Development and Product Application of Web Accessibility Evaluation Tool "WEBJUDGE"

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Abstract

We have developed the web accessibility JIS test tool "WEBJUDGE" as part of our human interface research activities. This tool tests the HTML sources of web contents automatically based on the JIS X8341-3 Standard. This paper introduces this tool and describes a consulting activity case in which the tool was applied to improve and maintain accessibility to the contents of a local governmental website.

Keywords

web, accessibility, JIS X8341-3, local governmental procurement conditions, auto test tool, consulting

1. Introduction

Since a JIS standard on web accessibility requesting local governments to include accessibility measures in their procurement conditions was launched in Japan, studies of specific methods for compliance with the standard [1),2)] and the development and publication of test tools [3),4)] are being increasingly undertaken. At the NEC Common Platform Software Research Laboratories, we are also promoting enhancement of web content accessibility for content producers and service providers inside as well as outside the NEC Group.

In this paper, we introduce "WEBJUDGE," an evaluation tool that we have developed independently as a part of our web accessibility enhancement activities and describe an actual case in which the tool was applied in order to improve the accessibility of a client.

2. Development of the Web Evaluation Tool "WEBJUDGE"

2.1 Positioning of the Tool

WEBJUDGE is a tool for the automatic testing of the HTML source and auxiliary CSS and JavaScript files of a web that has been designed according to test rules based on JIS X8341-3.

Before developing this evaluation tool, we set a target to create a tool that could be used extensively in improving the accessibility of the large variety of products developed and marketed by NEC. We developed it as a universal tool to be of benefit to a wide range of users for testing an unspecified number of web contents. Consequently, it is not only used for consulting by accessibility specialists but may also be used by content producers and service providers themselves.

WEBJUDGE has three significant features including a large-scale site testing capability, the introduction of original test rules that can be used in the testing of an unspecified number of contents, and a test result display that suits the purpose of each user. The following subsections deal with these features.

2.2 Large–Scale Site Testing Capability

WEBJUDGE tests not only the specified web content page by page, but can also test the entire site by tracing the links provided in the page. The user first specifies the start page and the number of linked levels to be traced.

This feature has been provided in order to test the contents of hundreds of pages as automatically as possible, assuming testing of a large-scale site such as a local government or private enterprise.

2.3 Test Rules

In order to deal with an unspecified number of contents, WEBJUDGE is run according to 71 rules, which covers 34 of the 39 items specified in 5.1-a to 5.9-f of Chapter 5 of JIS X8341-3. Among the 71 rules, 41 of them refer to "correction items," which can be tested with mechanical judgments of tag descriptions of HTML and which may be improved by correcting them.

In the basic rule, examples of the targets of mechanical

judgments include the presence and value of the “alt attribute” that should be written so that even visually handicapped persons can understand the image content, the presence of the “lang attribute” that indicates which nation’s language is used in the HTML description, the character codes that may not be displayed with certain browsers and discommended tags that may not work. In the WEBJUDGE-original rule, mechanical judgments are also possible in testing the overlapping of titles of more than one web page and in testing if cells with a table tag can be read correctly as intended by TTS (text to speech) software applications.

The remaining 30 rules are the “confirmation items,” which cannot be subjected to mechanical judgments but are checked visually by humans. For instance, when “ *KEIZAI* ” is entered as “ *KEI_SUMI* ” by inserting a space for the purpose of graphic design, the TTS software may read it as two words of “ *KEI* ” and “ *SUMI* .” Since it is hard to judge mechanically whether it is an intended effect or an error, the tester is prompted to check the doubtful words by activating the TTS software manually.

Using these test rules, the test outputs the “number of points that failed checking of each JIS point in each web content page” and the “number of positions that are found to need tag correction or visual confirmation per JIS item.”

2.4 Test Result Display

The test results are displayed using three kinds of display functions.

The display of the detailed test results shown in **Fig. 1**

Fig. 1 Display of detailed test results.

