XsWEB-ALL: Accessible Web for All

First Author
IIT Kanpur, India
Pawan Kr. Patel
patelp@iitk.ac.in

Second Author
IIT Kanpur, India
Amey Karkare
karkare@cse.iitk.ac.in

Keywords
Web Accessibility; Screen reader; persons with disabilities (PwDs); Visually Impaired;

Motivation and Introduction
In the today’s era of the web, where digital content is the top source of information for everyone including PwD’s. Most of the websites, including educational, financial and marketing sites, are not accessible at all. As per the census of 2011, In India, the PwD’s population is 2.2% (2.68 Cr) of the total. Out of that 78% (2 Cr) of PwDs face difficulties in accessing web content. In India, there are 1.4 Cr literate PwDs out of which only 12.5 Lakhs have completed graduation. This means that 90%+ of the PwDs have dropped out from education at an early stage. This shows the pathetic situation of PwD education in India. Nowadays the internet plays a vital role in imparting education. The inability to access the web is a significant hurdle in pursuing good quality education. This paper presents an overview of a manual intended to provide information to web developers towards implementation of existing best practices for web accessibility and suggest further improvisation on them.

Problem Statement
In this paper, our aim is to find out the barriers to accessing a typical website, and then prepare- (i) a web-development manual for naive web developers. (ii) A set of examples pertaining to the accessible web for training courses on accessible web development and finally (iii) Develop a tool called “XsWEB-ALL” which will act as an interface between web-page and screen reader.

Related Work
Michael Crystian[1] has described the barriers to accessing the web by visually impaired and normal vision users. Authors collected the empirical evidence of difficulties faced by blind users and raised the concern for alternative solutions. However, the source of the problem in accessing a particular webpage has not been identified. In this paper, an attempt has been made to identify the cause of inaccessibility associated with the various components of a website.

Hayfa.Y.Abuaddous[2] has classified the various web accessibility challenges into three categories (i) limitations of Standards and Guidelines, (ii) challenges faced by web developers to make web content accessible and (iii) challenges in accessibility evaluation of a website. This paper aims to address the aforementioned challenges (first two) by developing a manual for web developers that provides a comparison of accessible and inaccessible web designs with the demonstration.
**Approach**

We have divided a typical website into individual components to study the various barriers associated with them. The illustrative demonstrations of one inaccessible and accessible design for each component have been created. Table 1 presents few samples of challenges associated with the individual components of a website, the audience affected, the cause of inaccessibility and real-life example of an inaccessible website. In order to rectify the accessibility issues, Table 2 presents the suggested modification in design and real-life example of the accessible website corresponding to the table 1 components. In the next section, we will present a detailed example of a multi-column table to understand the various challenges in accessing the table.

**An Illustrative Example**

We have divided the illustration into two parts inaccessible design and accessible design for the same visual table as shown in figure 1.

1. **Inaccessible Design** – The output of screen reader (NVDA) in case of inaccessible design for the table in Fig. 1, is shown in Fig 2. There are issues with the output- (i) Leading to misinterpretation of the data since no information is given by the screen reader regarding the field association of cells. (ii) Term “CSE” spans over multiple rows but appears once since the rows have been merged. The screen reader reads it out only once at the first encounter and then skips its occurrence in subsequent rows.

2. **Accessible Design** as per the guidelines of WCAG 2.0 addresses the issue of headers mapping. The output of the screen reader is shown in fig. 3. There are still some issues which may lead to confusion to visually impaired user in a place where a user is unaware of context (e.g. exams). These include:
   - Unable to distinguish between “to”, “2” and “two”.
   - Unable to differentiate between “EE” and “E”.
   - Skipping the specific column is still an issue.

**Conclusion**

We have presented various challenges in accessing web content and described a sample example to be included in the manual for web-developers.

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**Table 1.** Individual components of a website, cause of inaccessibility, affected audience and daily life example.

<table>
<thead>
<tr>
<th>Component</th>
<th>Inaccessible Website</th>
<th>Date of Access</th>
<th>Intended Audience</th>
<th>Cause of inaccessibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check-box</td>
<td>Flip kart</td>
<td>5/23/2018</td>
<td>Screen reader users</td>
<td>no keyboard mapping</td>
</tr>
<tr>
<td>Form</td>
<td>Profile Update in NPTEL</td>
<td>5/24/2018</td>
<td>Screen reader users</td>
<td>Lack of feedback of events</td>
</tr>
<tr>
<td>Simple Table</td>
<td>NPTEL-phase 4</td>
<td>7/31/2018</td>
<td>Screen reader users</td>
<td>cell &amp; headers not associated</td>
</tr>
</tbody>
</table>

**Table 2.** Modification suggested for individual component and example of an accessible website

<table>
<thead>
<tr>
<th>Component</th>
<th>Modification Required</th>
<th>Accessible Website</th>
<th>Date of Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check-box</td>
<td>Proper keyboard mapping</td>
<td>NPTEL</td>
<td>5/19/2018</td>
</tr>
<tr>
<td>Form</td>
<td>Error on top / Inline errors, Resubmission of form, keyboard navigation</td>
<td>Facebook Registration</td>
<td>5/23/2018</td>
</tr>
<tr>
<td>Simple Table</td>
<td>map all headers associated with each cell of a table</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
References