

## USABILITY EVALUATION OF SOCIAL MEDIA WEBSITES

Tai Wen Jun <sup>\*1</sup>, Low Zi Xiang<sup>\*2</sup>, Nor Azman Ismail<sup>\*3</sup>, William Goy Ren Yi<sup>\*4</sup>

<sup>\*1,2,3,4</sup> School of Computing, Faculty of Engineering,  
Universiti Teknologi Malaysia (UTM), Johor Bahru, Malaysia.

### ABSTRACT

Website performance is an essential factor in determining the quality of the website and the number of loyal visitors. It usually refers to web pages' speed taken to be downloaded and displayed on the user's web browser correctly. This study used website performance evaluation tools including Pingdom, GTmetrix and Website Grader to evaluate various social media website such as Facebook, Twitter, Youtube, Wechat and more. We found that Wechat has the highest score on most of the evaluation criteria and was chosen to be the best social media website under the web performance test.

**Keywords:** Social media website, usability, performance, GTmetrix, Website grader, Pingdom.

### I. INTRODUCTION

Nowadays, social media have taken an important place in most people because social media can bring several advantages to us, such as allowing interactions between people in numerous ways. Besides, it can find out other life through some images or videos. It can get more information through the social media platform than newspapers and even allow someone to promote online business [1]. High performing websites can attract more visitor and provide higher SEO and sales [2]. As social media users grow, a social media website's web performance has become an essential factor for users to determine whether using a social media website or not.

Meanwhile, low performance can bring bad evaluation to the website company and may lead to a disastrous effect on reputation, brand, and overall customer retention. The website's delay can increase the user's stress level. For example, a two-second delay in the loading YouTube video can increase stress by 3% compared to 0-second delay [3]. Many criteria can affect web performance. Those criteria are [4]:

1. Overall load time - Time for a file required to render the website to download it. Usually affected by the latency, size of files and the number of HTTP requests by the file. The availability of preload of the file can decrease the load time.
2. Time for a site to be usable -Means time required for a user to use it even some other assets are still being loaded in the background.
3. Smoothness and interactivity - Refer to how we feel when using a site and how smooth it is when scrolling the site and also can the button and pop-ups clickable and can be open.
4. Perceived performance -Refer to how fast for a website to respond to the user request and what websites can do to prevent user thinking it is broken or no response when loading a large size of the file.
5. Performance measurements - Refer to the actual speed when the user and the perceived speed make no request.

Website performance evaluation was introduced to identify their performance. There are two evaluation methods for evaluating website performance: the questionnaire-based evaluation method and the tool-based evaluation method. The questionnaire is about gathering information from individuals based on the sets of questions given. A questionnaire can be administered through telephone, face-to-face interviews, handouts, as mail or electronically (by e-mail or web-based questionnaires) [5]. In comparison, each website performance evaluation tool may show different evaluation criteria when performs. These evaluations can show us how a site performs in different platforms or devices and reveals possible factors that cause it to slow down by monitoring websites' uptime, performance and interactions [8] and discovering optimisation opportunities [6,9, 10,11].

## II. RELATED WORK

**Xianghua et al. [9]** declared that one of the things that essential to Web services is the Web server performance. They presented an evaluation mode- Web Server performance evaluation Model. This model can use to evaluate the peak load of the web server based on the Response Time. Besides, when the request rate is lower than peak load, it will operate based on the special relationship between response time and throughput. The paper showed that this model has been verified by both empirical and theoretical points of view in real environment as it is more effective and simple compare to other.

**Zoran Babovic et. al. [10]** has present two web performance evaluation test application. The paper shows how the first test application can be used for comparing performance between each web platform implementation while measured latencies induced by different communication protocols, graphics rendering performance and message encodings. The second application is able to measure the latency rate of sensor data when delivery and throughput message which can be used to compare web performance of IoT messaging protocol like XMPP, AMQP, MQTT and DDS.

**Rich Friedrich et al. [11]** present a custom instrumentation, LQM which can estimate the client response time when conduct on a web server. Any impact on the server and client response times will be predicted by this model based on the Web server pool size and network topology. Besides, consequences cause by the configuration changes in server system will be considered when using LQM. For example, the modified of HTTP object cache size.

## III. METHODOLOGY

Seven selected social media websites data were collected based on their websites' usability scores via three usability testing tools. Three usability testing tools were used in this study to ensure the consistency of the result and analysis. Below is the three-usability testing tool and the reasons for each tool were used.

### 1) GTMetrix [6]

A website performance analytics tool that has provided professional reports about the website's analysis includes the First Paint (FP) and First Contentful Paint (FCP). This usability testing tool was chosen due to its complete report on various aspects of analysing the websites' performance.

### 2) Pingdom [7]

Pingdom had almost the same report compared to GTMetrix however, Pingdom's method in determining the time to stop test is different. Pingdom determines the time to stop test with on load time, which will stop when processing on the page is finished; however, GTMetrix uses the fully loaded time that stops after 2 seconds of no internet activity, which is theoretically longer than load time.

