

Development of Accessibility-Related Tools and Their in-House Applications

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Abstract

Following the amendments to Japanese industrial standards (JIS) regarding web accessibility in 2010, NEC enhanced the associated in-house tools and developed a new test tool for Web Accessibility-JIS standards. This tool implements features that include “batch processing,” “conformance level capability” and “iterative testing.” Its function is to support visual checking work and the “tests results output.” Additionally, the “large-scale site testing capability” feature has been inherited from a previous tool.

A color testing tool has been developed, which has improved the efficiency of the testing by means of its color vision deficiency simulation function, testing using contrast judgment formulae, the presentation of “recommended colors” and a character recognition technology. These tools are currently used as the standard tools for in-house software development.

Keywords

human interface, accessibility, JIS, development process

1. Introduction

Following the Section 508 Amendment to the Rehabilitation Act in the USA in 1998 and the WCAG (Web Content Accessibility Guidelines) 1.0 recommended by the W3C (World Wide Web Consortium) to deal with the rapid development of the worldwide web, awareness of the accessibility of systems and products has risen rapidly. As a result of this trend, Japan began to establish its own accessibility standards. As one of the related standards, the “Guidelines for elderly and disabled persons” was established in 2004. This standard is usually referred to as the “accessibility JIS X8341 series (these figures can be read as *yasashii*, which means “friendly,” in Japanese).” This series of standards are composed of the following parts.

- Part 1: Common guidelines (2004)
- Part 2: Information processing equipment (2004)
- Part 3: Web Content (2004)
- Part 4: Telecommunication equipment (2005)
- Part 5: Office equipment
- Part 6: Software (2011: Currently in preparation)

Among them, Part 3 “Web content” has attracted most attention following the explosive diffusion of the Internet. Therefore, in order to meet the developments in the technology, a revised version was issued in August 2010.

NEC developed an automatic test tool to meet the first edition of the JIS in 2004 and deployed it in-house. As JIS was amended recently, we improved this tool in order to adapt to the new JIS. We then tackled the automation of color testing procedures from the new perspective and implemented a new tool. This paper explains the main modifications of JIS, introduces the accessibility JIS conformance test tool and the color test tool and describes the methods of using them in-house.

2. Outline of JIS X8341-3 (2010), Main Modifications

The accessibility JIS prescribes the minimum required conditions for the user to operate information equipment and systems and utilize related services even when the user’s physical function is affected by various disabilities or by aging. Part 3 “Web content” of this standard is often regarded as being applicable to visually handicapped persons because most of the information in it is related to vision issues, but it also contains descriptions of operability such as information regarding link pointing. Although this part was amended in 2010, the basic items are not considerably modified from the previous ones. The new version identifies conformance levels according to the W3C/WCAG amended version 2.0 (three classes of A, AA and AAA). It also defines specific numerical targets, methods of verification and the declaration of conformity.

3. Accessibility-related Tools

Based on the trend in accessibility standards discussed above, we developed a tool for testing conformity with Part 3 (Web content) of the Accessibility-JIS X8341) and a tool for testing the color-related items that often rely on visual performance. These two tools are able to significantly reduce the time taken for accessibility testing.

3.1 Accessibility-JIS X8341-3 Conformance Test Tool (WEBJUDGE)

WEBJUDGE is a tool for the automatic analysis of whether or not content conforms to the Accessibility-JIS by converting the prescriptions of JIS X8341-3 into rules and applying them to the HTML of the evaluation target content. Its main usage scenarios are for the automatic testing of JIS conformance of completed contents but it can also be used to check content at every step of the development stage in order to reduce the modification workload in later processes. The features of this tool are as itemized below.

1) Batch test:

Function for the automatic simultaneous testing of multiple pages by acquiring their URLs.

2) Batch processing:

Function for simultaneous testing without interaction with the user. This function makes it possible to start the tests in the evening and complete them by the next morning without any intervention of the evaluation staff.

3) New JIS compatibility:

Function for constructing rules corresponding to achievement levels A and AA.

4) Repeated test function:

Function that stores the items that have already been checked visually in the history so that they are not subject to confirmation requests in the case of a re-test.

5) Test result output function

Function for sharing the test situations and disclosing the workflow results.

These functions make it possible to improve the efficiencies of tests in the development stage (Fig. 1 and Fig. 2).

3.2 Color Test Tool (VISJUDGE)

The VISJUDGE is an integrated color test tool for supporting color-related testing among the test items that have previ-

ously been reliant on visual testing because of incompatibility with the WEBJUDGE. The VISJUDGE has a function that simulates how color content looks for persons with certain color vision deficiencies. It enables identification in advance



Fig. 1 Test results of WEBJUDGE.



Fig. 2 Modification/confirmation items indicated by WEBJUDGE.

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of the potential of content illegibility (Fig. 3) according to the set rules. It also has a function that checks the contrast between the character and background colors to see if it conforms to JIS.

The features of this tool are as itemized below.

(1) Judgment of the result of contrast comparison between two colors using contrast-judging formulae as listed below. This function also implements an evaluation based on the achievement levels specified by JIS (Fig. 4).

- 1) Generally easy-to-view contrast.
- 2) Acceptable contrast quality for viewing by elderly persons and persons with disabilities.
- 3) Contrast that is sufficiently easy to view for older persons and persons with disabilities

(2) Presentation of “recommended color” that meets the required conditions during contrast judgment (Fig. 5).

(3) Automatic processing of the following operations using the character recognition technology aiming at saving the labor accompanying traditional contrast judgment procedures (Fig. 6).

