Comparison of Compression Tools for Optimization of Mobile Web Applications

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***Abstract*— Internet is one which integrates the people throughout the world. The access of the internet is rapidly increasing throughout the world because of new era of technology such as use of the smartphones and Tablet PCs. The uses of these devices are progressively increasing and we can never ignore the experience of customers on handheld devices. Therefore the websites need to be Toptimized for such devices (i.e. Smartphone, Tablets, iPhone) in order to provide the best user interfaces. In this research paper an educational domain based web app has been developed using HTML5 & CSS3 for smart devices, which is tested on different twenty compression tools and the results of best common five compression tools are analyzed and compared in order to suggest the more suitable HTML5 and CSS3 compression tool for code compression. Comparative analysis of this research study shows that YUI compressor tool is more suitable for code compression which can compress HTML or CSS code up to 30%.**

***Keywords*— Mobile Web Apps Optimization, Compression Tools, Responsive Web Design, CSS3 & HTML5**

INTRODUCTION

The technology revolution increases the accessibility of the internet throughout the world and internet is being accessed on different devices such as: PCs, Laptops, Tablet PCs, Smartphones and iPhones. Therefore websites need to be optimized for such devices. Various techniques can be usefull for web applications optimization and code optimization is one of them.Code optimization can make the code as fast as possible, because code is written by the human that may has problems such as extra space, comments, and other formats that are useless in code execution so that code optimization can be useful for fixation of such problems.'

The code written in HML5 and CSS3 can be compressed using HTML5 and CSS3 compression tools which are useful in order to compress the size of a website for smart devices which will minimize the page load time and improve the performance of a website. This may provide the visitors of smart device a much better user experience. The rest of the paper is organized as follows: section 2 out-lines related work, section 3 describes the compression tools, section 4 discusses the proposed framework of research, section 5 describes the results and discussions and section 6 concludes the research findings.

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RELATIVE WORK

A website must be developed in general way that is compatible and optimized for all devices in order to provide the best user friendly environment for all platforms. There are 6.8 billion people all around the world out of which 5.1 billion have cell phones and today the percentage of smartphone devices is rapidly increasing [1]. The Mobile clients are continuously growing and we cannot ignore the customer experience on a mobile device. Nowadays Responsive Web Design (RWD) has gained popularity wherein this approach allows designing website for mobile devices more closely by adapting different techniques [2]. The soul of this idea is to design and present web content that can be enabled for all existing media [2]. Responsive Web Design allows a website to adapt itself to any device or width of screen [3][4] automatically. According to Harry Robert and Paul Gordon most suitable name for such kind of designing is "Adaptive Web Design" [5]. The RWD allows to design website for mobile more closely by adapting different techniques such as: Fluid Grids, Flexible Images, and Media Queries [2]. By using the new features of HTML5 and CSS3 it is possible to reduce the amount of information that is to be loaded [6]. Advancement in HTML5 and CSS3 greatly influence the mobile application development for providing the much better user experience to the mobile client users [7]. The HTML5 is being use as common platform for mobile web application development, which deals with the lay-out of the webpage [8]. HTML5 based mobile applications support different platforms and different browsers. The latest version of HTML has made the significant improvement over the previous version. Its goal is to increase the readability of the code for humans and native support for multimedia such as audio, video [9]. The code optimization plays vital role in response time of a website, the visitors may also evaluate the website through response time especially on their first visit to the website. The Magnification removes the unnecessary characters that are useless in code execution such as White space characters, new line characters, and Comments. Magnification optimizes the code and minimizes page load time, make the search engines happy and provide the visitors

much better experience [10].

COMPRESSION TOOLS

The code of the developed web application can be compressed using different compression tools. There are various numbers of the compression tools available for HTML5 and CSS3. However in this paper five compression tools have been compared which are mentioned as below:

YUI Compressor Tool

The YUI compressor tool is developed by Yahoo and is written in Java and relies on Rhino to tokenize the source JavaScript file. The YUI compressor is widely used tool in terms of magnification of the code. The YUI Compressor is also able to compress CSS and HTML code [11].