### 3) WebsiteGrader [8]

This website evaluation tool provides analytic results such as security score, accessing the website via mobile score, search engine optimisation (SEO) and performance score not provided by other two website performance analytics tools.

While analysing the websites, Pingdom's location is Asia-Tokyo, Japan, GTMetrix is Vancouver, Canada. The website grader did not specify location due to the website's aspect evaluation did not differ based on the location.

After analysing all the seven social media websites on the usability testing tools, the result and highest score in the usability testing tool were generated to ease data presentation. The website with the highest score and the best social media website was concluded based on the analyst from the three usability testing tools.

## IV. EVALUATION

The websites that were being evaluated are listed in Table 1.

**Table-1:** The Social Media Website Listed

Social Media	Website URL
Facebook [12]	<a href="https://www.facebook.com/">https://www.facebook.com/</a>

Twitter [13]	<a href="https://twitter.com/?lang=en">https://twitter.com/?lang=en</a>
YouTube [14]	<a href="https://www.youtube.com/">https://www.youtube.com/</a>
Instagram [15]	<a href="https://www.instagram.com/">https://www.instagram.com/</a>
WeChat [16]	<a href="https://web.wechat.com/">https://web.wechat.com/</a>
Snapchat [17]	<a href="https://www.snapchat.com/">https://www.snapchat.com/</a>
Reddit [18]	<a href="https://www.reddit.com/">https://www.reddit.com/</a>

## V. RESULTS AND DISCUSSION

The paper has focused on three web usability tools to calculate social media platforms website usability. Table II, Table IV and Table VI show the evaluation results.

### A. Result of Pingdom Tool

Pingdom tools evaluated the websites using five factors which are Performance, Page Size, Load Time, Requests and Grade. Table II shows the result of the social media websites based on the five factors that evaluate by Pingdom. The WeChat website, <https://web.wechat.com/> scores maximum in Performance, Page Size, Requests and Grade but average in Load Time. Based on Table III, WeChat scores the highest in Performance, Page Size, Requests and Grade.

**Table-2:** Pingdom Tool For 7 Social Media

Social Media	Performance	Page Size (MB)	Load Time (s)	Requests	Grade
Facebook	76	1.2	1.28	58	C
Twitter	87	0.91	0.95	21	B
YouTube	67	3.8	3.4	99	D
Instagram	80	1.3	0.7	33	C
WeChat	94	0.4	2.6	13	A
Snapchat	79	1.8	0.77	43	C
Reddit	77	3.2	2.42	123	C

**Table-3:** Evaluation Of Social Media Websites Based On Usability Criteria

Website Analysis Criteria	Social Media Websites	Score Points
Performance	<a href="https://web.wechat.com/">https://web.wechat.com/</a>	94
Page Size	<a href="https://web.wechat.com/">https://web.wechat.com/</a>	0.4
Load Time	<a href="https://www.instagram.com/">https://www.instagram.com/</a>	0.7
Requests	<a href="https://web.wechat.com/">https://web.wechat.com/</a>	13
Grade	<a href="https://web.wechat.com/">https://web.wechat.com/</a>	A

### B. Result of GTMetrix Tool

GTMetrix tool evaluated the websites using five factors which are Page Speed Grade, YSlow Grade, Fully Loaded Time, Total Page Size and Total of Requests. The data generated from the GTMetrix usability tool produced another result with the highest score of websites in each sector. From the table V, we can conclude that Twitter and WeChat had occupied two of the five sectors: Twitter has the highest score in page speed grade, and YSlow grade and WeChat has the smallest total page size total number of requests. However, in this test, we conclude that Twitter has higher performance than WeChat because it has a significant advantage in page speed grade and YSlow grade, which is essential for the social media website.

**Table-4:** Gtmetrix Tool For 7 Social Media

Social Media	Page Speed Grade	YSlow Grade	Fully Loaded time	Total page size	Total of requests
Facebook	A(97%)	A(93%)	4.2s	1.11MB	55
Twitter	A (99%)	A (100%)	3.7s	847KB	22
YouTube	F(48%)	C(78%)	10.8s	3.60MB	103
Instagram	A(97%)	B(87%)	4.5s	1.13MB	33
WeChat	A(91%)	B(86%)	7.2s	390KB	14
Snapchat	C(78%)	B(86%)	1.7s	817KB	41
Reddit	F (18%)	C (73%)	22.4s	10.6MB	211

**Table-5:** Evaluation Of Social Media Websites Based On Usability Criteria

Website Analysis Criteria	Social Media Websites	Score Points
Page Speed Grade	https://twitter.com/?lang=en	A(99%)
YSlow Grade	https://twitter.com/?lang=en	A(100%)
Fully Loaded time	https://www.snapchat.com/	1.7s
Total page size	https://web.wechat.com/	390KB
Total # of requests	https://web.wechat.com/	14

**C. Result of Website Grader Tool**

Website Grader tool evaluated the websites based on five factors which are Performance, SEO, Mobile and Security. Facebook and Instagram obtain 0 scores in SEO. There is also a website that obtains a higher score in some part, table below shows the websites that have the highest score in a different factor. Among all websites, WeChat site has obtained the highest score in the overall score.