- 1) Identification of the locations of characters.
- 2) Identification of character and background colors.
- 3) Comparison of contrast between the character and background colors.

The functions and features referred to above have made it possible to reduce the person-hour testing load by 17% on average or by 66% at maximum. As this tool adopts the screen capture method instead of HTML analysis we believe that it may be effective for supporting the creation of catalogs as well as of web content.

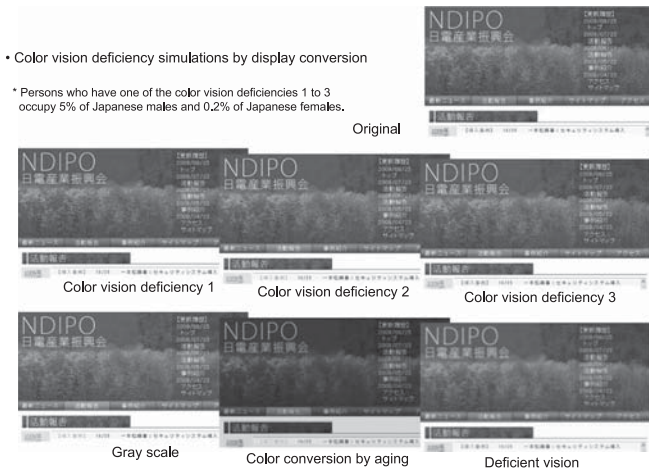


Fig. 3 Results of color vision deficiency simulations.

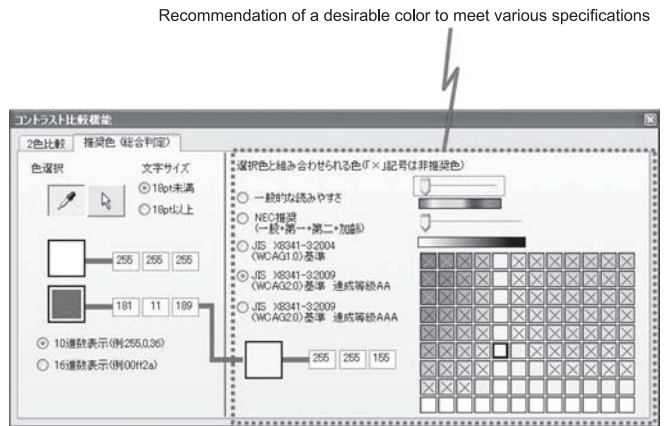


Fig. 5 Presentation of recommended colors meeting the contrast conditions.

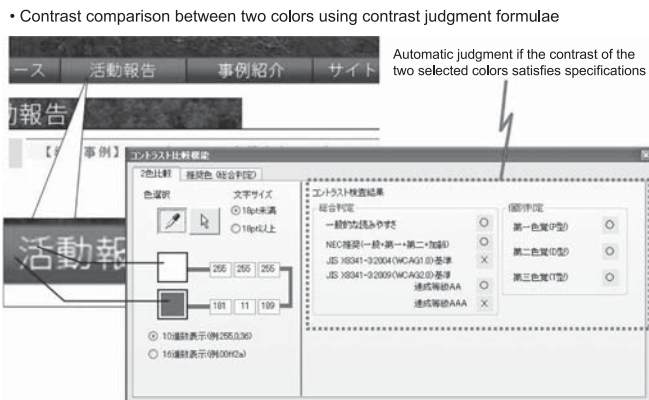


Fig. 4 Comparison of contrast between two colors.

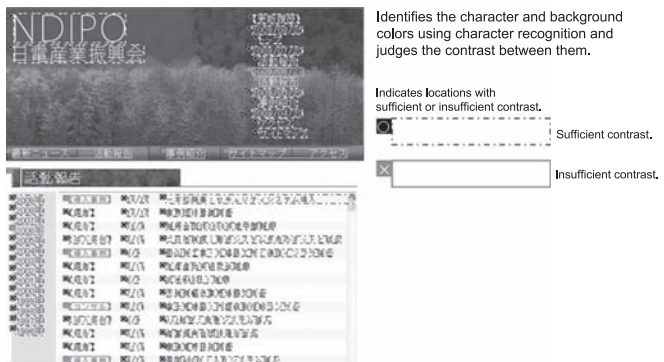


Fig. 6 Auto judgment using character recognition technology.

Furthermore, the batch processing function that processes tests simultaneously without the need of interactions with the user makes possible an operation by which the tests are started in the evening and completed by the next morning; without any intervention of the evaluation staff being required.

Similarly to the WEBJUDGE, the VISJUDGE also aims at being used in the content development phase in order to reduce the rework process by resolving issues at an early stage.

4. In-House Deployment

These tools are officially applied in-house since April 2011 as the standard corporate tools for software development. This course of action is expected to trigger greater enhancement of accessibility efforts by the NEC Group.

References

- 1) W3C: Web Content Accessibility Guidelines (WCAG) 2.0, 2008
- 2) Shin'ichi Fukuzumi: Web Contents Accessibility Check Tool, HCII2005

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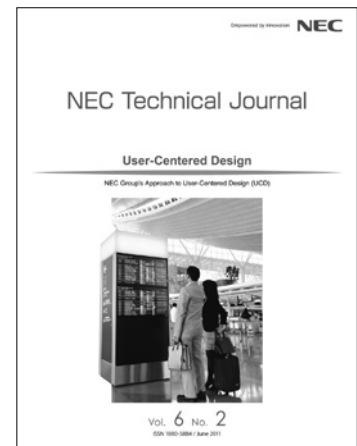
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