web service according to users' preference of each web page. The preference of the web pages can be obtained

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from the navigation history of users who visited the web site through computers. By providing only users' preferred web pages or smaller readable sections, the problem of the resource limitation can be solved to some extent. In this paper, we find the preferred web pages from the statistical preference transactions among web pages. In computing the preference, we consider the ratio of the length of each web page to users' staying time on it. Also, our system dynamically provides the personalized web service according to the different three cases such as the beginning stage, the positive feedback, and the negative feedback. In the experimental section, we demonstrate our personalized web service system and show how much the resource of mobile devices can be saved.

The remainder of this paper is organized as follows. Section 2 describes related works of various web content presentation techniques and personalization techniques. Section 3 defines fundamental terms related to our work. In Section 4, we describe our personalized web service system. Section 5 describes the architecture of our system. In Section 6, we show the experimental result of our system and its analysis. We then conclude our paper in Section 7.

2 Related Work

Many studies have been done about how to present web contents effectively on mobile devices in order to overcome the limitation of their monitor size. Researchers in Palm Inc. [2] made information in smaller chunks and compiled them into a compact format that can be decoded on the Palm VII. The Wireless Access Protocol's Markup Language (WMA) [5] replaces HTML to its own markup language to lay out each page for optimal viewing on small screen. The technique is effective, but it has to prepare the same information for both standard web browsers and PDAs. Another popular technique is to miniaturize standard Web pages by the ProxiWeb browser [4]. This technique is also effective, but it needs the large amount of necessary scrolling action.

Even though the techniques above can solve the problem on providing the standard web pages to the small mobile devices, they can not overcome the limitation of resources of mobile devices. In order to solve the problem, we provide the personalized web pages or smaller readable sections, called fragments.

Various personalization techniques can be classified into three possible categories such as the rule-based, inference method, and collaborative filtering. The rule-based recommendation is usually implemented by a predetermined rule, for instance, if-then rule. Kim et al. [6] proposed a marketing rule extraction technique for personalized recommendation on internet storefronts using tree induction method [7]. As one of representative rule-based techniques, Aggrawal et al. [8, 9] proposed a method to identify frequent item sets from the estimated frequency distribution using association-rule mining algorithm [10]. The inference method is the technique that a user's content consumption behavior is predicted based on the history of personal content consumption behaviors. Ciaramita et al. [11] presented a Bayesian network [12], the graphical representation of probabilistic relationship among variables which are encoded as nodes in the network, for verb selectional preference by combining the statistical and knowledge-based approaches. The architecture of the Bayesian network