A Review on Accessibility Evaluation of numerous E- commerce platforms for the visually impaired users

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Abstract.

The establishment of online shopping website has brought a positive impact not only in the global market but has also made the act of buying and selling an effortless chore for all the individuals .With the boundless amelioration in technology, it is desired that the e-commerce websites should have an approachable look and should be easily attainable to the incapacitate individual. The motive of this study is to assess the versatility of three e-commerce websites i.e. Amazon India, Myntra and Snapdeal and to figure out the complications faced by the users suffering from Glaucoma, Cataract and Diabetic Retinopathy particularly. This study also discovered the use of simulator namely the "ViaOpta Simulator for easy analysis of these websites based on the mentioned defects. Through this detailed study, we can conclude that none of the big e-commerce websites are focusing on the guidelines mentioned by WCAG.

Keywords--E-commerce, disabilities, accessibility, usability.

1. INTRODUCTION

E-retailers communicate with all the online costumers and seek to provide optimistic procurement via e-commerce websites. We have collected data from various e-shopping websites and evaluated the data based on user experience associated with different vision disabilities. This research will benefit both the owner and the consumer, the owner in terms of monetary gains, and the consumer in terms of accessibility. This research will also provide an insight into people suffering from disabilities like Glaucoma, Cataract, and diabetic retinopathy. Websites designed nowadays are by human-computer interaction which are easily attainable to all the costumers irrespective of their ages and disabilities, by taking into consideration the two concepts- accessibility and usability. Users with affliction often undergo many challenges due to their physical disability which restricts them from going for manual shopping. As per the law, people with disabilities should possess equal access to shopping websites. E-commerce has set off as a vital platform providing ease for anybody to shop online. The business-to-consumer (B2C) website engrossed the consumers to

purchase the products online without any physical barriers. B2C has created a massive change in the global market by generating more revenue in comparison to offline shopping. B2C is furnishing easy access, and at the same time gives an actual and appropriate shopping experience to the costumers. The World Wide Web Consortium, for example, provides accessibility for people around the globe including those with disabilities such as color blindness, deaf users, and age-related vision problems. E-seller can dodge lawsuits in the coming times by evaluating the web accessibility of online stores now and probably designing accessible websites [1, 2].

Our contribution is to learn how to measure the adaptability of three different e-commerce websites i.e. Amazon India, Myntra and Snapdeal by the visually impaired users like Glaucoma, Cataract and Diabetic Retinopathy particularly. We have performed this easy analysis of these websites based on the above mentioned defects using a simulator namely the "ViaOpta Simulator.

This study is structured as follows: Section II offers background and related works. Section III presents methodology of research. Finally, Sections IV and V provides results and conclusion respectively.

2. RELATED WORKS

Online shopping is the latest and the greatest craze in the history of marketing, which enables consumers to purchase goods within a short period with minimal effort. However, prior studies have shown that incapacitated individuals go through a series of problems while shopping online. With the advancement in technology, new techniques such as JavaScript, and HTML have been introduced to improve the visual platform, hence making it easier for all the users to interact and fulfill their needs. Howbeit, the websites were associated with many drawbacks, especially for users suffering from various impairments which covered almost 15% of the total population according to the World Health Organization. The Web Content Accessibility Guidelines have been framed for B2C automated web services to improve the web accessibility for people suffering from disabilities. These websites provide users with multiple options such as screen readers, voice recognition, and alternative website displays along with pointing devices. [1]

The interoperability analysis of E-commerce websites is performed by taking into consideration the three vital parameters- Performance, Accessibility, and Search Engine Organization (SEO). Thus, Usability plays a key role in determining the utilitarian behavior of virtual shopping. Myntra has attained the highest score in terms of performance and the most used online transaction app Paytm has been rated the highest in terms of accessibility.[3]

Usability is the degree up to which a user can utilize a product to attain his/her goals. depends on several factors namely: understandability, capability, notability, inaccuracy, and contentment. The elements of usability can be listed as feasible, climatic, sentiments (friendly interface), and the details. A B2C business more commonly called electronic retailing anticipates effortless purchases along with providing security for the user's personal

information at the time of transactions, which is, otherwise, at high risk from hackers. A user's positive experience produces a constructive effect on the company's accomplishment in digital marketing. Research conducted on the online store thepoplook.com originating in Malaysia, which offers complimentary deliveries by means of fast courier services to its customers within the same country, has shown that this method resulted in a boost in sales and allured more buyers. The significance of cyber shopping experience is enabling the consumers to purchase the commodities smoothly.[4]

The studies which evaluate the usability of e-commerce websites mostly have two methods: user testing and heuristic evaluation. Further, the study of these two methods did not offer any drawbacks and advantages. The structure for the assessment of online shopping website involves user based and a evaluator based method with Google Analytics software. This structure involves steps to provide quick and easy access for checking the problematic area on websites and their specific pages. The framework offers user testing for identifying specific major problems such as map-reading, blueprint, acquirement, availability, and client service, while the evaluator based method is good in finding minor usability problems such as map-reading, internal search, and design, site architecture availability, and customer service. The framework was tested and the outcome indicates its functionality in raising awareness. This helps the e-commerce website retailers to grow, survive and achieve success. [5]

The importance of usability of websites, e-commerce standards has been identified everywhere in the world [15, 16]

The authors in this paper [17] have compared the errors in usability and accessibility between African Europe e-commerce websites by using the automated tools

3. METHODOLOGY

The empirical method utilized for computing website usability is data interpretation. Therefore, the data evaluation outlook is used to inspect net usability in the context of online shopping websites [1]. The main tool used for this study is Indian Business to Consumer (B2C) referred from e-commerce websites. After the deletion of unimportant links, the remaining top 5 B2C online shopping websites were concluded for evaluation.

