A Project Report

on

WEBSITE CHECKER

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CANDIDATE'S DECLARATION

I/We hereby certify that the work is being presented in the thesis/project/dissertation, entitled **"WEBSITE CHECKER."** in partial fulfillment of the requirements for the award of the **BACHELOR OF TECHNOLOGY IN COMPUTER SCIENCE ENGINEERING** submitted in the School of Computing Science and Engineering of Galgotias University, Greater Noida, is an original work carried out during the period of **FEB-2023 to MAY-2023**, under the supervision of **DR. SHAJAHAN B, Department of Computer Science and Engineering of School of Computing Science and Engineering,** Galgotias University, Greater Noida

The matter presented in the thesis/project/dissertation has not been submitted by me/us for the award of any other degree of this or any other places

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This is to certify that the above statement made by the candidates is correct to the best of my knowledge

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CERTIFICATE

The Final Thesis/Project/ Dissertation Viva-Voce examination of **19SCSE1010033-MADHAV KUMAR, 19SCSE10400 RITWIK SINHA** has been held on _____ and his/her work is recommended for the award of **BACHELOR OF TECHNOLOGY IN COMPUTER SCIENCE ENGINEERING**

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Date: May 2023

Place: Greater Noida

ABSTRACT

The Website SEO checker helps you to perform a full webpage SEO Audit in just a couple of minutes. Enter your URL and focus keyword (make sure this keyword is relevant to the specific page you're going to analyze). Next, the tool will crawl and test your webpage to see how well it's optimized for search. Based on the results from the SEO scan the tool will provide you with actionable feedback and an overview of the issues found when analyzing the page. An SEO Audit analyzes a website or webpage designed to help you understand how well a website is optimized for search. Based on the result of the audit you should be able to fix/solve possible issues and get a better understanding of the Content, Authority or Content related opportunities to improve your organic traffic. Offering a free SEO audit can be a really effective way to collect leads. To help you automate this process I've also developed an embeddable version of this audit tool. Simply copy-paste the embed code on your website and you can offer your audience the opportunity to perform a fully white-label SEO quick scan. The tool will give you practical feedback and a summary of the problems discovered when analyzing the page based on the findings of the SEO scan. An analysis of a website or webpage called an SEO audit aims to show you how effectively a website is search engine optimized. Based on the audit's findings, you should be able to address any potential problems and have a better understanding of chances to increase your organic traffic through content, authority, or other related factors. Providing a free SEO assessment is a good method to get leads. I've also designed an embeddable version of this audit tool to assist you in automating this procedure. You may provide your audience the option to conduct a 100% white-label SEO fast scan by simply copying and pasting the embed code onto your website.

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CHAPTER-1
Introduction

1.1 Introduction

Performance of websites, including loading speed, is becoming more and more important. With the abundance of available online resources to choose from, web visitors are getting less tolerant about slow-loading websites. It appears that users are much more impatient than previously thought. Slow-loading sites are therefore a major frustration and turnoff for web surfers. The role and importance of the loading speed of websites are discussed in more detail in the State of the Art.

General causes and consequences of slow loading speed of websites are analyzed in this paper, along with website speed tests then the main concern of the rest of the paper Reliability of website speed tests is questioned because of the misleading usage of these tests and inconsistent default settings. In this paper, we will test several hypotheses related to website speed testing, which are based on our previous experience and existing research. Detailed testing methodology is then presented, along with the approaches from existing literature.

Recommendations are presented along with comments on usual practice and feasibility. The next step in improving the performance of the website is using website speed testing. However selection of such test, its settings and using it has its pitfalls. First we offer selection of several speed testing tools and choose the most feasible ones, which are further reviewed and discussed. Especially their functions, interface and other features, with a focus on choice of testing locations, browser and connection.

Relabilityto Barker, web performance is the time that the content takes to be delivered to the end user, including network latency and browser render time . Latency is then the amount of time it takes for the host server to receive and process a request for a page object . Latency is also a significant contributor to all factors that affect page load time [. According to Fong and Chung, a linear improvement in page loading times can be realized for every 20 ms improvement in latency . Consequently a simple latency optimization can yield significant improvements in overall page load times, usability and also revenue . Similar term to latency is response time. Brown-Sica et al. defined response time as the time that it takes for all files that constitute a single webpage to travel across the Internet from a Web server to the computer on which the page is to be displayed .

