An Interactive Mode to Aid Web Accessibility Evaluation

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\textbf{Abstract.} The level of web accessibility construction affects the information interactive ability of special populations directly, how to evaluate the Web Accessibility Level efficiently is a research hotspot. A part of the current evaluation metrics needs human intervention, and it requires the worker to master enough professional knowledge, at the same time, it is likely to reduce efficiency because of duplication of work. We have designed an interactive mode to aid Web Accessibility Evaluation, which uses short tutorials and leading tasks to make the worker master the necessary knowledge quickly, in additions, with the help of the mask, embedded information tips, and real-time assistant functions for the actual evaluation task, the evaluation efficiency has been improved.

\textbf{Introduction}

With the significant development of science and technology, the Internet has become an integral part of life; people can get all kinds of information and communicate with each other via the Internet. At the same time, the active participation of people brings in an explosive growth of information in the Internet. Thus, we need a lot of information standards and technologies to help people access the information they need conveniently. However, there exists quite a number of special populations in the society, such as the disabled, the aged, children and so on, they have difficulties accessing information in certain degrees due to the inherent physical defects, disability or physiological function degradation, such as the visually impaired people cannot get all the information from visual images, hearing impaired people cannot get all the information from the voice channel, so they have difficulties adapting to the information society, and they cannot enjoy the convenience brought by technology which hinders the comprehensive development of society.

In order to help the special populations better adapted to the information society, many researchers all over the world devoted into related work about developing information accessibility technology. The principle of information accessibility is taking advantage of the information channels that special populations can interact with to deliver more information, such as adding readable texts for images can enable visually impaired people to obtain basic information about images by hearing, or adding real-time subtitles for video can enable hearing impaired people to get information which can only be obtained through the auditory channel before. Thus, information accessibility work is mainly divided into two categories, one is that the information providers add some other interactive channels which enable special populations to access related information when the original information is created, and another is that these interactive channels designed for special populations can be provided by third parties before the special populations try to access information. Compared to the participation of third parties in the second scheme, the first method just requires information providers themselves to deal with the information accessibility for their information, so it is superior to the latter at the aspect of the accuracy of the additional description information and the operation complexity. But the first scheme invisibly adds additional work for information providers, and is rejected by many people, because they can ensure the most people access the information even if they don’t do this additional work, so the information accessibility work faces with great challenges.
As information accessibility plays an important role in improving the social benefit in the development of the society, and the information accessibility level of web pages which act as the main channel of information interaction on the Internet directly affects special groups’ ability to obtain information. Therefore, in order to help the special groups to obtain and understand the web page information and interact with the web page content, W3C proposed the Web Accessibility Initiative(WAI), aimed at improving people’s emphasis on website Accessibility, and required information providers actively add interactive channels for special groups to reduce the stress on subsequent accessibility reconstruction [6]. At the same time, in order to protect the rights and interests of disabled people and promote the development of information accessibility, countries adopted different measures and formulated related website accessibility standards.

To evaluate website Accessibility level, the W3C Web Content Accessibility Guidelines(WCAG) lists a series of checkpoints for evaluating site Accessibility [1], the researchers at home and abroad has put forward a series of methods for site Accessibility evaluation, such as consistency test, automatic evaluation[2][5][8]. However, because of the information accessibility evaluation metrics are mainly designed for bridging the semantic gap between a variety of interactive information channel, such as additional text description for images, video subtitles, etc. Existing automatic intelligent algorithm is not a good solution for filling the semantic gap, so there is still a part of checkpoints which needs to rely on human evaluation.

Interaction barriers for special groups brought by high-developed information have been gradually concerned, so there are a lot of enthusiastic people trying to change the situation. However, due to the differences in information interaction means between the general population and special groups, most ordinary people cannot understand the actual situation of interaction barriers in special groups, at the same time the special groups cannot accurately describe the main problems because of their interaction obstacle. Without the aid of professional knowledge, even simple website accessibility evaluation rules are not understood well by volunteers. So how to help more enthusiastic volunteers to understand the interaction barriers in special groups also requires technology support.

Site evaluation tools can help people evaluate site accessibility effectively and reduce the workload; different tools have their own advantages and disadvantages at the aspect of function, interactive mode (online service or desktop application tools), validity, reliability and evaluation costs. Now common site evaluation tools include 508 Checker, A-Tester at abroad and free go at home. But most of these tools are designed for automatic evaluation, for checkpoints that need human evaluation, corresponding supporting measures haven’t been provided. And in the process of human evaluation, the long and repetitive website accessibility evaluation work easily causes human visual fatigue and affects evaluation efficiency and results, and therefore it is necessary to propose an interactive mode to aid accessibility evaluation to help evaluation workers improve efficiency. And this paper designs and develops an interactive mode to aid information accessibility evaluation based on website accessibility. Main innovations include:

- Help them understand accessibility evaluation rules and be familiar with right and wrong samples by brief tutorials
- Let volunteers be familiar with evaluation tools and processes through the guidance mechanism, use prerecorded evaluation samples to simulate evaluation and strengthen their understanding of each check point.
- Use the mask web technology to help volunteers quickly locate checkpoints, reduce misconceptions about the checkpoints and prevent visual fatigue caused by a long time evaluation.
- Embed real-time checkpoint rules and corresponding evaluation metrics in the process of evaluation and aid volunteers to do the evaluation task correctly.

