Guidelines and Assessment Tool for Making Web Text Legible On Full High Definition Display

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Abstract

The degree of legibility of a webpage is also influencing the degree of usability of a webpage. This paper will be focused on a research on what need to be considers to make sure a text displayed on a webpage is legible in terms of colour, font type and size against the background colour on full high definition (Full HD) display. The goal of this research is to come out with guideline on how to choose the best font with the right combination of colour and size to maintain the legibility when viewing on high definition displays. Based on the guideline, a tool will be developed to assist webpage designer to measure the legibility level of their webpage design by using Optical Character Recognition (OCR) technology and the new guideline. To achieve this goal a survey will be done to quantitatively measure the legibility of a combination of a font type, colour and size against the background colour.

Keywords: Legibility; Webpage; Optical Character Recognition (OCR).

1. Introduction

Based on Oxford dictionary [27], legibility is the quality of being clear enough to read, and based on Wikipedia [28], legibility is the degree to which glyphs (individual characters) in text are understandable or recognizable based on appearance. Numerous researches has been done on webpage text legibility to define a set of guidelines that should be follow to design a good quality webpage that is, highly aesthetics, legible and therefore useable. The significance to study in this field is too great. Nielsen, J. [16] and Yan, P. et al. [24] agrees that ultimately, users visit to your website for its content, everything else is just the backdrop. Eye tracking studies done by Nielsen, J. [15] and Ducket, J. [5] have shown that users actually scan webpage for a relevant content. This shows that and supported by Yan, P. et al. study [24], the wordings used and the legibility of the content is effecting greatly on the usability of a webpage. According to an online encyclopaedia, Wikipedia [25], a Full HD display is a display that is capable in viewing 1092x1080 resolutions in progressive scanning mode. Based on the recent research done on the legibility of a webpage, this research have found out that, less of the previous researchers study on the legibility of a webpage on Full HD displays [1-6, 8-11, 13, 14, 17, 20, 22]. This reason has made it significant to study on the legibility factor that influencing the viewing experience when viewing a webpage on the Full HD display. This paper is organised as follows. Section 2 explaining related works done in studying legibility factor on a web page. Section 3 will discuss the methodology used in this research. Section 4 is discussion and the expected result from this research. Finally in section 5 this paper will draw a conclusion about this research and future works.

2. Related Works

Choosing the right colour is very important since it can make a strong impact on the users to decide stay or to stick to the web applications [11]. A research done by Kulkarni, R. et al. [11] did study and analysed a different category of websites. The result reveals that web colour application is significant determinant for web site trust and satisfaction. Chang, P. et al. on their study on chromaticity and luminance on visual performance and subjective performance for imagery on LCD proves that, chromaticity and luminance had little effect on legibility speed but on the subjective preference chromaticity seems to be more important than luminance [4].

Human factor such as eye blink was also studied. Hassan, S. et al. on their study on the effects of illumination, noise and text/background colour on spontaneous eye blink rate (SEBR) proves that the text-background colour combination was significant on the change in spontaneous eye blink rate values. So choosing the right colour is very important not just for the legibility factor but also to avoid users from getting various eye problems [6].

Colour contrast is also influencing the legibility of a website. According to the result based on the study done by Lee, E. and Hyeon-Jeong, S. on their study on The Effect of Colour Contrast between Text and Background on Human Comfort Psychological and Physiological Investigations shows that, the subject felt most comfortable when they were reading text in dark grey (60% grey scale) against a white background [12].

The size of the text did influence greatly on the legibility of a website. Not much research focusing specific in this area since the conclusion is clear and simple. The bigger the size of a text then the more it becomes legible. Bernard, M. et al. in their study

on The Effects of Font Type and Size on the legibility and Reading Time of Online Text by Older Adults shows that, the size of a font used does significantly affect the legibility [2]. Wu, H. [23] on his research on Electronic paper display preferred viewing distance and character size for different age groups showed that, the mean preferred character sized for all age groups is 42.0, 50.0 and 55.2 min arc. Wu also suggest that aged should also be considered when designing a webpage.

