

# Design and Implementation for Web Page Visualization Techniques using Android Smartphone

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**Abstract**— SMARTPHONE has become a big issue in South Korea and worldwide. In this work we will propose techniques that display web contents according to user preference and service provider's interest for small screen devices such as smartphones. A number of works and research have been conducted to generate suitable web contents for small screen devices. But such previous attempts have not failed to reflect the interest of users and service providers. Our proposed system simulates the Google Android Emulator, which is a free and well known open source.

**Index Terms**— Android, Mobile Phone, Smartphone, Web Page Visualization

## I. INTRODUCTION

SMARTPHONE has been a hot issue in South Korea since last year. KT, a communication service corporation in South Korea, started the service using the apple smartphone named iPhone since Nov. 2009 and smartphone emerged as one of the biggest issues in broadcasting through news media and internet portals. Several smartphone OS began providing its service in South Korea. These are Apple's MAC OS, Google Android, Microsoft's Windows mobile and Samsung's BADA, which is Korean company.



Fig. 1. The figure on the left is a picture of iPhone developed by Apple. The one on the right is a picture of the Galaxy model which uses the Android OS.

Smartphones could create a new paradigm. Apple is especially known for supporting Smartphone Applications(called APP). Google opened the Android market to stimulate the creation of new applications by

smartphone users and to enhance developer competition. Google tried to develop various applications.

In the case of South Korea, Samsung, SKT and KT started the App store service in order to meet the demands of smartphone users which number is increasing rapidly since 2009. Smartphone has a small screen which makes it better than the PC seen in figure 2. But browsing previously visited web documents using the Smartphone can create problems. Figure 2 shows one of these problems. In general the Smartphone screen is about 1/9 smaller than that of a regular PC screen and those who use smartphones must use touch pens and fingers to browse. This can be uncomfortable for people who are accustomed to using the mouse or a keyboard. Users are required to scroll or change the screen up to maximum 9 times in order to browse for contents.



Fig. 2. Display the yahoo web page PC and PDA[1]

A lot of research has been conducted to improve on such inconvenience for those who use small device like the Smartphone and PDA. Some research focused on summarizing original contents [1] while other research focused on regenerating original contents in a way that is suitable for small screen devices [2].

But most recent works focus the on service provider. The system of previous visualization techniques consist of automatically generating new web pages. Hence the system hardly reflects the end user's interests directly [1-11].

In this work, we introduce a method that reflects the concerns and interest of users and service providers. Our proposed system automatically selects and orders articles according to user interest as a means of easing the discomfort that comes from browsing internet news using

Manuscript received July 1, 2010; accepted July 1, 2010.

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small screen devices. We simulate our system with base on the Android emulator.



Fig. 3 An example of previous system which started service one of Korea news paper company for smartphone[13]

This paper is organized as follows. In chapter 2, we will discuss about existing related works. In chapter 3, we will introduce our proposed system. And finally, we will provide a conclusion and direction for future related works.

II. RELATED WORKS

Previously developed web contents were created to be suitable for PC screens. However, Smartphone screens and PDA screens are smaller than PC screens. This makes browsing for web contents with the Smartphone somewhat problematic, because it is quite uncomfortable for users to search for contents and articles. The following figure represents one of the reorganizing methods[1] that we are proposing. This section will also show some of the several previous works that have been developed regarding this matter.

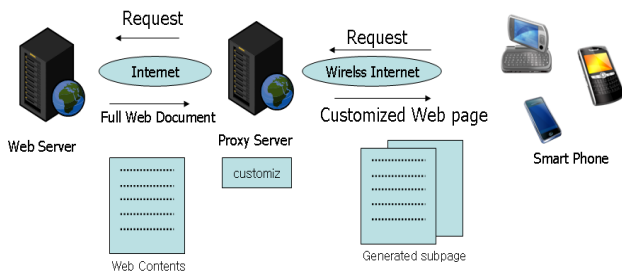


Fig. 4. Web page transformation techniques [1].

In [3] it is proposed that web page partition techniques be applied manually. This work allows users to directly apply a change in rule using tool interface. However, it is neither convenient nor suitable for users to continuously change the search rules for web content. Although it does consider the user's interest, it fails to reflect the priorities of service providers. For example, the number of clicks

made by users, which shows their perspective and preference regarding the content, would not be implicitly reflected.

The study in [4] showed a technique that automatically presents a summary of the text. Title, keywords and typed in language is used to reduce the amount of displayed info and list them at the center of the page. The paper in [4] proposed a hybrid segmentation method which segments web pages based on both the content-distance calculated by the previous scheme, and a novel approach which utilizes web page layout information.