This system can help volunteers who are not familiar with website accessibility evaluation rules, and assists them to complete long-duration evaluation tasks, it ensures the rules are explicit and improves evaluation efficiency.
Research approach

This paper is intended to assist volunteers without relevant experience to do accessibility evaluation. The main problems are:

The understanding of evaluation metrics

When volunteers do accessibility evaluation, they need to know every evaluation metric clearly to gain correct evaluation results. Evaluation metrics list in WCAG are relatively hard to understand, it will be hard to carry out the evaluation work as it is inefficient and likely to lead the misunderstood of evaluation metrics if volunteers just rely on metrics in WCAG.

The use of evaluation system

Volunteers using this system for the first time need some time to get familiar with the system and the process of evaluation, and it is difficult to understand the evaluation process correctly for volunteer workers who have never been exposed to accessibility evaluation, thus the system needs to provide a way to help volunteers quickly be familiar with the system so as to reduce the burden on volunteers and improve the evaluation efficiency.

The positioning of checkpoints

As one web page contains multiple checkpoints, how to quickly locate checkpoints in the web page is crucial in the process of web page evaluation. At the same time, web page evaluation is a long-term and repetitive task, volunteers will easily have a visual fatigue, and rapid positioning web page checkpoints can improve the evaluation efficiency of volunteers and can help volunteers to understand the specific content of each checkpoint. Thus great attention should be paid to checkpoints positioning in the design of this system.

The acquisition of evaluation rules

Even though evaluation tutorials show us specific evaluation rules about each checkpoint, it is not a good choice to view the tutorial when evaluate a page every time, how to quickly get the evaluation rules about current checkpoint must be considered.

To solve above problems that exists in accessibility evaluation, the concrete scheme this system has taken during the design process is as follows:

The understanding of evaluation metrics

To help volunteers understand evaluation metrics more accurately, this system increases tutorials in which correct and wrong samples have been provided for each metric so as to enable volunteers to understand metrics and do evaluation work in a relatively short period of time.

The use of evaluation system

To make volunteers quickly understand the system and work, this system has added leading page to guide basic work for evaluation. At the same time, in order to assess volunteers’ mastery of evaluation metrics, the system provides a series of correct and wrong samples according to which volunteers can test themselves and get feedback from the test results to improve their evaluation accuracy.

The positioning of checkpoints

This system uses a web mask technique, locate and mark checkpoints by analyzing website source code with the method of regular matching so that volunteers can get all checkpoints easily.

The acquisition of evaluation rules

The system embeds evaluation rules and the corresponding metrics for the current checkpoint in each evaluation page, so as to facilitate volunteers checking evaluation metrics and thus improve the evaluation efficiency.
System architecture and function

The system flow chart is as follows:

![System Flow Chart](image)

This system adopts J2EE multi-layer architecture based on the framework of the combination of Spring, Struts, and MyBatis. The server is Tomcat 7.0, the database is MySQL 5.5, and the development language is Java.

Specific samples the system provides to aid accessibility evaluation are as follows:

**The system provides corresponding tutorials for each evaluation metric:**

The system provides tutorials for volunteers who lack knowledge about accessibility evaluation. Evaluation rules, evaluation methods, correct and wrong samples for each checkpoint are involved in tutorials.

The sample demonstration will give results shown in the diagram below, with the *Text Size Adjustment* checkpoint passed. The *Text Size Adjustment* checkpoint means when we enlarge the font size of webpage, the content cannot exceed the border of webpage and the text cannot be overlapped.

![Sample Website](image)

**Figure 2. The website of State Administration of Coal Mine Safety, an correct example for Text Size Adjustment checkpoint.**

**The positioning of checkpoints and description of evaluation rules:**

The system provides current evaluation web page and the corresponding checkpoints after volunteers enter the system, the checkpoints will be highlighted in red frame on the basis of web mask, so volunteers can quickly locate the checkpoints. At the same time, volunteers can see the specific
evaluation rules and the corresponding evaluation methods about current checkpoint on the right side of the system. The evaluation results can be submitted at the bottom of the page.

![Image of assistant evaluation interface]

Figure 3. An sample of assistant evaluation interface.

Conclusions and future works

This paper explores an interactive mode to aid web information accessibility evaluation, and we propose the short tutorial and guidance mechanism for inexperienced volunteers to deepen their understanding of various checkpoint evaluation system by studying the existing problems in actual evaluation situation, we also use the mask web technology in the process of evaluation and embed real-time evaluation rules to assist volunteers to do evaluation task on web information accessibility faster and more accurately and result in a higher evaluation efficiency.

Although the existing system can help volunteers complete the corresponding evaluation task well, there is still some room for improvement, such as different evaluation results may be gained in different web pages on one same checkpoint, so real-timely providing the most similar correct sample according the web page in the process of evaluation can be considered in the further study, although part of the job cannot be done by machine, machine can provide recommendation results to support volunteers and realize evaluation tasks by the cooperation between volunteers and machine, boring evaluation tasks are quite tiresome, so adding a function of online communication between volunteers can also be considered, thus volunteers can also get help from professionals when faces with an evaluation task which is difficult to be determined.

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References


