Comparative Study of Cross Browser Compatibility as Design Issue in Various Websites

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Abstract - In this current era of information technology websites are very important means of communication. Lot of efforts is required by different institutions / organizations to portray complete information on beautifully designed websites. Websites act as an online agent through which a user can get his work done without physically visiting the organizations. Website design is given with a very critical look by the designer so that it can provide users with all the facilities of the concerned institutions / organizations online. To make websites behavior similar in all the different browsers employed by the different categories of the users, the responsibility of the designer and the concerned institutions / organizations increases manifold. In this research paper author developed an online tool using .NET Framework using C# to study cross browser compatibility as Design issue in various categories of the websites like Job portals, Government, educational, Commercial and Social networking. The automated tool developed by author function on the basis of the different standards prescribed in W3C guidelines document UAAG 2.0 [7] and act like a parser and renders the complete code of the website and produces result on basis of the behavior of the websites in five most popular and widely used Browsers like parameters like Internet Explorer[7,8,9], Chrome, Safari, Fire fox. Each Browser is tested on the basis of the five parameters which are included in the parser are Blinking, Active X control, Website Resolution; image Formats, HTML Tag errors. The results obtained after testing five different categories of websites shows that educational and social networking sites shows least compatibility in multiple browsers where as job portals, commercial and government websites shows 100% compliance to the website design standards recommended by W3C w.r.t browser compatibility of different websites on different browsing platform.

Key words: Websites, Browser, Compatibility, Design, .NE, Automated Tool.

1.0 INTRODUCTION

Website is a combination of interlinked and related web pages residing on a single server and severed to the user through single domain. There are different categories and wide variety of the websites available these days, but the most widely accessible categories of the websites include social networking, Commercial, Government, Educational and job portals. With the advancement in technologies and completions of providing all services to the citizen online, it has become mandatory as well as very important for different organizations (big or small) to develop website for rendering all its services online to the user at global level through networks. In order to provide better services online the websites are increasing in number in a very short span of time. With increase in the number of websites its popularity and cater to the need of all the different categories of the users it becomes mandatory for different organizations to put lot of efforts to design websites carefully so that it can easily be accessible for different services. Number of different websites design issues is there which needs to be kept into designers consideration while designing websites. Browser compatibility is one of the most important issues among all websites design parameters. These days multiple browsers are being practiced by the different users for accessing websites. With the advent of multiple browsers it becomes mandatory for a website to behave similar when open in multiple browsers. There are different organizations which are responsible for development and recommendations of different website design standards. For evaluating website design as per the different standards so that it behave similar in all the different browsers available, the number of different automated tools are available online. Each available online tool test the websites on its own criteria and supply the result accordingly. In order to test the websites design (Browser compatibility) w.r.t. the standards recommended by W3C, the automated tool is design and developed by taking into consideration the parameters which are not tested by any automated tool available online till date. The automated tool, developed shall take website URL as input and then parse the website complete code supplied by the server after submitting the desired request through its interface. The HTML code supplied by the server will be compared with the existing standards recommended by the W3C and embedded in the automated tool for its compliance. The working of the automated tool design and developed by the author is given below in Figure 1.The parser of the automated tool will take website URL as input and send same to the server as request for fetching the websites HTML code. The server within no time sends back the HTML code of the website to the interface of the automated tool for its comparison with the existing standards. The algorithm of the online automated tool developed by the author is given below:

Algorithm 1: To determine browser compatibility of a

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website.
Input: Website URL
Output: Compatibility status of website w.r.t different features for various browsers.