Response time then does not include the time it takes for the browser to render the page. The issue of loading speed is very important not only on presentation websites but also in e-commerce. Online customers expect fast loading Web pages . Loading speed is also influencing a user's preference for a particular website . Rosen and Purinton pointed out that web surfers are not very patient and some web design experts have estimated that they have exactly 10 seconds to lure people into a site. Based on the statistical reports, 57 percent of users abandon web sites if the page does not load in 3 seconds . Lindgaard et. al. suggests that time needed for assessing a visual appeal of a website is actually about 50 ms . Loading speed is then very important for user experience, because slow loading speed means that user is forced to watch blank white screen or only partially displayed content of a website for a certain period of time. However first impression of a web site is very important if the user continues to use the web site .

Therefore it is not surprising that slow loading sites are a major frustration and turnoff for web surfers . Also Miranda et al. agrees, that the time required to access information is critical factor for Web users seeking information . Loading time is also a major contributing factor to page abandonment - the average user has no patience for a webpage that takes too long to load . Therefore it is very important to test performance of websites and optimize the user experience. According to Sundaresan et al. , Internet service providers and application providers are increasingly cognizant of the importance of reducing Web page load times.

1.2 Formulation of Problem

There are many terms specifying the time needed for loading a website in the browser window, e.g. loading speed, site speed, page load speed, page load time, response time, speed of data display or download delay. One of these alternative attributes is usually included in various sets of usability or design attributes researched in literature. Lee and Kozar included some of these variations in their thorough analysis of website usability constructs and placed them all in one category called "Simplicity", along with such terms as efficiency, minimal action, or simple layout. Similarly, Morkes and Nielsen claimed that users want to get their information quickly, they want fast response times for hypertext links and at the same time, they like well-organized sites that make important information easy to find. Rosen and Purinton also connected loading speed with the website's simplicity. According to these authors, simplicity of design makes the site more appealing and also faster to load . The loading speed of websites has not impact only on user experience. Website speed also increases ranking in search engines like Google . Finally according to Meenan, there is an overwhelming evidence, which indicates that a website's performance (speed) correlates directly to its success.

Constantinides classified site speed as one of usability factors among the main building blocks of web experience, in other words one of the elements which enhance web site usability . Gehrke and Turban suggested among other usability factors also page loading and download time . Aladwani classified speed of page loading as one of technical characteristics of the website and important attribute of the website quality . Loiacono et. al. introduced response time as one of the dimensions for Web site evaluation in WebQual, an instrument for consumer evaluation of web sites . Cebi included speed as one of website design parameters under technical adequacy with following description: "The site should provide quick loading, accessing, and using"

1.2.1 State of Art

Green and Pearson presented web site usability dimensions, among them also download delay. They characterized this dimension by e.g. these wordings: "The rate at which the information was displayed was fast enough" or "The speed in which the computer provided information was fast enough" . Download delay is also among five factors included in the Palmer instrument for measuring of Web site usability . Download delay is defined as the initial request for access to the page and then each subsequent request for changing pages with the site .

Loading speed of websites reflects the website´s performance and has a significant influence on user experience and satisfaction . It is sometimes being interchanged with the term "performance". According about 15 percent slower than actual page load time [. Modern websites which rely heavily on JavaScript take even longer to load than usually accepted by users. Some of these websites use a simple technique to alter the perception of time - a progress indicator. Leavitt and Shneiderman recommend to provide users with appropriate feedback while they are waiting. Specifically, if processing will take up to sixty seconds or longer, use a process indicator that shows progress toward completion . Similarly Weinschenk recommends to always provide progress indicators so people know how much time something is going to take .

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CHAPTER - 2
Literature Survey

2.1 Services for Website Speed Testing

General recommendations are a good start for optimizing any website. Nevertheless when the website plays a key presentation role and is designed for many users, its performance should be analyzed in more detail. Website speed testing tools are suitable for this purpose. They measure page load speed, show what elements cause the biggest delay in website´s response time and also offer comparison and recommendations and many performance metrics.