Compressor and Beautifier Tool

The compressor and beautifier tool is provided by the mini-web-tools, which is useful for code compression of web applications developed in HTML and CSS. Com-pressor and beautifier tool also facilitate with beautifier tool that allow to make code pretty and readable and easier to edit [12].

HTML Compressor Tool

HTML compressor tool is useful for compressing the code safely. In this tool the code of HTML, CSS, and JavaScript files can be compressed easily and efficiently. It speeds up the webpage and reduces the loading time of a webpage [13].

Creativyst CSS&JS Compressor Tool

CSS & Java script compressor tool is provided by the Creativsyt. Creativyst CSS & JavaScript compressor works effectively in order to optimize a website. This tool eliminates the whitespaces and comments from the code and makes the size of code smaller which in-creases the efficiency of the website [14].

CSS / JavaScript Compressor Tool

JavaScript / CSS compressor tool is provided by the re-fresh-sf. JavaScript / CSS compressor is useful in magnification. The JavaScript / CSS compressor can be useful for JS, CSS and HTML code. It removes the comments, whitespaces and tabs from the code and optimizes the source code more smartly [15].

PROPOSED FRAMEWORK

Figure 1 Proposed Framework

Web App

First an educational domain based web application has been developed namely “Postgraduate Center” of Quaid-e-Awam University of engineering, science and technology, Nawabshah, the idea behind development of this web application is to use the code of the developed web application for compression tools as back-bone.

Compression Tools

The code of the developed web application has been compressed using different common compression tools. There are numbers of compression tools available for HTML5 and CSS3. However in this research five compressiontools are compared as mentioned in Section III.

Optimized Web App

At this level each compression tool produced an optimized web app as output (result).

Comparison of Tools

Once the code has been compressed the optimized web app has been evaluated, compared and tested on the basis of different criteria. Different factors of code optimization are identified in the developed code by each compression tool. There are numbers of the factors identified as: optimize numbers, optimize color, optimize font-weigh, replacing of double space with single space, repeated code, comments & white spaces.

Final Results

The final results are concluded on the basis of the comparison of tools phase. At this stage each tool is analyzed, evaluated and tested on the basis of the identified factors.

RESULTS AND DISCUSSION

Mainly two types of compression tasks are performed in this research work.

Tool wise Individual Web Page Compression

In tool wise individual web page compression the code of developed web application is compressed page wise individually by each compression tool in order to minimizethe size of the each web page of the web application. Each tool compressed the individual webpage and optimized the webpage by eliminating the code optimization factors.

The Table 1 shows tool wise individual original size of webpage and the compressed size of webpage as well as total size of complete web application before compression and after compression.

Tool Wise Complete Web Application Compression

In tool wise complete web application compression the code of whole developed web application is compressed by each compression tool in order to minimize the size of the web application. Here all the individual webpages are combined in a single folder and then the whole folder is then compressed. The Table 2 discusses the analysis of tool wise complete web application compression for each compression tool and shows the original size, compressed size, compression ratio and the number of bytes saved.

Table 1 Comparison Analysis of Tool wise Individual Web Page Compression

Tools	Home		Programs		Admissions		Contact Us		Total	
	Source	Compressed	Source	Compressed	Source	Compressed	Source	Compressed	Source Size	Compressed Size
Compressor and Beautifier	5.21kb	4.66kb	4.59kb	4.14kb	5.49kb	4.94kb	4.28kb	3.44kb	19.57kb	17.18kb
Creativsyt Compressor	5.21kb	4.70kb	4.59kb	4.14kb	5.49kb	5.10kb	4.28kb	3.87kb	19.57kb	17.81kb
HTML Compressor	5.21kb	4.36kb	4.59kb	3.78kb	5.49kb	4.79kb	4.28kb	3.52kb	19.57kb	16.40kb
JSS/CSS Compressor	5.21kb	4.36kb	4.59kb	3.52kb	5.49kb	4.65kb	4.28kb	3.44kb	19.57kb	15.97kb
YUI compressor	5.21kb	4.31kb	4.59kb	3.71kb	5.49kb	4.66kb	4.28kb	3.58kb	19.57kb	16.26kb