Instrumentation

Investigation was performed using a self-operating mobile application called 'ViaOpta Simulator' of version 2.4.3. ViaOpta Simulator was developed with three major European associations namely European Council Optometry and Optics, European Men's Health Forum, and AMD Alliance International. It was launched on January 8th, 2014 [6, 11] ViaOpta Simulator identifies the following disabilities:

- Glaucoma
- Cataract

- Diabetic retinopathy
- Dry eye
- Presbyopia

We have taken into consideration 3 e-commerce websites: Amazon India, Snap deal, and Myntra [7].

Amazon India- Amazon India is the most trusted and valuable e-commerce website for Indian online consumers. According to Amazon India, the estimation of website visitors is 322.54 million monthly. [7].

Snapdeal- Snapdeal is an Indian e-commerce platform established in February 2010 in New Delhi, India. Initially, the company was started as a coupon and deals site and later turned out to be a variety shopping platform having 30 million products and 40.15 million monthly active users. [7]

Myntra- Myntra is the largest e-commerce marketplace that deals in fashion, lifestyle, and home-related products. The estimation of the monthly users is 48.03 million. [7]

As per our study, we have considered a few disabilities like Glaucoma, Cataract, and Diabetic retinopathy.

Glaucoma is the result of damage to the optic nerve due to high eye pressure. Every year, over 1 million cases are recorded in India [12].

In **Cataract**, the lens of the eye gets cloudy. It develops over the course of a year. The main symptom is blurry vision [13].

Diabetic retinopathy affects the eyes of human beings, it is caused due to the damage of the blood vessels at the back of the eyes. The symptoms are blurriness, floaters, and dark areas of vision [14].

3.1 Procedure

The vast improvement in technology had called for the need of development of many impairment software which is available today worldwide in order to eradicate the afflictions that an incapacitated individual especially the ones with vision disabilities goes through. Consequently, we have performed our research taking into account an augmented reality application namely the "ViaOpta Simulator" in order to discover the complications that the individuals suffering from Glaucoma, Cataract, and Diabetic Retinopathy face while browsing through the E-commerce websites namely Amazon India, Snapdeal and Myntra which we have considered for this particular research.

Firstly, the introductory pages of these chosen shopping websites were thoroughly examined so as to obtain acumen in the direction of the drawbacks that these webpages might carry. An accessibility check was performed on all the webpages of all the three websites by entering the URL of each of these webpages into the required field and testing the compliance of these websites to Web Content Accessibility Guidelines 2.1.

The ViaOpta simulator was then employed to check the ophthalmic condition of the patients and it divided these vision problems into three levels-Level A (describes minimum level of conformance), Level AA (average level of conformance), Level AAA(maximum level of conformance) in accordance to the WCAG 2.1 which also divides the websites into different levels based on conformance. After prior testing, it was discovered that Diabetic Retinopathy comes under Level A, Glaucoma falls under Level AA, and Cataract comes under Level AAA. Thus, if a webpage had the lowest level of conformity it could not pass the trial, and if no mistakes, then this website is said to have passed the test.

4. RESULT AND DISCUSSION

According to the research, the above-mentioned online e-commerce platforms are paying the least attention to disabled consumers. We have found that these top online e-commerce platforms are violating the WCAG ("Web Content Accessibility Guidelines") contrast, checker. Hardly any of these mentioned websites have 0 accessibility violations [9].

The table below shows the accessibility violation on the home page: [9]

Name of the website	**Home page URL**	**Number of issues**
Snapdeal	http://www.snapdeal.com/External Website	160
Amazon	http://www.amazon.in/External Website	28
Myntra	http://www.myntra.com/External Website	26

The following are the observations made from the study for visually impaired users;

The accessibility of the Web is predominantly significant visually impaired users has ample struggle surfing the web. Hence images of the products have to be shown mentioning their usage and not looks.

Such as the usage of ALT-tags to let reader of screen to miss insignificant images.

Usage of small explanation for images.

Users with visually impaired can utilise screen readers such as Job Access with Speech (JAWS).

To study how to a screen reader for visually impaired users would vocally tell the text of a website, developers can utilise plug-ins of a Firefox plug-ins like Fangs Screen Reader Emulator

The designers can utilise Color Oracle software which is freely available [18].

Usage of tools for calculating active colour contrast ratio and evading the font of text with less resolutions and font.

We have evaluated that these websites should follow the mentioned ways to make their website accessible: [10]

1.	Provide enough color contrast.
2.	Limit color and don't rely on it.
3.	Avoid text over background images.
4.	Enable manual font size adjustment.
5.	Add relevant anchor text and alt text.
6.	Grant keyboard accessibility.
7.	Use clear and elaborative tags for links and buttons.
8.	Use titles to seek page content.

5. CONCLUSION

With that, we can conclude that none of the B2C e-commerce websites in India are concentrating on fulfilling the norms of the WCAG. With the rapid growth in online shopping in India, disabled consumers are in need of easy access to online shopping. Along with that there are various online evaluation tools for accessibility and the skilled evaluators may mention the varied accessibility errors while accessing such e-commerce websites.

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