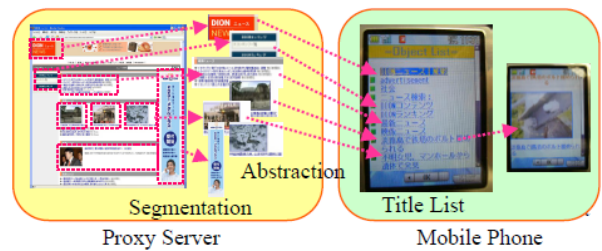


Fig. 5. Web page segmentation techniques [4].

NAC: A Basic Core for the Adaptation and Negotiation of Multimedia Service in [5, 6]. NAC was developed as part of an Opera project. The system was developed based on CC/PP (Capabilities/Preferences Profiles).

The Web Views system in [7] is a system developed by Bell Research Institute. It was designed for personalized contents in the mobile environment. The system was designed to make complicated web pages with image, flash and java script, but it did not reflect the user's interest explicitly.

Figure 6 shows the Android architecture that is based on the Linux kernel and it provides a lot of API, such as XML and JAVA, which is useful for developers.



Fig. 6. Android Kernel, Important Components and API[13].

The system in [8] suggested some personalized XML document generating techniques for mobile device users.

But previous works on this system did not reflect the priorities of service providers, such as measuring the number of clicks by users which reflects their perspective implicitly.

In this work, we will use Android emulator for simulation. The Google Android represents a collection of important applications for mobile devices regarding middleware and operating system. It is also well-known that Android, which was developed by Google, opened its source for users.

### III. WEB CONTENTS TRANSFORM TECHNIQUES BASED ON RULES

This chapter describes our proposed system. In A, we introduce an overview of our proposed system. In B, we will describe reflection techniques that meet both user and provider interests.

#### A. Proposed System Overview

In this study, the contents of Web documents often change, especially when it comes to internet newspaper. The following figure 7 shows our proposed system.

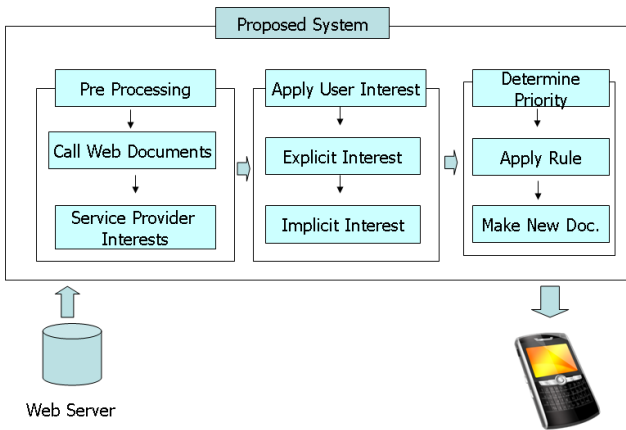


Fig. 7. Proposed system overview.

The system is largely divided into three stages and they show how this study will be conducted. First, we set up a list of concerns and priorities of service providers to set up the step. The following reflects the information generated by the user as the user steps in and explicitly selects a topic of interest. Where the user clicks implicitly reflects his/her interest on this step. And in the following step, the service provider's interest and priorities are met, as the user's interest on contents and articles are revealed.

#### ● Design XML DTD

We design a XML DTD which saves user's interests and service provider's interests. Our proposed system has a structure as following figure 8. The system has similar structure to current internet newspaper. users interests and service providers interests are saved PCDATA.

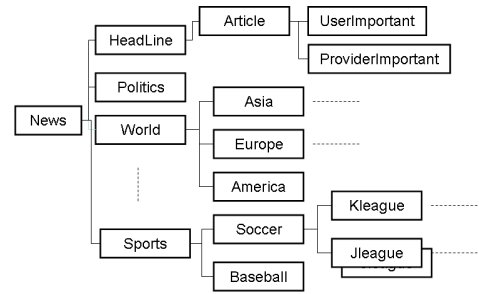


Fig. 8. XML DTD for saving users and service providers interest.

#### B. Reflect Priority Techniques

Setting the weight of priority is important for service providers, just as headlines or breaking news articles are given higher priority along with user preference.

If the article includes subjects that are explicitly deleted by the user, except headlines generated by the service provider, then the priority weight shifts towards that which is generated by the user.

#### ● Applying user interest.

- Subject's weight of importance is explicitly generated by the user.

The weight of importance in terms of interest is explicitly generated by the user. User preference and interest on certain subjects is weighed and measured over others, and in such cases, latest news articles would be given greater weight over older articles.

