XsWEB-ALL: Accessible Web for All

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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.

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

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

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

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

Students Details

Engineering Students		
Serial Number	Student Name	Deptartment
1	Ram	CSE
2	Shyam	
3	Mohan	EE

Figure 1 visual display of a multi-column table to be designed by a web developer.

"Student details heading level 3, table with 5 rows and 3 columns,
Row 1 column 1 to 3 Engineering Students,
Row 2 column 1 Serial Number column 2 student name 3 department,
Row 3 column 1 1 column 2 Ram row 3 to 4 column 3 cse,
Row 4 column 1 2 column 2 Shyam,
Row 5 column 1 3 column 2 Mohan column 3 EE"

Figure 2 Screen reader output - inaccessible design of Figure 1

"Student details heading level 3, table with 5 rows and 3 columns,
Row 1 column 1 to 3 Engineering Students,
Row 2 column 1 Serial Number column 2 student name 3 department,
row 3 Engineering Students Serial Number column 1 1 Engineering Students student name column 2 Ram Engineering Students department row 3 to 4 Engineering Students column 3 cse,
Row 4 Engineering Students Serial Number column 1 2 Engineering Students student name column 2 Shyam,
Row 5 Engineering Students Serial Number column 1 3 Engineering Students student name column 2 Mohan Engineering Students department column 3 EE"

Figure 3 Screen reader output – accessible design of figure 1

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.

References

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