There are several ways of how to choose the right speed test. Nagy used in his research a collection of top website speed testing tools published on Sixrevisions.com named "20 Free Online Tools for Website Speed Testing" . Sixrevisions is a web publication for web developers and web designers . Out of this list Nagy selected five online services:

Six functional services emerged from the analyzed collection. Google PageSpeed was consequently excluded, because it offers only verbal evaluation without actual values and performance metrics. The remaining five functional and suitable services were analysed more thoroughly in the next step. The analysis focused on the available settings, including possibilities after registration if the service had one

The presented tools have diverse user interfaces and approach to presentation of options. Interface of Pingdom and GTmetrix encourage to run the speed test without even looking at settings, which are hidden and accessible by user interaction. The most emphasized design elements are the textbox for tested website´s URL and button for running the test. WEBSITETEST also hides its settings, however the buttons for accessing settings are more apparent than in previous cases. Dotcom-monitor initially hides settings of location as well, but offers visible icon set for browser selection. WebPagetest presents both location and browser selection right under the textbox for website URL, with link to advanced settings under these elements.

WebSitePulse provides in-depth website and server diagnostic services that are intended to save e-business customers time and money by reporting errors and Web server and website performance issues to clients . As can be seen in the Table 3, the most popular free services also offer the paid service,The paid service is usually offered for longterm monitoring of websites.

Images, CSS, Java scripts, RSS or Flash [30]. After the testing session, these key metrics are provided: performance grade, number of requests, load time and page size. The detailed results are provided in a form of a waterfall chart, where stages of requests are listed for every file on the tested webpage. Results of the testing are also presented as a set of performance grades for several key design rules, along with recommendations for performance improvement. These best practices originates from Google Page Speed, Additionally, results include load time analysis (time spent per state / content type / domain), size analysis (size per content type / domain) and request analysis (requests per content type / domain)

2.2 WebPageTest

WebPagetest is available on http://www.webpagetest.org/, as seen in This service is also free and offers the widest selection of settings of all reviewed services. The number of available testing locations is slightly variable, we have encountered from 44 to 47 locations so far. Offered testing servers are however provided mostly externally, not by WebPagetest´s own servers. Some of the providers have also their own website with speed testing tool. E.g. location "Hong Kong" and "Denver" is provided by Dotcom-monitor, which has its own service [44]. Location "Ashburn" is provided by YOTTAA, which runs the WEBSITETEST . The selection of web browser is dependent on the chosen location, however the majority of locations offers more than three web browsers to choose from. The variability of test settings is then quite generous. WebPagetest was recommended among others in Barker´s Pro JavaScript Performance book.
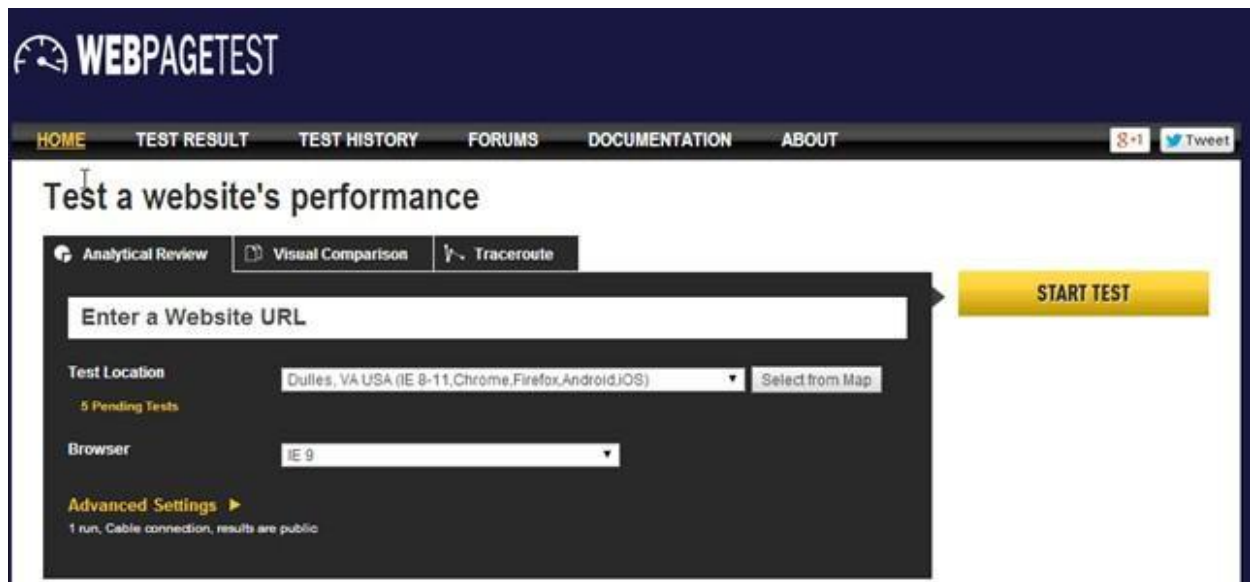