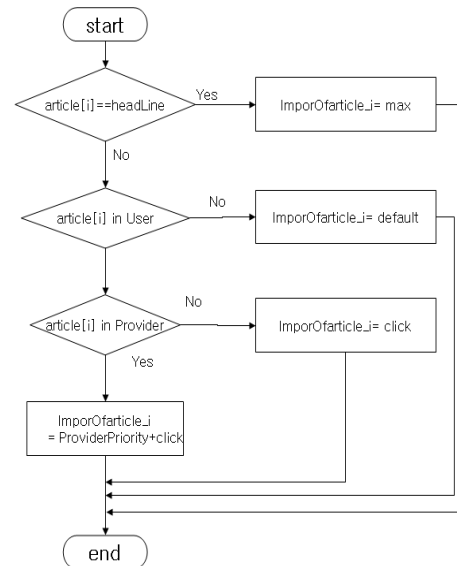


Fig. 9. Flow chart of our proposed rules

-Subject's weight of interest is implicitly generated by the user.

The user's implicit interest is measured through the number of clicks on certain topics or subjects. The weight of importance on subjects and topics increases as the more the user clicks on them. This reveals the user's implicit

interest, whether or not it has been explicitly specified by the user.

-Applying our rule on the whole system

The weight of interest of subjects and topics which is explicitly specified by the user starts out with an interest weight of 6. Among those, the latest 5 articles are given a higher weight of importance over others, but their weight will decrease by 0.1 every time that a new article is added to appear. However, subjects and topics will be given an extra 0.1 point on weight each time that the user clicks on it, as it will be considered and measured as an implicit interest on that area. Subject and topics that are explicitly defined to be of the user's interest will start out with a weight of importance ranging from 1 to 10. But user interest, as measured by the number of clicks on certain subjects and topics, will not increase the weight of importance significantly, unless it is often clicked on. A click adds 0.1 points to the weight, so it requires 10 clicks on a subject to increase its weight of importance in terms of interest by 1.

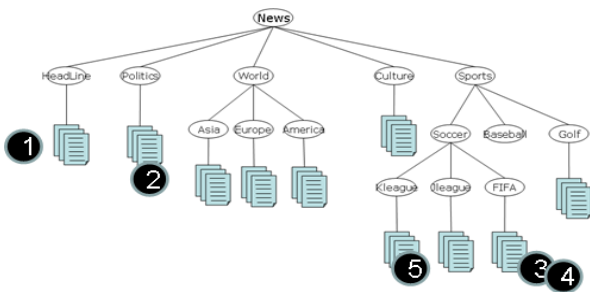


Fig. 10. Selected articles example after applying rules

● Development of Prototype

Prototype developed using Windows 7 and Android emulator. Our test interface developed using JAVA swing. The size of prototype is similar to a size of real smartphone application. Extraction of articles which selected after applying rules use to XSLT technique[14].

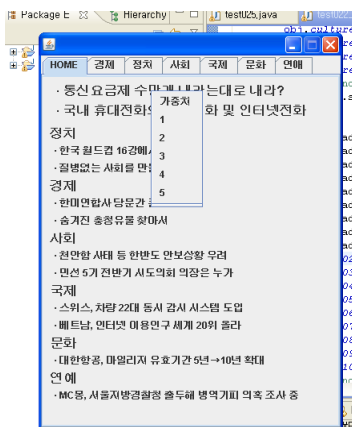


Fig. 11. Screen shot our proposed system interface.

The figure 11 shows user interface. User can create their interests using following interface. They can generate their interests as specific articles and subjects. The interface developed by JAVA and Eclipse. The following figure 12 shows the result proposed our system regarding user interest.



Fig. 12. Screen shot of our proposed system

IV. CONCLUSIONS AND FUTURE WORKS

The Smartphone is rising as one of the biggest issues these days. In this paper, we suggested web content generation techniques for small screen devices such as smartphones and PDAs. Our suggested methods reflect both the user's interest and the service provider's interest. The system developed news contents that continuously changed. There have been several works and studies for generation regarding small screen devices. Previous works focused on summarizing existing web contents or generating subpages. However, our proposed system reflects on both the user's interest and the provider's interest implicitly and explicitly. We created several applicable rules to set priority based on these interests.

In this work, our proposed system was developed by Android emulator. We will be extension our work to use App. application program. If our work will develop App. application, then a lot of people will use this system.

APPENDIX

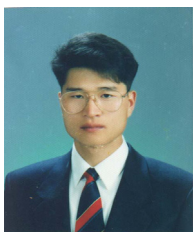
This paper was modified and extended the paper "Design of Web Page Visualization Techniques for Android Smart Phone" that was presented at international conference of KIMICS 2010.

ACKNOWLEDGMENT

"This work was supported by the Korea Research Foundation Grant funded by the Korean Government(MOEHRD)" (KRF-2007-331-D00429).

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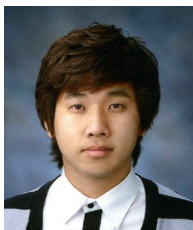
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