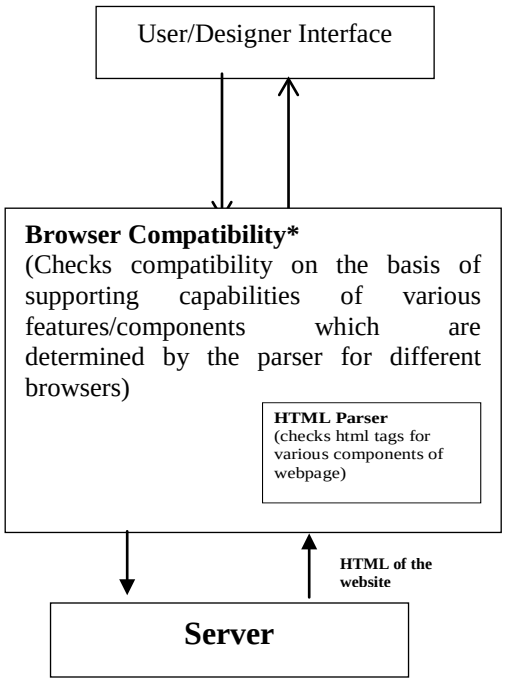

Figure 1: Block diagram of Browser Compatibility Parameter

Method:
Begin
Step I: Generates request for obtaining HTML file of the website by passing url to the server.
Step II: For each feature considered for determining compatibility
Flag=0;

(i) Check for the presence of the feature in the website by a look out of the HTML file.

(ii) Determine the compatibility of the feature w.r.t different browsers.
If (feature isn't supported by any browser)

Set flag=1;

Step IV: if (**flag**==0)
Website is compatible for all browsers
else
Website isn't fully compatible.
End

2.0 LITERATURE SURVEY

All though many people have worked in area of website design and development but still the desired qualities of a website has not been achieved. Still websites fails to deliver the desired goals as is evident from the literature available. A details review of literature regarding the concerned topic of research has been done through different sources of Literature like journals, research papers, books and article with Internet as the major source of this literature. Most designers feel that they should be supporting all or at least as many browsers as they possibly can. But honestly, this is impossible. If there are 5 major browsers, IE has over 7 versions, Fire fox has over 3, Opera has over 9, Safari over 3, and now Chrome has come out. So even if you try to support just the 2 latest versions of each common browser you're looking at 10 browsers, 8 of which you'll have to test on both Macintosh and Windows - so that's 18 tests for every page. And that's not even close to all, or even most, of the browsers available. [1] When there are nearly 100 web browsers available today, [2] each browser parses a web code in a different way. It becomes very difficult for a designer to design websites which shows similar behavior in each browser employed by the user. . If we are using java scripts or AJAX calls for UI functionality, performing security checks or validations then give more stress on browser compatibility testing of our web application [3]. The components of web pages like blinking, active X controls, resolution, image formats and HTML tag error (like video tag), Ajax, Flash, and event-handling for dynamic HTML [4] etc. have a direct effect on the cross browser compatibility of a website. These features are supported to different levels by various types of popularly known web browsers or their versions. E.g. the compatibility of blink tag by various browsers [5] is shown in table 1 below.

Hence to avoid loss of business and reputation it is very important to pay attention to cross browser issues [6]. W3C guidelines document UAAG 2.0 [7] states that web sites must follow the maximum standards to make website behavior similar in all browsing platforms. There are other categories of features that hinder the compatibility of websites over the commonly employed browsers which include Different Browsers, Different Browser Versions, Different Computer Types, Different Screen Sizes, Different Font Sizes, and HTML Errors, Browser Bug, Add-ons and Third Party entities [8]. In near future the different government organizations are going to provide all facilities through web and they are available once the user visited there websites through its browser [9]. Web based applications are extremely helpful in enhancing the success rate of any organization.

The sustenance of High level Process maturity can be achieved by adopting web application technology [10]. As already discussed the technology also plays vital role on making websites compatible with different browsing platforms. Government organizations are putting lots of efforts to provide different services in the Directorate General of Foreign Trade (DGFT): [11] e-licensing, e-BRC, e-tendering,

e-monitoring, e-meeting e-delivery, e-PRC, e-grievance re-addressal etc. regarding the implementation of ICT and different user's access information from different browsing platforms. The continuous evolution of the Internet has opened unimaginable opportunities and challenges in web based education and learning [12]. Each and every person these days is getting all his work done by the use of web based system which is accessible through one oir the other browsing platforms. Only Workplace (office, school, college etc) was found to be the most common place for internet access. Most offices and schools provide internet (broadband) access; therefore people indulge in internet activities at work, only 22% of the respondents did not have internet facility at work [13]. So attention needs to be paid to the design of the websites in order to make uniform behaviors of all the websites in different widely used browsers.

