An Overview of Web Accessibility Evaluation of Government Websites in China

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Keywords: Web Accessibility, Government Websites, Accessibility Evaluation.

Abstract. Web accessibility is one of the key factors in building the inclusive society. Government websites carry public information for the general mass and their accessibility is going to affect a large portion of the disabled population. In this article, we analyze the status quo of the accessibility of China government websites in 2014 by presenting the evaluation results for 32 provincial government websites. We expect to present new perspectives for China government’s efforts on web accessibility and its future works.

Introduction

The World Wide Web (WWW) has become an essential part of our daily life. Nevertheless, more than one billion disabled people in the world are experiencing various difficulties when accessing the information on the Web [1]. Many efforts have been made to address this issue. Laws and regulations in different countries mandate the accessibility of government websites, such as 508 Section in US [2], Disabilities Act and the National Institute on Ageing Guidelines (NIA) in Australia [3] etc. W3C released Web Content Accessibility Guidelines (WCAG) 1.0 and 2.0 in 1999 and 2008 respectively [4][5]. Many governments nowadays either directly adopt WCAG or its adapted versions in their website accessibility evaluations [6][7].

China has the largest disabled population in the world. The 2nd China National Sample Survey on Disability showed there were about 86,000,000 disabled persons in China [8]. Moreover, China has the largest older population in the world. Statistical survey by the Ministry of Civil Affairs shows that population ages 60 and above in China reaches 212 million, which constitutes 15.5% of the whole population by the end of 2014. Meanwhile, Internet penetration rate continues to rise in China. By the end of the 2014, there are about 649 million Internet users around China, which increase by 2.1% compared with last year’s data [9]. In fact, the disabled and the old may meet some obstacles when accessing contents on the Web. For example, the visual information on a page might not be accessible for the blind; the audio information might not be heard by the deaf; and small-sized text and complex operation will make senior citizens experience difficulties. So it is vital to let all the people, especially the disabled and the old access the information effectively and make full use of diverse resources of Internet.

The Web accessibility evaluation is an assessment of how well the Web can be used by people with disabilities [10]. China has made considerable efforts on its government website accessibility since 2013 when Web accessibility evaluation based on the standard named as Technical Requirement for Web Accessibility (YD/T 1761-2012) was started. We summarize the accessibility evaluation results for 32 provincial government websites in 2014 in this article. We expect to provide insights into the status quo the government website accessibility in China and suggestions on how it can be improved in the future.
Web Accessibility Development of China

China government attaches great importance to accessibility construction, and information accessibility was listed as a key area in its 12th Five Year Program. In 2008, the Protection Law of Disabled People in China was revised to explicitly include information accessibility. The Rules of Accessibility Environment Construction by the China State Council in 2012 symbolized the beginning of the Web accessibility campaign for government websites in China. This campaign is led by China Disabled Persons Federation the evaluation (CDPF), with the system development and website evaluation undertaken by the China Research Center of Information and Accessibility Technology for Disability (CRCIATD), which is jointly founded by CDPF and Zhejiang University.

The campaign was accompanied by the standardization of Web accessibility in China. In 2008, the Ministry of Industry and Information Technology (MIIT) released the first industry standard for Web accessibility in China: The Technical Requirement for Information Accessibility and People with Difference in Physical Function (YD/T 1761-2008), which was fundamentally based on WCAG 2.0. Four years later in 2012, the industry standard released its second version, renamed as the Technical Requirement for Web Accessibility (YD/T 1761-2012), with the major change in its taxonomy of accessibility levels from three levels to five levels.

Starting from 2013, two nation-wide accessibility evaluations for government websites have been carried out in China based on the YD/T 1761-2012. (1) The 2013 accessibility evaluation covered 117 government websites, including 32 provincial government websites, 53 ministry websites, 27 provincial capital city websites and websites for 5 independently listed cities in the state plan; (2) The 2014 accessibility evaluation extended coverage to more than 300 websites. Besides the websites in 2013 evaluation, public service websites, such as news portals, railway service, commercial banks etc. are also included in the evaluation.

Principles and Checkpoints

The second edition of the Web accessibility guidelines in China is called as the Technical Requirement for Web Accessibility (YD/T 1761-2012), aiming to improve Web accessibility construction and evaluation in China. In order to guarantee the accessibility of the website content, four general principles are considered following the WCAG by W3C: perceivable, operable, understandable and robust. That is, information and user interface components must be presentable to users in ways they can perceive [5]; User interface components and navigation must be operable [5]; Information and the operation of user interface must be understandable [5]; Content must be robust enough that it can be interpreted reliably by a wide variety of user agents, including assistive technologies [5]. Under every principle there are corresponding guidelines for content authoring for achieving the principle. Five accessibility levels are defined for the achievement of these principles. Table 1 shows the details of these different accessibility levels.

Table 1. Five Levels of Web Accessibility.

<table>
<thead>
<tr>
<th>Level</th>
<th>Requirement</th>
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</thead>
<tbody>
<tr>
<td>Level 1</td>
<td>Basic Web Accessibility</td>
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<tr>
<td>Level 2</td>
<td>Reinforced Web Accessibility</td>
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<tr>
<td>Level 3</td>
<td>High Web Accessibility</td>
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<tr>
<td>Level 4</td>
<td>Superior Web Accessibility</td>
</tr>
<tr>
<td>Level 5</td>
<td>Additional Web Accessibility</td>
</tr>
</tbody>
</table>

In 2014 China government website accessibility evaluation, 25 checkpoints were included in the evaluation, including 10 checkpoints from level 1, 8 checkpoints from level 2 and 7 checkpoints from level 3. Among these checkpoints, we cover 6 perceivable checkpoints, 10 operable checkpoints, 3 understandable checkpoints and 6 robust checkpoints. Each checkpoint has a corresponding evaluation score according to its importance, and for each evaluated websites, the total score is 100.
Figure 1 lists the checkpoints in the evaluation.