Fig. 2 Display list of issues.

indicates the number of issues in the tested page checked by following each test rule. These issues are the points and positions that failed checking in the evaluation test and need to be either corrected or visually confirmed. The test rules are shown with a priority classification of whether the point is instructed by the JIS (mandatory point) or simply recommended (desirable point). Additionally, as the detail information is intended to serve the content producer, the HTML source of each position needing tag correction or visual confirmation is also shown.

The display of the numbered list of issues in **Fig. 2** indicates the numbers of points and positions of the tested pages at a glance. This information is intended to serve the site administrators who do not produce the contents by themselves or the accessibility specialists who perform a consultative function. Such people can use this list to identify the number of corrections and their priorities and to estimate the labor needed to carry out the requisite accessibility measures.

The display of the distribution of the number of problematic issues in the **Table** below shows the number of issues on the tested pages in a detailed form per test at a glance. This display makes it possible to compare the pages in details. For example, if all of the tested pages have the same number of issues, it is highly probable that these pages use the same template, so these positions may be correctable at once by simply correcting the template. This display serves not only the correction by the content producers but also estimates the labor

Table Display of the number of issues per test rule.

Test target page/ Test rule	5.2b-1	5.2b-2	5.2c-1	5.2d-1	5.2e-1	5.2f-1	5.2g-1
City of Odawara	1	125		27			1
Odawara: Topic	1	54		15			1
Odawara: Birth	1	54		15			1
Odawara: Child care	1	54		15			1
Odawara: School entrance	1	54		15			1
Odawara: Marriage	1	54		15			1
Odawara: Mayor's Office	1	54		15			1
Odawara: Public facilities	1	54		24			1
Odawara: City information	1	54		20			1

required by the site administrators or accessibility specialists to carry out the requisite accessibility measures.

As seen in the above, the test tool not only presents the correction positions of each page but also displays information for use in estimating the work required for the correction of hundreds of pages and decides on the optimum correction method.

3. Examples of Application of WEBJUDGE

We tested the operation of WEBJUDGE by applying it in a consulting activity for an accessibility specialist.

3.1 Improvement of the Odawara Municipality Site

The test operation for a consulting activity of an accessibility specialist was aimed at improved accessibility of the site held by the Odawara Municipality for its citizens [5].

The Odawara Municipality introduced CMS when it renewed the site in 2005, and has been promoting accessibility improvement measures from the aspect of content administration. However, as it was not able to undertake accessibility improvement measures for the website contents, the site continued to pose problems of accessibility. When the Odawara Municipality requested the services of the accessibility measures specialist, it instructed that "the existing site assets should be used as much as possible" and that "the persons in charge of the actual work should be the site administrator personnel."

3.2 Test and Estimation Using WEBJUDGE

First, we conducted auto testing of the 150 pages linked from the "Home" page of the Odawara Municipality website using WEBJUDGE and estimated the man-hours required for taking the accessibility measured based on the number of issues and their priorities.

Next, we determined the correction period and correction positions based on the above estimation. With the instructions of the Odawara Municipality in mind, we utilized the display of distribution of the number of issues to find the issues that could be corrected effectively with the least man-hours. The selection was made based on the following two conditions; the "positions that may be hard to read because there are too many issues as indicated in the test result list" and the "positions that can be corrected simultaneously by correcting the CMS template." We selected 11 points including "capability of character size variation," "addition of alt attribute to images" and "adjustment of the contrast between the character colors and background colors."

3.3 Study of Accessibility Improvement Measures, Compilation of the Modification Plan

We then studied the methods for improving the accessibility to the selected correction positions by considering the instructions of the Odawara Municipality and drew up a plan for correction by the site administration personnel. Some of the actual indications and notes that we gave to them for the work were as follows.

