



## Analysis on Design Issues of E-Government Websites of India

Jatinder Manhas

Department Of Computer Science and IT, University of Jammu  
Ambedkar road, Jammu, India

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**Abstract**—Design of the e-government website is a crucial factor that should be considered for improving its effectiveness, efficiency and satisfaction w.r.t services to citizens [1]. In this study the effectiveness of various design parameters (such as page size, composition, download time etc) on e-government website will be analysed by taking into considerations different website development standards recommended for them. The aim of this study is to analyse different government Website by testing their existing design with the help of online tools to understand their deviations from the standards and to evaluate their performance with respect to the parameters considered by the tool. The results indicated that there is an urgent need to improve the design features of e-government website in order to be more effective and user-centric. The author took 10 Government websites of India, analyse their different parameters and on the basis of analysis shows their overall compliance with the standards and guidelines. With the help of the results obtained a graphical analysis of the websites is made by the authors that determine the effect of these parameters on the efficiency and accessibility of the government websites.

**Keywords**— e-government, website design, webpage size, html, css, website evaluation, website standards, website guidelines

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### I. Introduction

As internet usage is growing daily the people around the globe are coming closer. With the advent of World Wide Web as a vast phenomenon, it has surprisingly brought the world closer making it a smaller piece to live in for its user. The number of citizens seeking information and services online are increasing rapidly in almost every country of the world. The citizens expect government websites to save their money and time. The responsibility of the government is to design websites that are easy to use and are accessible to each and every type of citizen. Implementing the simple principle of having website that works well and doesn't confuse the user or get him frustrated, will help to reduce the abandonment of the website by visitors. But during the development process errors creep into the design of websites either implicitly or explicitly.

Evaluation is a systematic determination of a subject's merit, worth and significance, using criteria governed by a set of standards. Design, organization and ease of use are important considerations. Web sites can provide useful sources of information; but if they are slow to load and/or difficult to navigate, search or read, then their contribution or usefulness will be diminished. An effective web design is one in which your users are able to find information *quickly* and in a *logical* fashion.

Do they visit the content you want them to visit? Are they looking in the right places of your web page? Are you able to keep your user's attention, or do they just leave quickly?

It's not *just* about the content either. If your design *loads slowly* – or if moving from one section to another takes a long time – it affects the user's experience.

These things can be the make-or-break factors between a user *clicking on a link* to find more information, or the *back button* to find it elsewhere.

#### *Few things to consider in website design [2]:*

- Is important information being *seen* by the user?
- Are the navigation and action items intuitive?
- Is the user being *directed* to sections in a logical manner?
- Does the web page load *quickly* enough to not turn away the user?

Based on the above reasons a detailed study of government websites of India was made with the help of Web Page Analyser an online tool provided by Website Optimization[4]. The tool calculates the size of individual elements and sums up each type of web page component. Based on these page characteristics the script then offers advice on how to improve page load time. The tool incorporates the latest best practices for web page size guidelines and trends, and web site optimization techniques into its recommendations.

## **2. Methodology**

A total of about 10 websites from the e-government portal of India were analyzed by the authors for the following parameters [4]. Based on the results collected from the tool a graphical analysis of the sites was made that helped to determine their deviations from the guidelines provided.

### **(a) Total HTML:-**

This parameter of web site calculate the total no. of html file on the web page .The no. of HTTP web request increases accordingly as the no. of html file increases. Minimizing http request is the key for website optimization.

### **(b) Total Objects:-**

This parameter counts the total no. of objects being used in the website. These objects include html file, css file, css images, JavaScript, multimedia, etc. Above 20 objects per page the overhead from dealing with the actual objects accounts for more than 80% of whole page latency. In order to remove the overhead associated with objects combine, refine, and optimize the objects. Replace graphics rollover with the CSS rollovers to speed display and minimize HTTP requests. Consider using CSS sprites to help consolidate decorative images. Using CSS technique such as colored backgrounds, borders, or spacing instead of graphics techniques can reduce HTTP requests.