![Checkpoints in 2014 Evaluation](image)

**Perceivable (38 points)**
- CAPTCHA Lv1
- CAPTCHA Lv2
- Non-Text Links Lv1
- Non-Text Controls Lv1
- Non-Text Contents Lv3
- Multimedia Lv2

**Operable (38 points)**
- Keyboard Lv3
- Keyboard Trap Lv1
- Keyboard Trap Lv3
- Skipping Over Navigation Lv3
- Jumping Between Sections Lv3
- Multimedia ControlsLv3
- Enough Time Lv2
- No Floating Windows Lv1
- Tips For Input Lv3
- Tips For Error Lv3

**Robust (12 points)**
- Auxiliary Ways for Accessibility Lv1
- Link Position for Accessible Version Lv1
- Link Form for Accessibility Lv1

**Understandable (12 points)**
- User Interaction Compatibility Lv1
- User Interaction Compatibility Lv3
- Feedback Contact Lv1
- Page Titled Lv2
- Intra-site Search and Navigation Lv3
- Help Lv2

**Evaluation Metric and Results**

32 websites of government of all levels were evaluated for content accessibility in 2014, based on YD/T 2012. Website accessibility is evaluated on the scores these websites obtain. We also present detailed statistical evaluation for each checkpoint to show the success rate for each checkpoint.

We have developed the Web Accessibility Evaluation System based on YD/T 2012. The evaluation system is optimized for Chinese website design and for whole website evaluation. We also exploit the crowdsourcing techniques in accessibility evaluation to reduce the cost. Figure 2 shows the flow chart of this system. First, we crawl the website and sample pages for evaluation. Page rendering from the raw HTML is necessary before automatic evaluation and human inspection can be engaged to check the extent of web accessibility quantitatively. From the raw evaluation result, we do some in-depth analyses and present final reports for the evaluation. Intelligent sampling method and machine learning algorithms are exploited in the system to minimize the costs of human inspection and make evaluation feasible for large websites.

![Web Accessibility Evaluation System](image)
Figure 3 shows the results of 32 Chinese Provincial Government Web Accessibility Evaluation ranked by total points in descending order. The scores with yellow background are the highest scores in each column, and the lowest scores of each column are marked with the green background. In 2014, Shanghai government website gained the top-rank with a evaluation score of 88, which also ranked first in operable, understandable and robust principles. Following Shanghai are Hubei and Guizhou government websites, scored 76 and 66 respectively. The lowest one is Xinjiang Corps website, scored only 24. Six provincial government websites got full marks in the understandable principle, indicating that the contents on provincial government websites are easy to understand.

Furthermore, we find that the scores of understandable accessibility of each website is close to the full mark level and this principle has the lowest variance (the variance is about 1.29), which implies good accessibility construction in understandable principle of all websites. The operable and perceivable principles are scored quite low, which reveals insufficient awareness in these aspects. The variants of the remaining three principles are large (perceivable: 61.87, operable: 27.61, robust: 12.27), implying the large difference of web accessibility construction in these three principles among different provincial governments.
Figure 4. Score Distribution of Provincial Government Websites Accessibility Evaluation.

Figure 4 shows the score distribution in 2014 evaluation. The average score of 32 government websites is 52.03 and 13 websites in the 32 are above the average. Moreover, most of the provincial government websites score between 40 and 60 (21 websites, about 66%), but only 8 government websites are over 60 (about 25%). Furthermore, there are 24 government websites scored under 60 points (about 75%), 3 websites scored less than 40 (up to 9%). So most of Chinese provincial government websites are still lack of sufficient awareness in web accessibility and need more improvements in the future.

Figure 5. Checkpoints Success Rate for Chinese Provincial Government Websites Evaluation.

Figure 5 shows each checkpoint success rate during evaluation. We can see that multimedia, page titled and intra-site search and navigation are at the highest success rate while context-sensitive help, keyboard, bypass navigational links and bypass blocks are at the lowest success rate. More than half of the checkpoints achieve a success rate of more than 55%. This implies that some frequent accessibility problems exist in provincial government websites.
Conclusion and Future Works

Although the importance of Web accessibility is recognized by governments of all levels in China, much improvements are still to be made to achieve better accessibility for government websites. Currently, only a small portion of Chinese provincial government websites such as Shanghai, Hubei have achieved good accessibility. Most of China government websites still need significant improvements to make their contents more accessible. Fortunately, governments of all levels are now actively seeking accessibility solutions and we expect improvements in government websites in the coming future.

On Feb. 25, 2016, CDPF and the National Internet Information Office jointly issued the Guiding Opinions on Strengthening the Website Accessibility Construction. This may symbolize a new beginning for website accessibility in China as a nation-wide effort: formulating information accessibility standards, developing better authoring tools and evaluation systems etc. In addition, accessibility is now listed as a government website management index in China, and governments of all levels are now better motivated in Web accessibility.

Acknowledgements

This work is supported by National Key Technology R&D Program (Grant No. 2014BAK15B02), Zhejiang Provincial Natural Science Foundation of China (Grant no. LZ13F020001), National Science Foundation of China (Grant nos. 61173185, 61173186).

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