User Interface of WebPageTest

2.3 Pingdom

Pingdom Website Speed Test is available on http://tools.pingdom.com/fpt/. The service is free and offers several testing locations to choose from, Figure 2 shows the interface, where different settings can be chosen. The number of locations is variable, supposedly according to their availability. We have encountered from three to six locations so far. Pingdom does not offer any other settings which would have an influence on the outcome. Only Google's Chrome web browsers are used for the testing, the type of connection is not specified.

Pingdom provides measurements of the loading speed of an HTML page including all its objects such as WebPagetest offers also numerous advanced settings, which include type of connection, number of tests to run, first view and repeat view, disabling or ignoring some functions etc.
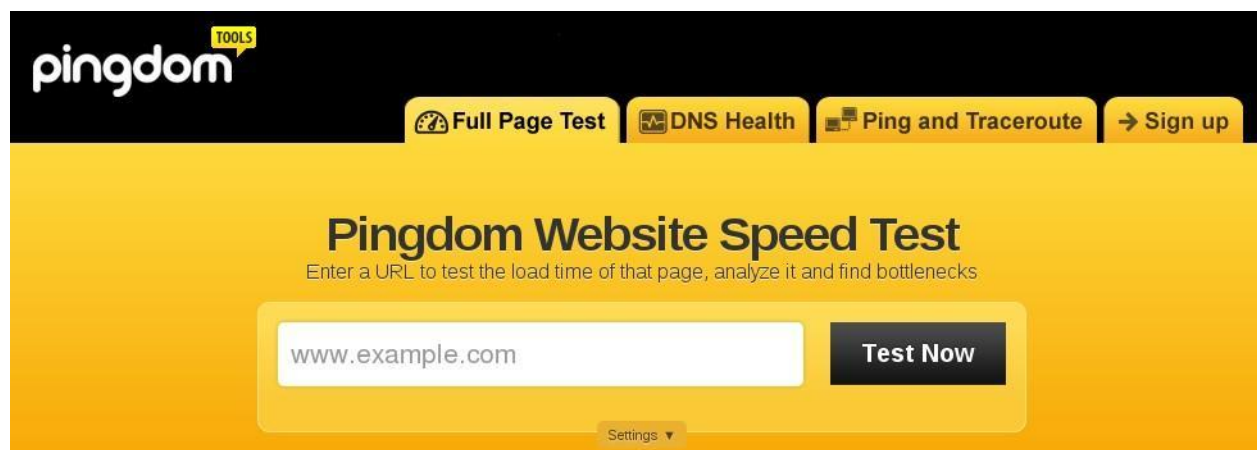
User Interface Pingdom

Chapter 3

3.1 WebSite Test

Unfortunately we were not able to run any test with this service. We have tried to do so several times on three different days on several devices and browsers. After configuring settings and clicking on start button "test", the screen with results was loading for several hours, after which we terminated the trial test.

3.2 Causes of Slow Loading Speed

As was thoroughly discussed in the previous section, page speed has a significant influence on user web content differently according to the particular device - its screen size and capabilities - on which it is being viewed. Resizing a desktop image to fit a mobile device's screen however implies downloading an image that's been suited for a desktop environment, which is an unnecessarily large file.

Many web designers tend to use the simplest method available - common way of dealing with this issue is hiding too large images (and other content) for smaller displays. This however does not solve the problem with downloading too much data when it is not needed. The images will not be displayed, but they will be still downloaded, causing delay in page loading speed . And if you use CSS media query to replace the background image with a mobile version, in some cases it would actually download both images. Another common way of dealing with images is "shrinking" - as responsive web design uses fluid images to match the different screen sizes, desktop-grade image is downloaded every time, even when loaded on a much smaller screen

3.3 Images

Web site designers can simply choose not to include slow loading elements . These are especially photos and other images, which have big file size in order to keep high quality. The cost of pictures is in download speed, frequently mentioned as a concern to on-line users . Including many images and videos on a web page results in a slow loading time, which can be very frustrating .se whether to download large (slow) graphics . The situation is much more difficult for mobile phones - networks are slower, hardware is less capable, and you have to deal with the messy world of data limitations and transcoding methods

Despite of these conclusions, modern web design trends tend to prioritize large high-quality photos and graphics. When we look at modern websites or at web design templates available on the internet today, either free or for a price, very often there is a large picture over the whole screen. If it is a responsive website, the image is usually wide enough to fit on the widescreen monitor. These background or header images are often not even content-related and sometimes quite ambiguous, while they consume significant amount of downloading time and negatively affect loading speed.