### **(C) Total Images:-**

This counts for the total Image being used in the website. It should be reduced to reasonable numbers. Recommend combining, replacing, and optimizing your graphics. Replace graphic rollover menus with CSS\_rollover\_menus to speed display and minimize HTTP requests [3]. Consider using CSS sprites to help consolidate decorative images. Use CSS techniques such as colored backgrounds, borders, or spacing instead of graphic techniques to reduce HTTP requests. Replace graphic text headers with CSS text headers to further reduce HTTP requests. Finally, consider optimizing parallel downloads by using different hostnames to reduce object overhead.

### **(D) Total CSS:-**

It counts for the total CSS being imported in the website.

Because external CSS files must be in the HEAD of your HTML document, they must load first before any BODY content displays. Although they are cached, CSS files slow down the initial display of your page. Remember to place CSS files in the HEAD and JavaScript files at the end of the BODY to enable progressive display.

### **(E) Total Size:-**

It evaluates the overall size of the website by calculating the total size of all the objects being used in the website. In order to achieve good response time for website we should consider reducing size of website. For example consider reducing total page size to less than 100K to achieve sub 20 second response times on 56K connections.

### **(E) Total Script:-**

It counts the total number of external script files being used in the website. Consider reducing this to one or two. Combine, refactor, and minify to optimize your JavaScript files. Ideally you should have one on your pages. Consider suturing JavaScript files together at the server to minimize HTTP requests. Placing external JavaScript files at the bottom of your BODY, and CSS files in the HEAD enables progressive display in XHTML web pages.

### **(E) HTML Size:-**

The total size of HTML file is calculated here. This size should be minimized as far as possible.HTML size should be such that it will not affect the average time user are willing to wait for a page to display(10 sec).

### **(E) Image Size:-**

It calculates the total size of your images on the website. It should not be over 100k. Consider switch graphic formats to achieve smaller file sizes (from JPEG to PNG for example). Finally, substitute CSS techniques for graphics techniques to create colored borders, backgrounds, and spacing.

### **(E) Script Size:-**

This parameter evaluates the total size of all external script of your website. The total size of the external script should be less than 8K.

### **(E) CSS Size:-**

The size of all the external CSS which is used in the website is calculated in this parameter. The total CSS size should be less than 8K.

### **(E) MULTIM Size:-**

This parameter counts for the size of all the external multimedia being used in the website. This should be less than 10K.

## **3. Analysis and Results**

On testing and analyzing about 10 e-government sites on Webpage Analyzer tool the statistics obtained for various parameters are listed in the table 3.1 given below:

Table 3.1[4]

Website name	Total HTML	Total Objects	Total Images	Total CSS	Total Size	Total Script	HTML Size	Image Size	Script Size	CSS Size	Multi media Size
<a href="http://www.mit.gov.in">www.mit.gov.in</a>	1	119	109	7	463813	6	46616	122786	96494	40507	0
<a href="http://www.indianrail.gov.in">www.indianrail.gov.in</a>	1	32	28	1	80873	2	5949	52937	14061	7926	0
<a href="http://www.moia.gov.in">www.moia.gov.in</a>	1	3	0	0	294201	1	1029	0	0	0	293172
<a href="http://www.rajasthan.gov.in">www.rajasthan.gov.in</a>	1	30	23	1	322108	5	26196	199566	89974	6372	0
<a href="http://www.india.gov.in">www.india.gov.in</a>	1	254	250	1	1296463	2	11021	876401	396925	12116	0
<a href="http://www.upsc.gov.in">www.upsc.gov.in</a>	4	6	2	0	66805	0	22215	44590	0	0	0
<a href="http://www.petroleum.nic.in">www.petroleum.nic.in</a>	1	27	18	1	455325	4	53035	200524	72259	4485	125022
<a href="http://www.rbi.org.in">www.rbi.org.in</a>	1	1	0	0	1036	0	1036	0	0	0	0
<a href="http://www.coal.nic.in">www.coal.nic.in</a>	1	4	2	0	4362	1	1781	2100	481	0	0
<a href="http://www.tourismofindia.com">www.tourismofindia.com</a>	1	23	19	1	691648	2	9838	669923	8307	3580	0

Based on the statistics obtained as shown in Table 3.1 above and the guidelines provided in section 2 of this paper the results obtained are provided in the table 3.2 given below. (Y) in the cell for a website under any parameter determines that the site follows the guidelines recommended for that very parameter and (N) in the cell determines that the site does not follows the guidelines recommended for that parameter.

