Personalized Service Studies CSS for Web Accessibility Improvement of the Senior Generation

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Abstract

For user's web accessibility, Responsive Web Design (RWD) is the preferred approach to web design layout aimed at avoiding eye strain to the user due to small screen size. As the user's visual convenience, the PC browser provides magnification of the web page. An effort to enhance the web accessibility has become more important due to the wide range of ages and the increase in number of web users. Presbyopia relates to loss of the elasticity of the lens of the eye, occurring in the middle age and starting from 40. Because of the aging of existing web users, CSS is developed for personal services in accordance with the emergence of a new silver generation who is positive in social participation. Personality diversity of the web screen has also been implemented by utilizing login subsequent age and personal information, we describe its effectiveness.

Keywords: CSS, Personalization Service, Senior, UI, UX, Web Accessibility

1. Introduction

Web technologies are the indispensable means of communication during daily life in terms of society, culture and economy. Web services have been expanded to include smart TVs, smart phones and *etc.* Responsive Web has been developed to reduce the visual discomfort of the variable screen size of devices. Changing the layout of content and the position of the navigation directly improves web accessibility. The Government of the Republic of Korea tried to enact the legislation for web accessibility to take advantage of the web equally to everyone, a situation that the efforts to reduce the digital divide index. Public sites are being encouraged to comply with the corrective recommendation of Web Accessibility in order to regulate discrimination in the access to information with regard to electronic information, which is related to implementing the Act on the Disabled Discrimination and Remedies April 2008. Even though the average ages of web users were 20s-30s in the past, the age is on widen trend and the number of older users have increased recently with the appearance of positive participation group in society such as New Silver generation. Existing Web is designed for youth; hence, elder people experience difficulty and become a marginalized information group because of the lack of accessibility. In the current web accessibility, everyone could become isolated information groups due to aging issues. Since presbyopia often begins in the middle age – 40 [1], universal design for the Web should be considered to the Web easier to access without physical restrictions for elderly and cognitive conditions [2]. This paper studies how the usages of status through an information divide in the index of the senior generation have been investigated.

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We focus that the users want to resolve matters on the basis of particular complaints. After revision of the theoretical and physical aging of the senior generation has been identified, it was mainly observed that there was a need to make the website give a more personalized service. In this research, the senior target of developing CSS is designed to provide customization to the user in relation to the user's age and the option at the login extent, instead of a fixed model of the web design layout. The Internet is becoming more important for real life and conveniently reducing the economic and social cost. The gap of the information era is getting worse because of particular categories, directly leading to the alienation of human relations and loneliness of old age. Digital Aging policies may help to solve the aging problem and overcome a variety of disorders facing the senior issues by utilizing ICT technologies. Furthermore, an endeavor to solve the digital divide may improve the quality of life. This research proposed a responsive Web interface based on user information targeting age so that everyone can enjoy the benefits of information and the equality of older users [3-5].

2. Related Research

2.1. State Web Usage of Older Users

According to the Internet usage survey published by National Internet Development Agency of Korea in 2013, the number of users are 40.08 million people (82.1%). 16.6 percentage points has increased compared to 10 years ago (it was only 10 million people). Because there has been an increase in the number of middle and old-aged users, 50s aged Internet usage has been increased sharply from 60.1% to 80.3% [6-7]. However, generational digital gap is shown different in areas of real life such as shopping, learning and internet banking. The Internet education and convenience facility should be increased for the middle and old-aged target. The following Figure shows the percentage of the Internet population of South Korea in 2014.

Below is a graph with the distribution of information based on the index of the entire Republic of Korea with 100 people [8].
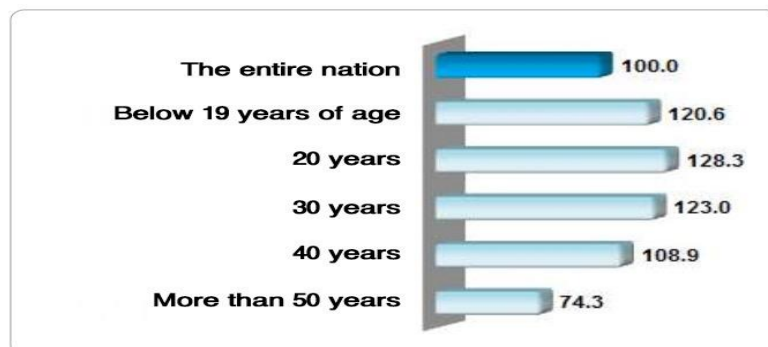

Figure 1. The Age - Specific Information Gap Index (National Internet Development Agency of Korea, 2014)

2.2. Characteristics of 'New Silver Generation'

The 'baby boom generation' is aging, but they are trying to participate actively in society to keep up with digital society. Because they seem to dislike being referred to as "elder", they try to use the words "Honors" and "Seniors" to refer to themselves. However, humans are aging and their physical, cognitive and psychological function will deteriorate with age. In contrast, discriminating power will reduce from 1.5 to 4 times compared to young people (INCLUDE, 1998). In addition, the visual cognitive ability which determines the action on the basis of accepting the visual information they receive

will be reduce as well (Sharps, 1990). Depression also tends to increase (Bwlsky, 1999; KartandKinney, 2001) along with caution and dependence (Yoon, 1987) [2]. Even though those vulnerabilities are present, 'New Silver generation' is always active and love to participate socially with a hearty curiosity.

