

Chapter 5.14

Querying Web Accessibility Knowledge from Web Graphs

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ABSTRACT

Web Accessibility is a hot topic today. Striving for social inclusion has resulted in the requirement of providing accessible content to all users. However, since each user is unique, and the Web evolves in a decentralized way, little or none is known about the shape of the Web's accessibility on its own at a large scale, as well as from the point-of-view of each user. In this chapter the authors present the Web Accessibility Knowledge Framework as the foundation for specifying the relevant information about the accessibility of a Web page. This framework leverages Semantic Web technologies, side by side with audience modeling and accessibility metrics, as a way to study the Web as an entity with unique accessibility properties dependent from each user's point of view. Through this framework, the authors envision a set of queries that can help harnessing and inferring this kind of knowledge from Web graphs.

INTRODUCTION

Since its inception, the Web has become more and more prolific in people's lives. It is used as an information source, both one-way (e.g., newspapers) and two-way (e.g., blogging, forums, or even instant messaging). New Web sites and new content are produced and published each second by both professionals and amateurs, each one with different usability and accessibility quality marks. This fact, in conjunction with the Web's decentralized, yet highly connected architecture, puts challenges on the user experience when interacting and navigating between Web sites.

At the same time, the attractiveness of the Web brings more users to use it on a regular basis. This means that user diversity will be closer to real life where both unimpaired and impaired users coexist. Since each user has its own specific requirements, (dis)abilities, and preferences, their

experience is different for each one, resulting in different satisfaction levels. In the same line of user diversity, device prolificacy and Internet connection ubiquity also contribute to the range of possible user experiences on interacting with the Web and, consequently, also have a stake in accessibility issues.

For all these reasons, the shape of the Web itself deeply influences each user's interactive experience in different ways. Users tend to navigate through the Web by avoiding Web sites that cannot be rendered correctly, which provide poor interactive capabilities for the specificities of the user or the device she/he is using to access the Web, reflecting negatively on users' experience. Therefore, it is required to understand the Web's graph of Web pages at a large scale from the point-of-view of each individual's requirements, constraints and preferences, and grasp this information to devise future advancements on Web standards and accessibility-related best practices. The inability to adapt the Web, its standards, technologies, and best practices will pose severe problems on the society in general, by leaving untouched the barriers towards a proper e-inclusion level that can actually cope with everyone, independently of impairments and related needs.

The main contributions of this Chapter are: (1) the establishment of a Web accessibility framework that can be used to create complex knowledge bases of large scale accessibility assessments; and (2) a set of query patterns to infer critical aspects of the accessibility of Web graphs with a fine-grained control (based on users' requirements and constraints). The proposed framework and the set of query patterns will form a core tool that helps analyzing the semantics of the accessibility of Web graphs. Next, we describe the relevant background work on Web accessibility and knowledge extraction from Web graphs.

BACKGROUND

Two main research topics have influence and contribute to the study of Web accessibility on large scale: the analysis of accessibility compliance of a Web page (or Web site), and the analysis of the Web's graph structure.

The Web Accessibility Initiative (WAI, n.d.) of the World Wide Web Consortium (W3C, n.d.) has strived for setting up the pace of Web Accessibility guidelines and standards, as a way to increase accessibility awareness to Web developers, designers, and usability experts.

The main forces of WAI are the Web Content Accessibility Guidelines, WCAG (Chisholm et al., 1999). WCAG defines a set of checkpoints to verify Web pages for specific issues that have impact on accessibility of contents, such as finding if images have equivalent textual captions. These guidelines have been updated to their second version (Caldwell et al., 2008) to better handle the automation of accessibility assessment procedures, thus dismissing the requirement of manual verification of checkpoint compliance.

Until recently, the results of accessibility assessment were presented in a human-readable format (i.e., Web page). While this is useful for developers and designers in general, this is of limited use for comparison and exchange of assessment results. Therefore, WAI has defined EARL, Evaluation and Report Language (Abou-Zahra, 2007), a standardized way to express evaluation results, including Web accessibility evaluations, in an OWL-based format (Dean & Schreiber, 2004).

EARL affords the full description of Web accessibility assessment scenarios, including the specification of *who* (or *what*) is performing the evaluation, the *resource* that is being evaluated, the *result*, and the *criteria* used in the evaluation.

However, EARL does not provide constructs to support the scenarios envisioned in macro scale Web accessibility assessments. It cannot cope with metrics (thus dismissing quantification

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