Chapter 4
A Systematic Review of Web Accessibility Metrics

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ABSTRACT

Currently, providing accessible websites for all users is an essential requirement. There are various qualitative and quantitative evaluation methods to assure accessibility. Among these, the quantitative methods show the level of accessibility of the website using web accessibility metrics (WAM), which provide a way to understand, control, and improve these websites. This study was aimed to identify current trends and analyze WAMs through a systematic literature review. Therefore, 30 WAM studies that were published since 2008 were determined and investigated according to attributes defined for the metrics such as guideline set used by the metric, coupling level with the guidelines, type of evaluation, site complexity, and validation with the user. Fourteen recently proposed WAMs were determined since 2008. Recently proposed WAMs have begun to consider more elaborate issues such as rich internet applications, website complexity, usability, or user experience issues and implement some machine learning approaches for the metrics.

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INTRODUCTION

Currently web sites have become a main dissemination mechanism of information and services. People do most of their daily transactions through the web sites. On the other hand, 15% of world's population is estimated to be disabled by World Health Organization (Chan & Zoellick, 2011). In addition, the aging of the population would affect to increase the numbers because elderly people begin to have problems in vision or their cognitive skills. Therefore, the audiences of websites are various people with different abilities or disabilities (Masri & Luján-Mora, 2011). Thus, providing inclusive and accessible websites for all people is necessary.

Since web sites have become indispensable, some countries make use of general guidelines such as WCAG (Web Content Accessibility Guidelines) 1.0 (W3.org, 1999) or 2.0 (W3.org, 2008) or some rules or regulations such as ISO 9241-20 (ISO, 2008) or Section 508 (US Access Board, 2000) to make the web contents more accessible. Recently, WCAG 3.0 (W3C, 2021) was publicized as a working draft but WCAG 2.0 [3] is still used as a general guideline for accessibility evaluations by developers, designers, etc. to provide a certain level of accessibility for all users.

There are various evaluation methods to assure web accessibility in the literature and these methods can be categorized as qualitative and quantitative methods in general (Masri & Luján-Mora, 2011). Qualitative methods are used to investigate a website's compliance to guidelines by the use of automatic tools (Zaphiris & Ellis, 2001) or to some heuristics by experts manually (Brajnik, 2011). Other than these two analytical methods, user testing conducted with people with disabilities is an empirical method which reveals accessibility problems more accurately (Masri & Luján-Mora, 2011). Many recent research (Akgül, 2021; Alajarmeh, 2021; Baeza-Yates, 2020) also focuses on website accessibility evaluations as well. On the other hand, quantitative methods show the level of accessibility of the website by the use of accessibility metrics which have been proposed in the literature (Freire et al., 2008). These metric-based methods are important to help understand products, processes, and control and improve them in software development (Fenton & Bieman, 2014). In terms of accessibility, metrics are useful for increasing accessibility of existing products and identifying accessibility problems in a product in the development process. Various studies (Sullivan & Matson, 2000) have been carried out on metric definition and application of these metrics in measuring web accessibility .

There are several studies (Hackett et al., 2003; Sirithumgul et al., 2009a; Vigo et al., 2007) that propose WAMs (Web Accessibility Metrics) and these are very valuable for developers and researchers studying in this domain. There are some reviews on WAMs in the literature. Freire et al. (2008) and Brajnik and Vigo (2011) report WAMs which were proposed until 2011. Vigo et al. (2007) also offers a comprehensive list of metrics in their work, where they proposed a framework for