Table 1. The Difference between Silver and New Silver Generation

No.	Attribute	Silver Generation	New Silver Generation
1	Image	Stubbornness, conservative	Bright, flexible, rational, positive
2	values	Inter-generational break, change denial	Open to change
3	Attitudes of life	Frugality, simplicity, No Hobby	Free, enjoyment, a variety of unique hobby
4	Human Relationship	Intercourse among the elderly in senior citizen center	Group activities wide relationships
5	Design one´s old age	Dependent children	Planned design one´s old age trying to independence

2.3. Universal Design Policies for the Elderly

As the world population is aging, International Organization for Standardization (ISO) has emphasized a focus on the detail for 'elderly care' in future international standard-setting processes. Five- principles for the elder (Independence, Participation, Care, Self-realization, Dignity) have been established and enacted the ISO/IEC Guide 71 (adopted in 2001) to indicate the urgency of elderly care in the world. ISO/IEC Guide 71 Guidelines for the elderly and the disabled are as follows [9].

Table 2. ISO/IEC Guide 71

No.	Attribute	Sensory abilities	Physical ability	Cognitive abilities
1	Function and capability classification	Visual, auditory, tactile, olfactory	Weak physical fitness, communication skills	Judgment, memory
2	Care area	Presbyopia, deafness	Language disorders	Intellectual Disability
3	Information display	Color, size of the character, Contrast, shape, *etc.*	Location, layout,	Graphical symbols, *etc.*
4	User interface	Color, character size, layout, and easy to handle	Layout, Easy to handle	Tables, Figure sign, easy to understand, *etc.*

3. Personalized Service Web Design Development for Senior Generation

Web Page's three elements are HTML, CSS and JAVASCRIPT. Web pages are divided into HTML (composite the contents), CSS (covering design), and JAVASCRIPT

(implement special features). By modifying the contents of the CSS, the design will change completely. This study made the best use of JAVASCRIPT to apply CSS for seniors depending on the user's age information database. First, HTML has been designed to enable a flexible design by considering items convenient for the senior generation from related research. At this time, the design for normal users should be produced first. It is very important not to hinder the normal user's convenience and aesthetics for the senior custom design. Web design is made to develop a concept that reflects the client's requirement and current trends. Senior customized designs are produced using the CSS background images and colors appropriate to ensure that there are no significant changes from the design concept of the web site. The color may be the same or there may be a subtle increase in the degree of luminance by increasing the contrast. Using enlarged and bold font will be the biggest change to the whole layout. Of course using CSS, the article should not be imaged to adjust the form of font.

The size of the font and the color contrast was in compliance with the AA' Compliance Level' of at least three levels of WCAG 2.0 Guidelines [10].

1. A: It must be strongly recommended as the minimum level to be followed to claim that ensure Web accessibility.

2. AA: It must be strongly recommended as the minimum level to be followed to spread the claim that ensures Web accessibility.

3. AAA: This level may be too difficult to mandated levels, as you should have if you want to maximize your web accessibility.

Table 3. Personalized Services Items for Improving Web Accessibility Senior

No.	Web Components	The item considering the Recognition of ease
1	Typography	The minimum font size is 14point
2	Color contrast	Giving relatively strong contrast to the background and contents for increasing luminance, inquiring attention to gender- based long-wavelength colors (red-yellow)
3	Image alternate text	Providing a voice service in a text function that describes the image.
4	Global navigation bar	Display the details of frequently automatically menu by clicking to add to the Quick Menu Area
5	Contents	Production HTML structure of content using CSS for flow type layout, Changing the layout to place first in the senior generation information of interest to the top of the screen by using CSS

Font and background color must satisfy at least 5:1 brightness and contrast. However, it should be able to decrease the brightness and contrast to 3:1. Depending on the font size and weight, the relative effect will be very different. Labels could help to compensate cognitive faculty and convey fast and clean visual information by replacing the appropriate icon. Because the color is more conscious of the longer wavelength color (warm color) by the chlorosis, short-wavelength (cool color) color is not used in small text.