Several researchers did study on text legibility on a few types of screens and displays. Humar, I. et al. [8] on their research, on the impacts of colour combination, luminance contrast, colour difference, and polarity on the legibility on CRT displays were studied. Based on their analysis of variance test, colour combinations significantly affected the number of correctly identified characters. The obtained results showed that more than 90-year-old Le Courier legibility table is not appropriate for integrative colour computer displays. Consequently, they propose a new legibility table [8].

Humar, I. et al. [8] and Buchner, A. et al. [3] on their research conclude that, polarity of a text and background colour also influences the legibility. Polarity means here is refers to, whether text or background has the higher luminance. Buchner, A. et al. [3] found out that only on a display that are capable in displaying in high luminance level then only positive polarity have an advantage.

Legibility is also influence by the size of the screen. New innovation and technology on mobile devices has made a mobile device affordable and become popular. Even with this factor, there is still lack of effort in converting a webpage into a mobile version due to many reasons. Paternò, F et al. [17] have emphasized the importance to study on automatically adapting web sites for mobile access through logical descriptions and dynamic analysis of interaction resources. Based on their research, they proposing a general solution that is able to dynamically build logical descriptions of existing desktop web site implementations. This will then later adapt the design to the target mobile device, and generate an implementation that preserves the original communications goals while taking into account the actual resources available in the target device. Adipat, B. et al. [1] on their study on the effects of tree-view based presentation adaptation on mobile web browsing. By based on cognitive fit theory and information foraging theory, they propose a novel hybrid approach to adapting webpage presentation that integrates three types of adaptation techniques, namely tree-view, hierarchical text summarization, and coloured keyword highlighting. The results show that presentation adaptation significantly improves user performance and perception of mobile web browsing. They also discovered that the positive impact of presentation adaptation is moderated by the complexity of an information search task.

Several researchers have explored on the legibility factor to help visually impaired person. It is important to choose a best colour to make our webpage usable to the visually impaired users. Toriano, L. et al. [20] on their research on adapting palettes to colour vision deficiencies by genetic algorithm, they have come out with a solution based on genetic algorithm that assist the user interface (UI) designers by suggesting appropriate variations of colour palettes. Their algorithm went on to search the space of colour palettes aimed to find a colour combination representing a good trade-off between aesthetics and accessibility requirements.

Li, Y. et al. [13] on their study on typeface personality traits and their design characteristics, did found out that Garamond, Centaur, Times New Roman, Arial, Helvetica, Rockwell, and Footlight MT Light are the best font to be used to ensure a highest legibility level. Based on Humar, I. et al. study [8], choosing the right colour for text and the background also influence greatly on legibility. The higher the difference between text and the background colour the more legible the text is [22].

Table 1. Factors influencing the legibility of a webpage

Factors Influencing the legibility of a webpage	Descriptions
Text Size	As the font getting smaller it become less legible. Too large it will become difficult to read.
Colour	The difference between background and text colour must be at a certain value. Combination of colours that are too similar will make it not legible thus difficult to read.
Font Type	By using font type that have characteristic that are too artistic will make it difficult to read.
Screen Size	Size of screen is influencing greatly the legibility. Text that have small font type will look smaller when view on small screen.
Luminance	When the background colour is too bright than text colour. It will make it too challenging to read text on the screen thus not legible.