As for user experience point of view, it was proven by eyetracking methodology that people ignore more images than they look at on the web, and they look at images for just a fraction of a second . Also on web pages with multiple superfluous images, people treat the entire page as an obstacle course they must navigate, as a result they look at text around images but not at images. Even though their role is not well-founded, large images play a significant role in today's web design, probably because it is "modern" and it looks "professional".

3.4 JavaScript Techniques

According to Barker, JavaScript is potentially the largest area for improvement when trying to address the total performance of the website. Websites relying heavily on JavaScript, especially those with AJAX (asynchronous JavaScript and XML) can experience performance issues. Souders tested the Alexa Top 100 URLs with and without JavaScript and demonstrated improvement of an average performance of 31% when removing JavaScript from a website . Of course solution to faster loading speed is not removing JavaScript completely, web designers should rather learn to use it more efficiently.

A motivation to learn programming properly is however a big problem these days. Because of the limitless resources available on the internet, one does not have to learn a lot to create a plausibly functional website. This trend can be simply confirmed e.g. by looking at "a question and answer site for professional and enthusiast programmers" called Stack Overflow (available at http://stackoverflow.com/). Often the questions are so basic with respect to the relevant field of knowledge, that it is apparent that people who ask them are lacking of elemental knowledge, yet they are trying to create a website, some of them are even trying to do it for business.

Another issue of JavaScript, apart from bad programming techniques, is its overuse. Inexperienced developers often download whole JavaScript libraries in order to add functionality, which could be accomplished in cleaner and more efficient way. Sometimes they do not even need the libraries, they just incorporate them into the webpage as a part of "useful" package of functions because it is simple. The same goes for front-end frameworks such as Bootstrap or Foundation which offer a collection of code, styles and functions

3.5 Methodology in the Literature

Many research papers use website speed tests in order to test performance of websites or systems. However presented testing often lack any methodology. In some papers there is only briefly mentioned that some tests were performed, along with the name of the used service [e.g. 29,30,31].

Methodology of testing is described in more detail e.g. in the research of Brown-Sica et al. [33], who performed testing of response time with use of WebSitePulse service. The authors stated that the testing was performed at different times of the day - one set of links was tested in the morning, one at midday, and one in the afternoon. There is no notion of why this variance of testing conditions was applied. Location of Seattle was chosen for all tests and the data were gathered for thirteen days.

Fong and Chung devoted several pages to performance evaluation of their webpage with detailed look at the results. Methodology was not mentioned and the presented results were supposedly values gained by only a single speed test. This approach would be valid if the purpose was only to reveal recommendations generated by the test. However load time is metrics with significant variance and we should at least calculate a median from several measured values. WebPagetest does this automatically if more than one test was selected.

4.0 Conclusion

Our results indicate that the choice of service and location affects significantly results of website speed testing. This turns out to be a very serious issue in the case of comparing the test results, which we need in most cases. Either we need to compare between our website and competitive websites, or we compare previous versions of our site with the current one. Redesign of a website, which is a lengthy and costly process, is often based on these results, so it is very important that they are reliable. If we rely on default settings, we get significant hidden inaccuracies in the measured values, which are caused by inconsistent settings. We can see another trend in the results as well - the effect of time of a day on results, possibly also the effect of different day of the week etc. In our case, the most pronounced difference was encountered during evening testing. You can notice that several sets of values have higher values in evening measurements Also the number of encountered errors and instances of unavailable services was higher in this time of a day. Further research is needed in this case

Several recommendations originate from our results and confirmed hypotheses. These recommendations relate to use of website speed tests:
1)   do not use speed tests with arbitrary default settings or inconsistent settings if you are serious about measuring the page load time.
2)   if you need to compare results in any way, choose one fixed combination of service, location and browser
.
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