S. No	Web Browsers	Compatibility for Blink Tag
1.	Internet Explorer[7,8,9]	Not Supported
2.	Chrome	Not Supported
3.	Safari	Not Supported
4.	Fire fox	Supported

Table 1: Browsers compatibility with blinking tags

3.0 METHODOLOGY

3.1 Problem Identification

A good web design aims to give a uniform look to the website, viewed from any web browser. Thus, a good website should be viewable in its full functionality on any web browser.

Since every webpage is built up of various components with their own characteristics and these characteristics affect the performance of a webpage in different contexts. Like other measures of performance evaluation the browser compatibility feature of websites is also affected by the various components of a webpage either directly or indirectly. It is also dependent on the type of technology used in building websites like AJAX as already discussed in literature review. Different technologies sometimes also create the compatibility problem. So during the design phase of the websites they must be tested rigorously for its compatibility at different browsing platforms

As already discussed in literature review, different components of web pages like blinking, active X controls, resolution, image formats and HTML tag error (like video tag), Ajax, Flash, and event-handling for dynamic HTML etc. have a direct effect on the cross browser compatibility of a website. These features are supported to different levels by various types of popularly known web browsers or their versions. The compatibility of blink tag by various popularly known browsers is already in table discussed in literature review.

Similarly, the other features described above offer different levels of compatibility conflicts to various levels when websites are opened on distinct web browsers or their versions. These features are the basis for categorizing websites for their cross browser compatibility capabilities.

3.2 Online tool for testing web pages

The automated tool designed and developed by the author for testing various categories of the websites in order to study the deviation from design standards by the designer includes five different parameters. For testing browser compatibility parameter the features (or measures) which are considered by automated tool in determining the compatibility of a website on various commonly used browsers like Internet Explorer, Google Chrome etc. are:

1) Blinking
2) ActiveX Controls
3) Website Resolution
4) Image Formats
5) HTML Tag Error

The test for various websites is carried out on the basis of the above features to determine compatibility conflicts. This online web diagnostic tool provides a complete statistics of the browser compatibility based on the features which are considered for the purpose.

3.3 Sample Data

The Sample of data undertaken to study Browser compatibility as design and development issue in various websites is given below in table 2. the five different categories of the websites which are widely used and accessed by the users were selected which includes government websites, commercial websites, job portals, social networking and educational websites. The different category of the websites undertaken by the author helps the designer to understand about diversity in website design in a better and efficient way. Total 100 websites belonging to different categories was taken for testing which includes 20 websites from each categories mentioned above. The different websites are designed in consideration with different design constraints and they are applying specifically to each category undertaken for testing. Moreover, it helps a lot to study diverse nature of the website design as far as browser compatibility on different browsing platform is concerned.

3.4 Results and Discussions

The Sample data undertaken to study cross browser compatibility as website design issue in various websites is shown in below given Table 2 and the results obtained are shown by framing the analysis into a graph shown in below given figure A.

Based on the graph shown in fig.(A) above, it can be analyzed that the website categories that have maximum support in percentage for various types of commonly used browsers belong to e-government websites, e-commerce websites and job portals and the websites which shows least compliance to the different browsing platforms belongs to social networking

websites and educational websites.

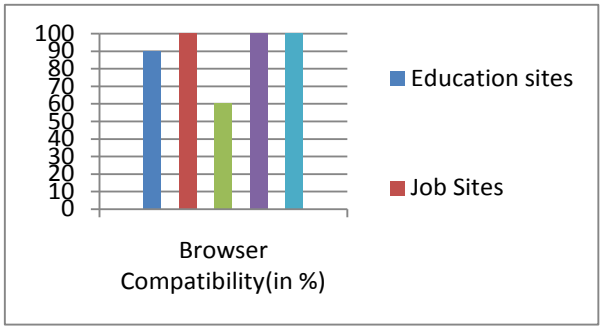

Figure 2: %age for Browser Compatibility

It has been observed from the results obtained that out of the five different categories of the websites taken as a sample data for testing the e-governance, e-commerce and job portals follows the maximum of the standards recommended for the websites design w.r.t. behavior of the websites in different browsing platforms.

4.0 CONCLUSION

Designers cannot assume that their application will run fine and display and work for all the browsers without cross browser testing. The organizations must put lots of efforts in designing websites in order to avoid loss of business and reputation. The analysis carried out on the cross browser compatibility feature of websites above using the online web diagnostic tool Website Design Evaluator clearly indicates that websites are neglecting criteria that otherwise must be considered for complete cross browser compatibility in spite of the web browser employed.