With the new innovation and advancement in display technologies and with the availability of high-speed networks the display clarity and the size of a webpage is no longer a problem. Table 1, shows summary on factors influencing the legibility based on research done previously. From the table, the author found out that, less researchers focussing on resolution as a factor to be considers when designing webpage. Display screen now days are featured with very high-resolution thus capable to display a very sharp image and with the advancement of the technology this has make this kind of display getting cheaper and affordable. This statement is supported based on a few survey, and the result is, the number of devices that capable viewing a website in Full HD keep on increasing month by month [7, 18, 19]. This has encouraged designer to go freely with their design ideas to make their web page as attractive as possible. However, at the same time this might encourage the web designer to not to follow guidelines. Some web designers might be using themes that can makes reading a text in a webpage a bit challenging. Some designers might be using a background image that is quite similar with the colour of a text. The experiment result from the previous research [1-6, 8-11, 13, 14, 17, 20, 22] and the guideline proposed [21] are using old cathode ray tube (CRT) or not a Full HD display as their experiment setup. This kind of monitor however does have several limitations for research in vision and becoming obsolete [26]. This factor have made it is necessary to re-evaluate current available guidelines and recommendation from the result from the previous research.
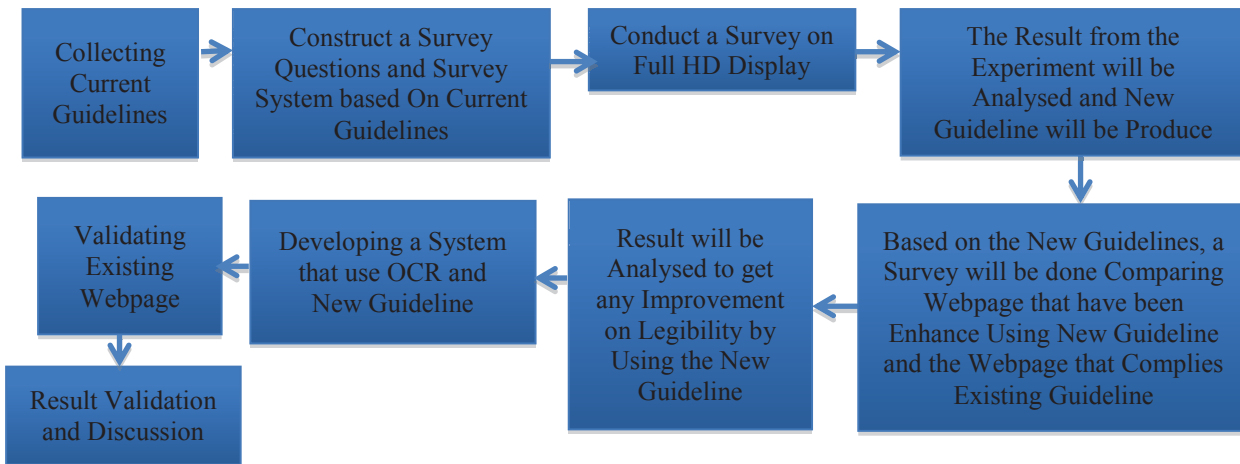
3. Methodologies

Figure 1 : Methodology Process Flow

3.1 Procedure

Figure 1 shows the methodologies this research will follow. This research will start by collecting initial guidelines. The source of the current guideline will be from standard body or international community, result from previous research and others sources. Based on the information collected, a survey question will be constructs. A survey system will be develops to collect data from the survey.

Survey will be then conduct. One of the computer labs in Faculty of Computer Science and Software Engineering (FSKKP), University Malaysia Pahang (UMP) will be setup for this experiment. The requirement for this experiment will be a few sets of computers that have a monitor capable in viewing a Full HD resolution (1092x1080). The computer must have network link so that it is capable to reach the survey system.

The result from the experiment will be analysed and the analysed result will be used to form a new guideline. Another survey will be done to validate the new guideline. Set of questions showing webpage that have been enhance using the new guideline and webpage that complies the existing guideline will be construct. The result from the survey will be analysed to validate the new guideline.

Implementation for this new guideline will be done by developing a system that use OCR technology to scan and determine the font characteristics (type, size and colour) and a new guideline. This system will be used to validate existing webpage. The system will be then give suggestion to improve the existing webpage based on the new guideline. The system will be used to validate the existing webpage and the result will be validate and discuss.

4. Discussions and Expected Result

Based on statistics, Full HD displays is getting popular and affordable [7, 18, 19] and based on the research done previously, the old CRT monitor is getting obsolete and have some limitation when used on research in vision [26]. These a few factors have encouraged author to re-evaluate and research on the legibility of a webpage when viewing on high definition monitor. The

expected result from this research will be the new legibility guideline. The knowledge will then implement on a tools that will be develop that will assist webpage designer to evaluate their webpage design.

5. Conclusions and Future Work

Full HD display provide clearer image but at the same time will make the image smaller and the text on a webpage become illegible due to large number of pixel per inch. This study will try to overcome this problem by re-evaluating the existing guideline. In this research a few variables have been ignore or being set to fixed value. The survey environment has been set to normal computer lab environment. The result coming out from this research is suitable for similar setup such as viewing webpage from an office workstation. Viewing distance and environment lighting is ignoring in this research. This research also does not cover person who has visual problems. This research can be enhancing to include all the ignored parameters. These will sure the new guideline will make legibility on a webpage is not a problem with any condition.

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