Table 2 Analysis of Tool wise complete Web Application Compression

S. NO	Tool	Source Size (in bytes)	Compressed Size (in bytes)	Compression Ratio	Bytes Saved
1	Compressor & Beautifier	110,896	108,645	2.03	2,251
2	Creativsyt Compressor	110,896	109,085	1.63	1,811
3	HLML Compressor	110,896	107,642	2.93	3,254
4	JS & CSS Compressor	110,896	107,184	3.35	3,712
5	YUI Compressor	110,896	107,492	3.07	3,404

Compression Ratio for Each Compression Tool

Figure 2 shows the compression ratio for each compression tool including original and compressed size in bytes. The area for each compression tool is highlighted with different colors and each compression tool is shown with respective legend keys. The YUI compressor tool has more suitable compression ratio as compare to the all other compression tools and shown in following figure.

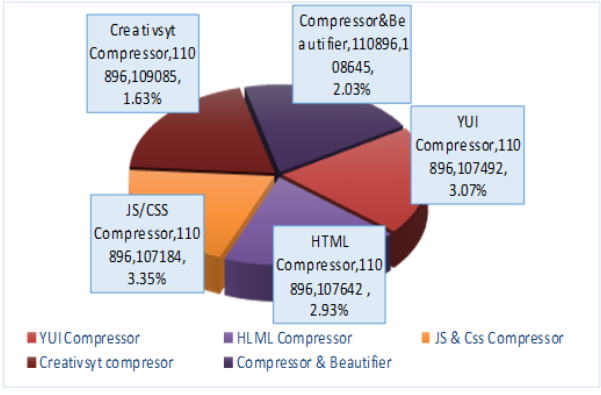
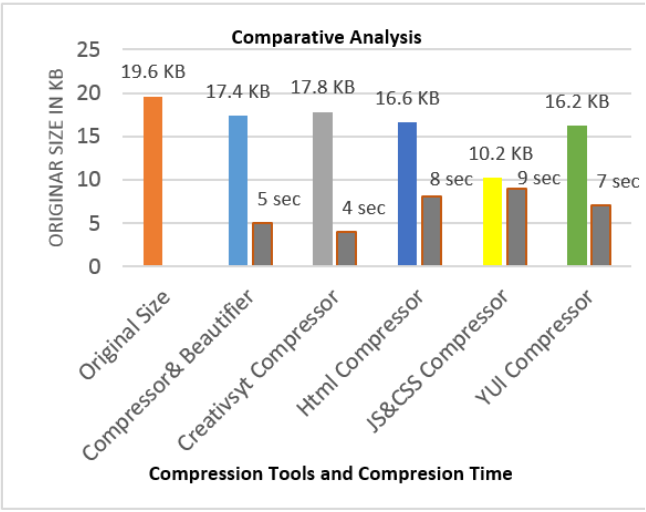


Figure 2 Compression Ratio

Comparative Results

Figure 3 shows the overall comparative results of all compression tools.The comparative results are obtained on the basis of comparative analysis of all compression tools by examining the efficiency for eliminating the code optimization factors. The comparative analysis is performed for each compression tool by accomplishing Tool wise individual web page compression task and Tool wise complete web application compression task.



The comparative analysis results show that the JS/CSS compressor tool has higher compression ratio as compared to other tools, however this tool also affects the quality of the web application after compression. Therefore, YUI compressor tool is more suitable for code compression in order to optimize the web application. YUI compressor tool does not affect the quality of the web application after compression. It takes original web application size as 19.6 kb

and after compression it gives 16.2 kb and it has taken 7 seconds to compress the web application code.

CONCLUSION AND FUTURE WORK

In this paper HTML5 and CSS3 compression tools are compared for code optimization. In this research work an educational domain based web app has been developed using HTML5 & CSS3 which is used as input for code compression tools then web application is tested on different common five compression tools in order to suggest the more suitable HTML5 and CSS3 compression tool for code compression. Although JS&CSS compression tool provides higher compression ratio yet it affects the look and feel of the web application. Therefore, comparative results of this research study show that YUI compressor tool is more suitable for code compression for developed as well as existing web applications. The web developers /engineers may use proposed compression tool to develop highly optimized web applications and provide the visitors much better experience. This research work can be continued in future for testing additional new compressions tools for mobile web apps optimization.

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