Table 3.2

Website name	Total HTML	Total Objects	Total Images	Total CSS	Total Size	Total Script	HTML Size	Image Size	Script Size	CSS Size	Multi media Size
<a href="http://www.mit.gov.in">www.mit.gov.in</a>	Y	N	N	N	N	N	Y	N	N	N	Y
<a href="http://www.indianrail.gov.in">www.indianrail.gov.in</a>	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y
<a href="http://www.moia.gov.in">www.moia.gov.in</a>	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N
<a href="http://www.rajasthan.gov.in">www.rajasthan.gov.in</a>	Y	N	N	Y	N	N	Y	N	N	Y	Y
<a href="http://www.india.gov.in">www.india.gov.in</a>	Y	N	N	Y	N	Y	Y	N	N	N	Y
<a href="http://www.upsc.gov.in">www.upsc.gov.in</a>	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
<a href="http://www.petroleum.nic.in">www.petroleum.nic.in</a>	Y	N	N	Y	N	N	N	N	N	Y	N
<a href="http://www.rbi.org.in">www.rbi.org.in</a>	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
<a href="http://www.coal.nic.in">www.coal.nic.in</a>	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
<a href="http://www.tourismofindia.com">www.tourismofindia.com</a>	Y	N	N	Y	N	Y	Y	N	N	Y	Y

Graphical analysis of results

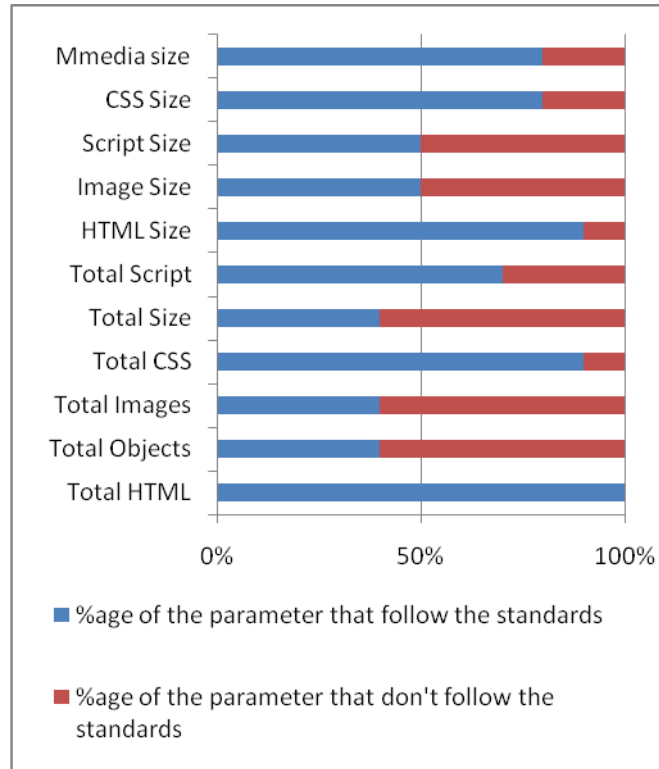


Fig.3 (a)

From the graph above in Fig.3 (a) it is clear that the only parameter that follows the guidelines completely in almost every e-government website of India is the total number of HTML files used in the webpage. The rest of all the parameters are partially following the guidelines and hence minimizing the overall performance and maximizing the download time of the webpage making them less effective from the user point of view.