By evaluating the different categories of the websites on the automated tool design and developed by the author it has been observed that websites are not meeting the different standards recommended by the different standard organization (e.g. W3C) for the design and development of various websites such as blink tag for $IE_{[7,8,9]}$ and Mozilla, video tag for IE_8 and earlier versions etc. The result of this study confirms that the developers of the websites somehow are not able to completely follow the standards recommended. It is clear from the results that more efforts are required to follow websites design standards in order to make websites 100% compatible in different browsing platforms.

5.0 LIMITATIONS

Appendixes, In addition to the features considered for compatibility test, there are also other features for determining browser compatibility that can be included in order to widen the cross compatibility check to better help developers/designers to build websites that have increased compatibility capabilities. The features considered are not quite enough to fully determine the compatibility capabilities of a website. There are other categories of features that hinder the compatibility of websites over the commonly employed browsers e.g.

a) Different Browsers
b) Different Browser Versions
c) Different Computer Types
d) Different Screen Sizes
e) Different Font Sizes
f) HTML Errors
g) Browser Bug
h) Add-ons and Third Party entities

6.0 FUTURE SCOPE

In future more number of measures will be added to browser compatibility parameter to help the designers to create page that are more efficient, user centric and follow the standards provided by concerned organizations in a more appropriate way. The parameters that are under consideration to be included in the parameter belong to categories like diversity in web browser versions, other HTML tag errors, screen sizes etc. All these features are under consideration and will be included in the tool to enhance its capability to check websites for more number of design issues regarding cross Browser compatibility problem.

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Table 2: Sample Data

S.No	Govt. Websites	Educational Websites	Commercial Websites	Social Networking Websites	Job Portal Websites
1.	www.mit.gov.in	www.upsc.gov.in	www.bsnl.co.in	www.facebook.com	www.monster.com
2.	www.indianrail.gov.in	www.shiksha.com	www.onlinesbi.com	www.gmail.com	www.careerbuilder.co.in
3.	www.moia.gov.in	www.apple.com	www.airtel.in	www.orkut.com	www.indeed.co.in
4.	www.rajasthan.gov.in	www.schoolcircle.com	www.india.philips.com	www.yahoo.com	www.simplyhired.co.in
5.	www.jkgad.nic.in	www.classteacher.com	www.libertyshoes.com	www.rediffmail.com	www.nakuri.com
6.	www.maharashtra.gov.in	www.jammuuniversity.in	www.bata.in	www.frenzo.com	www.glassdoor.com
7.	www.assam.gov.in	www.kashmiruniversity.net	www.hp.com	www.bebo.com	www.usajobs.gov
8.	www.india.gov.in	www.coeju.com	www.tata.in	www.goibibo.com	www.reed.co.uk
9.	www.aponline.gov.in	www.kashmiruniversity.ac.in	www.godrej.com	www.jakpinch.com	www.monesterindia.com
10.	www.nagaland.nic.in	www.jmi.ac.in	www.hul.co.in	www.myspace.com	www.placementindia.com
11.	www.upsc.gov.in	www.jamiahamdard.edu	www.marutisuzuki.com	www.mycantos.com	www.timesjobs.com
12.	www.petroleum.nic.in	www.smvdu.net.in	www.britannia.co.in	www.friendster.com	www.beyond.com
13.	www.rbi.org.in	www.islamicuniversity.edu.in	www.pg.com	www.viber.com	www.findtherightjob.com

14.	www.dotindia.com	www.du.ac.in	www.colgatepalmolive.com	www.netlog.com	www.bright.com
15.	www.coal.nic.in	www.jnuonline.in	www.hindwarehomes.com	www.flickr.com	www.ziprecruiter.com
16.	www.tn.gov.in	www.amu.ac.in	www.pepejeans.com	www.watsapp.com	www.theladders.com
17.	www.tourismofindia.com	www.skuastkashmir.ac.in	www.ashokleyland.com	www.plus.google.com	www.monester.co.uk
18.	www.upgov.nic.in	www.skuast.org	www.dabur.com	www.tagged.com	www.career.com
19.	www.darpg.gov.in	www.pondiuni.edu.in	www.pepsico.com	www.ning.com	www.tweetmyjobs.com
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