Contrast Ratio	FG/BG Color	Normal Text 12pt(16px, 1em, 100%) + Normal	Large Text 14pt(19px, 1.2em, 120%) + Bold	Large Text 18pt(24px, 1.5em, 150%) + Normal
21:1	#000000/#FFFFFF	Power of Web. Passed AAA	**Power of Web.** Passed AAA	Power of Web. Passed AAA
12.63:1	#333333/#FFFFFF	Power of Web. Passed AAA	**Power of Web.** Passed AAA	Power of Web. Passed AAA
7:1	#595959/#FFFFFF	Power of Web. Passed AAA	**Power of Web.** Passed AAA	Power of Web. Passed AAA
5.74:1	#666666/#FFFFFF	Power of Web. Passed AA	**Power of Web.** Passed AAA	Power of Web. Passed AAA
4.54:1	#767676/#FFFFFF	Power of Web. Passed AA	**Power of Web.** Passed AAA	Power of Web. Passed AAA
4.48:1	#777777/#FFFFFF	Power of Web.	**Power of Web.** Passed AA	Power of Web. Passed AA
3.54:1	#888888/#FFFFFF	Power of Web.	**Power of Web.** Passed AA	Power of Web. Passed AA
3:1	#959595/#FFFFFF	Power of Web.	**Power of Web.** Passed AA	Power of Web. Passed AA
2.85:1	#999999/#FFFFFF	Power of Web.	**Power of Web.**	Power of Web.
1.61:1	#CCCCCC/#FFFFFF	Power of Web.	Power of Web.	Power of Web.
1.16:1	#EEEEEE/#FFFFFF	Power of Web.	Power of Web.	Power of Web.

Figure 2. The Example of Using the Brightness and Contrast Conformance Level Foreground/Background Color on the WCAG 2.0 Guidelines

```
<script>
<!--
    var fm;
    var lnk;
    var ifm;

    function fncInit() {
        fm = document.frm;
        lnk = document.getElementById('lk');
        ifm = document.getElementById('ifrm');

        lnk.href = 'style1.css';
        ifm.src = 'http://www.' + 'i';
    }
//-->
</script>

<input type='button' value='style1.css'
onclick='javascript:setStyle(this);'>
```

Figure 3. JAVASCRIPT CODE for Changing the CSS

In this study, the content including a keyword of interest are produced and arranged at the top. For example, because it is arranged at the top, the process of a senior subject could help in the Longlife Education Center web site. The page that is frequently clicked is automatically registered in the Quick Menu to relieve the difficulty of finding a page that had been visited in the Website. It was designed to save details about the web page that has been visited 10 pages recently in Quick Menu.
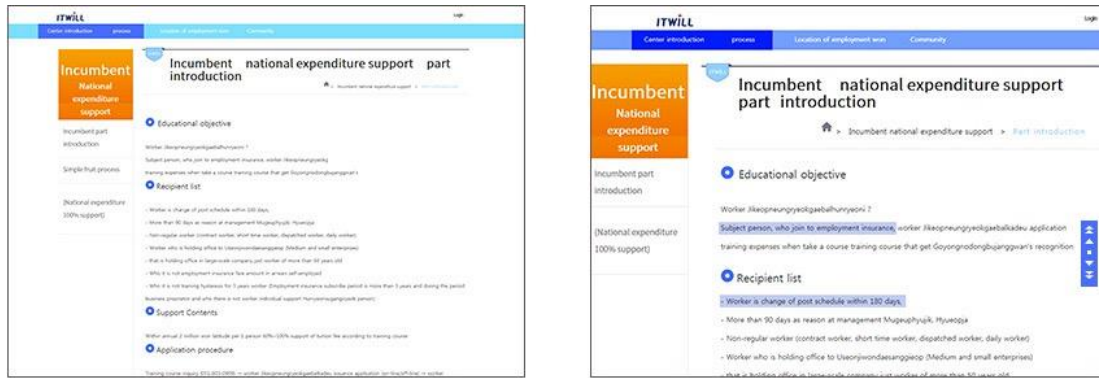
(a) The Scene of Login Before   (b) The Scene of Login After

Figure 4. Common Design before Login and Custom CSS Applied after Login Web Page for Seniors

4. Conclusion

The study focused on implementing a personalized service in order to change the customary web design for seniors and senior user's login function at the same time. In compliance with the international standards of the W3C Web Content Accessibility (WCAG2.0), it focused on elderly-friendly intuitive operation for ease of usability. Relevant information can be found as soon as a keyword is implemented in CSS to reposition the order of the content. Frequently visited pages' URLs are automatically stored in the quick menu for senior users' convenience. The quality of the web page will give the users satisfaction and these services will expect to further enhance the profit of the company. As a means of communication in Internet, giving the aging society a chance to participate socially would increase their confidence. Based on this study, it is hoped that a customized UX (User Experience) Design designated by 'Persona' scheme will be developed. All the people of the world without regard to fault will be a truly become 'world wide web' where you can share information easily.

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