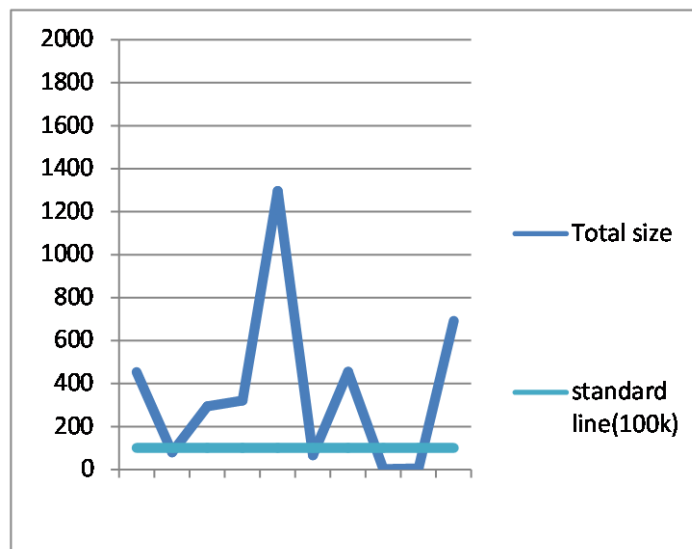


Fig.3 (b)

The overall effect on the total size of the webpage is shown in Fig.3 (b) above. Among the websites sample used for analysis only 40 percent of the government sites are below or on the standard line (100kb as recommended for better performance for any type of website for different modem speeds) indicating that maximum of the government sites are having sizes that are unacceptable from effectiveness and user-centric point of view.

On summarizing the results from the statistics obtained and the graphical analysis made it has been observed that on average only 30 percent of government sites compliance with the standards and guidelines Fig.3 (c) below while rest of all government sites are not completely feasible from user point of view.

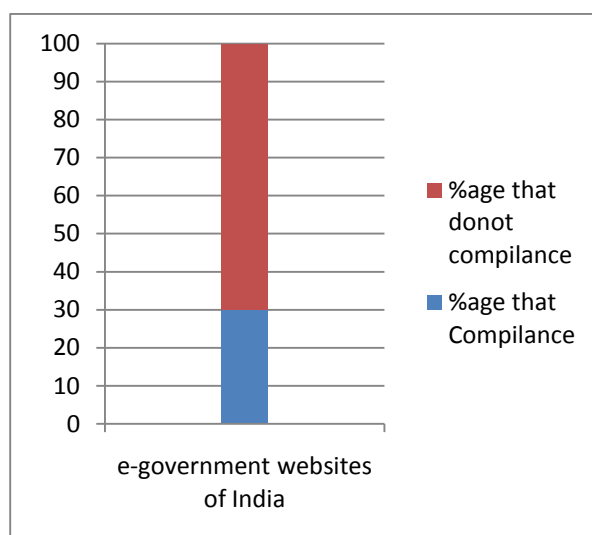


Fig.3 (c)

#### 4. Areas of Further Study

Web development and designing discipline is an ongoing process and has just started gaining attention of researchers, developers, academics, and other major players in Web-based system implementation such as customers and their contract administrators. It needs to evolve and mature to effectively handle the new, unique challenges posed by Web-based system development. We need to study and evaluate current approaches and practices, guidelines and standards and develop new methods and techniques to address the challenges of developing Web-based systems. The more standardized your website will be the less are the chances for the users to move on to your competitor.

The areas that need further study include:

1. Minimization of external objects.
2. CSS and Image size optimization.
3. Website effectiveness and usability.

#### 5. Conclusion

Testing of e-government portal of India was conducted to analyse the performance and user-centricity. Highly accessible government websites all over the India were selected for this study. The online tool web analyser was used as it provides a detailed analysis of the site tested and the areas that need to be improved. The results indicates that websites has a serious accessibility problem. There is an urgent need to improve the total size, minimize the number of external objects, size of images used etc to make e-government websites to be more effective, highly user-centric and easy accessible for the citizens.

#### Acknowledgement

This paper is the outcome of study done during previous few years and will be helpful to students that are new to the field as this will provide them with nut shell information regarding this ever expanding field. It is also going to help with larger perspective to the people in the field of academia, research and web developers/designers to a greater extent. We would like to thank the developers of *Web Analyser* for the free online availability of their useful tool that proved to be key component for this study.

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