**Table-6:** Website Grader For 7 Social Media

Social Media	Performance (30)	SEO (30)	Mobile (30)	Security (10)	Overall (100)
Facebook	30	0	20	10	60
Twitter	25	30	20	10	85
YouTube	25	30	20	10	85
Instagram	25	0	30	10	65
WeChat	30	25	30	10	95
Snapchat	19	25	20	5	69
Reddit	14	25	20	10	69

**Table-7:** Evaluation Of Social Media Websites Based On Usability Criteria

Website Analysis Criteria	Social Media Website	Score Points
Performance	<a href="https://www.facebook.com/">https://www.facebook.com/</a> , <a href="https://web.wechat.com/">https://web.wechat.com/</a>	30
SEO	<a href="https://twitter.com/?lang=en">https://twitter.com/?lang=en</a> , <a href="https://www.youtube.com/">https://www.youtube.com/</a>	30
Mobile	<a href="https://www.instagram.com/">https://www.instagram.com/</a> , <a href="https://web.wechat.com/">https://web.wechat.com/</a>	30
Security	<a href="https://www.facebook.com/">https://www.facebook.com/</a> , <a href="https://twitter.com/?lang=en">https://twitter.com/?lang=en</a> , <a href="https://www.youtube.com/">https://www.youtube.com/</a> , <a href="https://www.instagram.com/">https://www.instagram.com/</a> , <a href="https://web.wechat.com/">https://web.wechat.com/</a> , <a href="https://www.reddit.com/">https://www.reddit.com/</a>	10
Overall	<a href="https://web.wechat.com/">https://web.wechat.com/</a>	95

## VI. CONCLUSION

Based on the evaluation usability criteria through three automated tools, WeChat has scored the highest for the Performance, Page Size, Requests, Grade and Mobile. Hence, this WeChat website can be concluded as the best website based on usability. However, for the other website they can improve the parameters which they are lacking.

## ACKNOWLEDGEMENTS

We would like to express our great gratitude to Universiti Teknologi Malaysia (UTM) and for providing the facilities and equipment.

## VII. REFERENCES

- [1] Yashwanth sitamraju, 2018, Why has social media become an Integral part of life?, viewed 30 Oct 2020 <https://www.tutorialspoint.com/why-has-social-media-become-an-integral-part-of-life>
- [2] Anush Gasparyan , 2019, Most important metrics for your website performance, viewed 30 Oct 2020 <https://www.monitis.com/blog/most-important-metrics-for-your-website-performance/>
- [3] Ericsson, 2016, Streaming delays mentally taxing for smartphone users: Ericsson Mobility Report, viewed 30 Oct 2020 <https://www.ericsson.com/en/press-releases/2016/2/streaming-delays-mentally-taxing-for-smartphone-users-ericsson-mobility-report>
- [4] MDN contributors, 2020, What is web performance, viewed 30 Oct 2020 [https://developer.mozilla.org/en-US/docs/Learn/Performance/What\\_is\\_web\\_performance](https://developer.mozilla.org/en-US/docs/Learn/Performance/What_is_web_performance)
- [5] U.S. Department of Health and Human Services, 2018, Evaluation Briefs, viewed 31 Oct 2020 <https://www.cdc.gov/healthyouth/evaluation/pdf/brief14.pdf>
- [6] GTmetrix, 2020, Carbon60, accessed 30 October 2020, <https://gtmetrix.com>
- [7] Pingdom, 2020, SolarWinds Worldwide, accessed 30 October 2020, < <https://tools.pingdom.com/>>
- [8] Website Grader n.d, Google Lighthouse, accessed 30 October 2020, <https://website.grader.com>
- [9] Xianghua, X., Tingting, X. & Yuyu Yin, J. W., 2013. Performance evaluation model of Web servers based on response time. 2013 IEEE Conference Anthology, pp. 1-5.
- [10] Z. B. Babovic, J. Protic, and V. Milutinovic. Web Performance Evaluation for Internet of Things Applications. IEEE Access, 4:6974–6992, 2016.
- [11] John Dille, Rich Friedrich, Tai Jin, Jerome Rolia, Web server performance measurement and modeling techniques, Performance Evaluation, Volume 33, Issue 1, 1998, Pages 5-26.
- [12] Facebook, 2020, Facebook, accessed 30 October 2020, < <https://www.facebook.com/>>
- [13] Twitter, 2020, Twitter Inc, accessed 30 October 2020, < <https://twitter.com/?lang=en>>

- [14] Youtube, 2020, Google LLc, accessed 30 October 2020, < <https://www.youtube.com/>>
- [15] Instagram, 2020, Instagram From Facebook, accessed 30 October 2020,  
< <https://www.instagram.com/>>
- [16] WeChatWeixin, 2020, Tencent Inc, accessed 30 October 2020, < <https://web.wechat.com/>>
- [17] Snapchat, 2020, Snap Inc, accessed 30 October 2020, < <https://www.snapchat.com/>>
- [18] Reddit, 2020, Reddit Inc, accessed 30 October 2020, < <https://www.reddit.com/>>