(1) As the values specifying the font size were described in the internal style sheet, we pointed out the issues and indicated the relevant correction method. JIS indicates that the structure and decoration should be separated and that the decorative elements such as the font size should be compiled into the style sheet. Although it was desirable to redevelop an external style sheet because it is more advantageous than the internal style sheet, we decided to leave the internal style sheet considering that JIS does not explicitly specify the use of internal or external style sheet.

(2) The test results showed that a large number of transparent gif images are used in the tables to maintain their layouts. As this conflicted with the major intention of JIS "to compile decorative elements in a style sheet," it was essential to redo everything. It might be possible to retain the table structure, eliminate only the gif images and specify the horizontal and vertical sizes of the table, but this might not permit a satisfactory table display for certain browsers and it was also contrary to JIS requirements. With regard to this point, we decided to place priority on avoiding browser related display variations and deal with this problem by

Fig. 3 Example of Contrast Correction.

simply adding the alt attribute.

(3) The test results showed that some characters are hard to read due to insufficiency of contrast between the character color and background color. The sufficiency of contrast may be judged by "substitution in the W3C contrast calculation formula [6] " or "setting of the threshold based on an independent standard." However, the W3C formula is subjected to severe conditions and it was expected that the site's theme color would have to be changed. Therefore, we decided to also change the background colors so far as the changes did not affect the site' stheme color (**Fig. 3**).

As a result of the improvement, the Odawara Municipality site gained a high score in the accessibility ranking of the Nikkei e-City Ranking [7] that evaluates the information services of local governments by succeeding in preventing the accessibility from dropping after renewal. From the viewpoint of the use of this tool in the consulting activities, it contributed to the estimation of the accessibility man-hours using the display list of the number of issues and to the discovery of optimum correction methods using the display of the distribution of the number of issues per test rule.

4. Problem

Support for the Accessibility Improvement Plan

In the consulting example above, we first submitted the test results of 150 pages obtained with WEBJUDGE to the site administration personnel. However, the site administration personnel were not well acquainted with accessibility and had difficulty in finding the positions to be corrected from the huge number of test results. This problem was eventually solved by the accessibility specialist, who identified the priorities related to "how far the corrections extend" and "how many man-hours are required for the corrections" and drew up the final correction plan.

The estimated users of WEBJUDGE are not limited to accessibility specialists but also cover content producers and site administrators who are not always well acquainted with the accessibility issue. We therefore considered it necessary to provide the tool with a test result display method that also allows non-specialists to make optimum decisions. In the future, we will develop a method for easy-to-understand presentation of the large amount of test results, as well as establishing specific judgment criteria for indicating the degree of accessibility achievement and also develop a function for displaying the results of compliance to the criteria.

5. Conclusion

In the above, we introduced the web accessibility evaluation tool "WEBJUDGE." This tool is a universal tool for use in testing an unspecified number of web contents. It features large-scale site compatibility for testing multiple pages by tracing links in the contents. In the displays of the test results, the tool presents any issues checked by testing in the details and also displays a list and the distribution of the number of issues of multiple pages. These features also make the tool usable in supporting the estimation of the number of man-hours that are used for taking accessibility measures and designing optimum correction methods.

We applied the tool in the test operation of a consulting activity by an accessibility specialist, and to support an estimation of the man-hours used in taking accessibility measures and deciding on optimum correction methods. Use of the tool has succeeded in contributing to the improvement of accessibility of the Odawara Municipality site. However, this operation has also clarified a problem, which is the difficulty for non-specialists in finding "how far the corrections extend" and "how many man-hours are required for the corrections" from the test results alone.

The results of the test operation will be used to review the test result display method in the future so that we can develop a tool that can facilitate accessibility improvement work without requiring the intervention of accessibility specialists.

In closing, we would like to express our deep gratitude to Mr. Iiyama, Chief Examiner of Public Relations Office, City of Odawara, and his staff for their kind cooperation.

*As the products introduced in this paper are mainly provided for the domestic market, some figures feature explanations by the Japanese Language.

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