A study on improvement of evaluation method on web accessibility automatic evaluation tool's <IMG> alternative texts based on OCR

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Abstract. The Web accessibility means enabling disabled persons to recognize and operate the Web and interact with the Web. In the contemporary times in which the use of the Web is increasing, websites should be constructed observing accessibility. Images used on the Web are content of which the information cannot be recognized by visually handicapped persons. Therefore, to observe accessibility, alternative texts should be provided. When the provision of alternative texts for <IMG> tags is evaluated in automatic evaluation methods, many cases where actual disabled persons cannot recognize information are indicated as being 'acceptable' in the evaluation results. Therefore, in the present study, a method that enhances accuracy compared to existing automatic evaluation methods by extracting texts from images containing texts and automatically inserting the results as alternative texts was proposed and implemented.

Keywords: Web Accessibility, Mobile Accessibility, Web Standard, HCI

1   Introduction

Web accessibility basically refers to enabling disabled persons to use the Web and more concretely, it means enabling disabled persons to recognize, understand, and operate the Web and interact with the Web [1]. Sites that ensure accessibility enable even persons with physical or cognitive difficulties such as disabled persons and aged persons to use Internet services and content [2]. Therefore, in the contemporary times in which the use of the Web is ever increasing, constructing web pages observing accessibility and evaluating web pages whether they are sites that observe accessibility can be said to be indispensable.

Images account for a large part of the Web. However, from the position of visually handicapped persons, image content from which information should be obtained using

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vision is content from which information cannot be easily obtained and for which they should be provided with alternative texts [3].

Automatic evaluation methods for evaluating web pages to see whether the web pages observe accessibility are frequently used in studies of web accessibility because they enable evaluating many pages in a short time [3]. However, K-WAH which is an automated evaluation tool widely used in South Korea produces wrong evaluation results in many cases because it evaluates alternative texts provided for <IMG> tags without considering the meaning or use of images.

Therefore, in the present study, a method that extracts texts from images with texts using an OCR program and automatically inserts alt = ″extracted texts″ unlike existing evaluation methods were proposed and implemented. If the method proposed in the present study is used in automatic evaluation, cases where web pages are judged 'acceptable' in web accessibility evaluation but actual visually disabled persons cannot recognize information will be reduced by using alt = " " and developers' simple repetitive work can be reduced if the developers use texts made into images.

2   Improvement of evaluation method on web accessibility automatic evaluation tool's Alternative Texts based on OCR

The kinds of content provided through the Web are diverse and in particular, the ratio of images is high to the extent that images account for 73% content provided through the Web [4]. However, image content of which the information should be recognized using vision is one of those types of content from which accurate information cannot be recognized for which alternative texts should be provided from the position of visually handicapped persons.

The 'Korean style web content accessibility guidelines 2.1' stipulates accessibility principle 1(easiness of recognition) that reads, 'For content that is not texts, alternative texts should be provided so that the meaning or use of the content can be recognized' as guideline 1.1. In cases where alternative texts are provided, emphasis should be placed on the meaning or function intended to be expressed by the image rather than the visual characteristics of the image [5].

Table 1 below shows a proper method of provision of alternative texts for <IMG> tags [5].

Table 1. Providing correct alternative text for <IMG> tags

Division	Description	Provide alternative text
image with meaning	All images that have meaning	Provide with alt= "alternative text with a same meaning as image"
image without meaning	bullet points, blank images, edge, decoration images, etc.	provide with alt= ""

Accessibility evaluation methods for evaluation of web pages to see whether the web pages observe web accessibility or not, are divided into automatic and manual ones. Automatic evaluation methods analyze the sources of relevant web pages using programs to examine whether the web pages were developed to meet the accessibility standard and are known to be the most excellent in terms of cost-effects. Therefore, many previous studies of web accessibility evaluated web accessibility using automatic evaluation methods [6]. However, automatic evaluation methods have problems in reliability and have a shortcoming that they cannot examine all accessibility problems [3].

Table 2 below shows the automatic alternative text checking rules of K-WAH, which is the most widely used as an automatic evaluation method in South Korea [7].

Table 2. Ways of K-WAH to evaluate alternative text

Division	Description
pass	Pass if alt = ""
	Pass if alt = "" or even if it has long attribute value or inconsistent contents
fail	Fail with no properties of alt and longdesc

To review the checking rules in Table 2, alternative texts that do not have any of alt and longdesc attributes for <IMG> tags are 'errors'. However, all alternative texts that have any of alt and longdesc attributes are processed as being 'acceptable' without evaluating whether they provided alternative texts suitable for the meaning or content of the image.

Table 3 below shows wrong evaluation results by K-WAH for a shopping site in South Korea.

Table 3. Results of Source Analysis K-WAH' error

image	Description
판매만족도 :	<li class="sat1"><a><img src="http://s.011st.com/img/shoppingplan/sellerinfo.sat1.gif" alt="">
	When clicked, the text is linked to an image with the content: "satisfaction with sales." Therefore, alt = "satisfaction with sales" instead of alt = "" should be designated to the text.

Therefore, in the present study, HTML documents are read to evaluate whether the attribute alt was provided for <IMG> tags. Texts included in images are extracted

using an OCR program in cases where the attribute alt was not provided for <IMG> tags and in cases where alt = "" was provided. When there are extracted text, alt = "extracted texts" is automatically inserted. Figures 1 and 2 are screens that implemented the process through which a text in an image in an 'asd.jpg' file is extracted and the extracted text is inserted as alt = "extracted text". In the present study, OCRSDK which is an open source was used as an OCR program [8]. The 'asd.jpg' file is an image having a text that reads 'I'm burning up a sun just to say goodbye'.

On reviewing the tag in Figure 1, it can be seen that the alternative text of the 'asd.jpg' was provided as alt = "".

Fig. 1. Form of asd.jpg's alternative text provided as alt= ""

Figure 2 shows a view of the alternative text of the 'asd.jpg' file provided as the extracted text 'I'm burning up a sun just to say goodbye'.

Fig. 2. Form of asd.jpg's alternative text provided as alt= "I′m burning up a sun just to say goodbye"

3   Conclusion

K-WAH that is widely used in South Korea as an automatic evaluation tool for evaluation of the provision of alternative texts for images just evaluates the provision of the attribute alt and cannot evaluate the meaning of images. Therefore, it has errors in checking results in some cases. Accordingly, cases where websites are judged 'acceptable' through checking with K-WAH and information cannot be recognized when visually handicapped persons use the website become to occur.

Therefore, in the present study, texts are extracted from website images using an OCR program and alt = "extracted texts" is automatically inserted. If the method proposed in the present study is used in automatic evaluation, cases where web pages are judged 'acceptable' in web accessibility evaluation but actual visually disabled persons cannot recognize information will be reduced by using alt = " " and developers' simple repetitive work can be reduced if the developers use texts made into images.

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