A study on progress Indicators: Effect of progress Indicators on web user's bearable waiting time

Abstract

A good website provides feedback on performing actions on it and at the time of delay in the process. Delays are usually caused by internet speed and server response time. For that time duration, progress indicators (a user-interface tool) play an important and useful role to enhance the attractiveness and effectiveness of a website. Mainly, feedback and signs are keys of the excellent and positive user experience and provide the information on what is happening, what happened and what is going to happen in the future. Use of the Good and appropriate type of indicators reduce the chances of abandoning the website and also it keeps user engagement to the process. In the previous literature regarding the effect of visual content on the wait time, has been studied but there is not enough information regarding the relationship between the indicators and user's bearable waiting time on a website. In this experiment, the process is going to analyze the effect of progress indicators on the user's willingness to persist on the website. This paper discusses what type of progress indicators would be effective for the website and it includes a small pilot study with the result of an experiment with types of progress indicators.

Keywords

Progress indicator, Delay, Feedback, Waiting time, Website

Introduction

Displaying progress indicators is a graphically showing technique of how much of a process/task has been completed and when it will be finished. Also, it is not a new thing,

in the past the normal system show progress while copying, deleting, moving files in any operating systems like windows. This feedback mechanism is also very common in web browsing as well. When any website takes more than usual time to respond by user's action, it may seem to the user that the website is working slow and responding late. In order to increase the user's bearable time, the inclusion of the progress indicator can reduce the tendency to leave the website and stay focused with the process and one previous study is there to support this fact. This study indicates that with longer waits, additional visual content that distracts the user from the passage of time makes the wait feel shorter and reduces users' negative effect toward the wait (Hong, Hess, & Hardin, 2013). One another study concentrates on progress indicators as one of the technical factors influencing the response rate of using indicators on the web survey (Couper et al. 2001, Crawford 2001 & Conard 2003). The effect of progress indicators is a very important factor to make the product with rich user experience and don't let go to the user for other websites.

The progress indicators come with many varieties and vary by style, shape, size, speed, therefore, the main purpose of this study is to find the effect of different types of progress indicators on the user's bearable time on websites. To achieve the goal of this study, the mock web pages with the different types (majorly falls in two broad categories i.e. determinate and indeterminate type of progress indicator) of indicators are being tested and after that, I would like to find the relationship between the progress indicators and the user's bearable time.

Bearable Wait Time (BWT)

Bearable Wait time is the time until the user wants to wait for the feedback from the system (Shown in Figure 1). This time depends on the user actions while the user is dealing with the wait on a particular website.

Figure 1: Bearable Wait Time

Progress Indicators and its types

Progress indicators express an unspecified wait time or display the length of a process. There are two types of progress indicators one is determinate and another indeterminate. According to the Google material design (A web design style guide resource) definitions of both major types of progress indicators are as follows

Determinate Progress Indicators: The determinate operations display the indicator increasing in width from 0 to 100% of the track, in sync with the process's progress.

Indeterminate Progress Indicators: The indeterminate operations display the indicator continually growing and shrinking along with the track until the process is complete.

There can be combinations of both the type. Based on the two categories of the progress indicators followings are the progress indicators taken for illustrating the difference between both the types

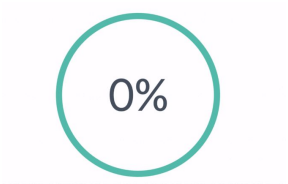
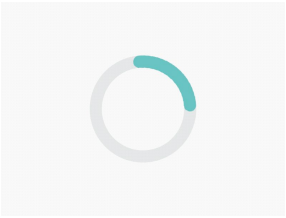
Progress Indicators			
Determinate		Indeterminate	
Linear	Circular	Linear	Circular
			

Figure 2: Types of Progress Indicators

Literature Review & Background

The first studies on progress indicators have been done in HCI literature (Mayer, 1983). This research indicates that user prefers having indicators instead of not having for an operation. Also, one previous studies around the progress indicators in the web context is that the display of progress information can change users' perception of the task difficulty and duration, thus affecting their moment-to-moment decisions to continue or abandon the task (Conard, Couper, Tourangeau & Peytchev, 2010). In another study, it is found that if the task is very long, an indeterminate (constant speed) progress indicator may increase break-offs relative to no feedback because the progress will appear to

accumulate slowly. One could, therefore, make the case for presenting no feedback, intentionally keeping users in the dark about their progress (Conard, Couper, Tourangeau & Peytchev, 2010). But in this research study, I discuss the impact of having different types of progress indicators on the user's BWT and not considering the case of not having progress indicators and presenting the supportive previous research (Mayer, 1985) that strongly recommended to have progress indicators. This study indicates that users prefer progress indicators and presented the result that there are only 6 chances out of 10,000 that the users are not expecting the progress indicators. Also, this study clearly states that, in observation of subject perform the experiment, it was found that when the progress indicator is present, the subjects tend to watch it on the screen since they had no other task to do and without a progress indicator, the subject got bored with screen and looked around the room or at the question or instruction sheet.

Presence of progress indicator affects whether or not user remains on the website and wait till the next web page appears completely. Web users can treat progress indicators to reassess that how much time duration is required for the next web page/step. Supporting this fact, one of the previous studies indicates that providing feedback on task completion is only likely to please users and improve their experience to the extent that the feedback communicates encouraging news such as the task will be brief or is moving quickly (Conard, Couper, Tourangeau & Peytchev, 2010)**.** If a web page is taking more time than expected then determinate progress indicator conveys the state (percentage done of task) of the system and in same case indeterminate one shows the only state of progress i.e. (rotating motion, or animation) to user but in case of determinate progress indicators with showing percentage of task done then it conveys

discouraging news, such as the task will last for a long time or is moving slowly, this may displease users and lower their satisfaction (Conard, Couper, Tourangeau & Peytchev, 2010).

The presumed benefit is that users will be more likely to complete the task if they see they are making progress but it is also possible that feedback indicating slow progress may sometimes discourage users from completing the task (Conard, Couper, Tourangeau & Peytchev, 2010). One of the research findings shows that the effect of progress indicators on drop-off rates varies depending on the speed design. Fast-to-slow indicators reduced drop-off rates (even though the average survey duration was longer than for the other two groups, 22 min vs. 18 min) and slow-to-fast progress indicators increased drop-off rates (Villar, Callegaro & Yang, 2013). Overall, the results suggest that when progress seems to outpace users' expectations, feedback can improve their experience though not necessarily their completion rates; when progress seems to lag behind what users expect, feedback degrades their experience and lowers completion rates. The benefit of progress indicators is that they inform respondents of their progress through the instrument and should motivate them to complete the task.

The effectiveness of displaying progress indicators well explained by the idea "Knowledge is pleasing" in one previous study on the effect of progress indicators on web design survey (Conrad et al., 2010; Crawford, Couper, & Lamias, 2001; Myers, 1985). Also, providing the knowledge about the running progress can encourage users to coupled with the process. The design of progress indicators can’t be avoided and the previous study has classified progress indicators into three categories. First textual, second graphics only, and the third one is the combination of graphic and text

(Kaczmirek, 2009). Different designs of progress indicators can convey different messages or be more or less visible to users (Conrad et al., 2003). Therefore, it is very important to measure the effect of different types of indicators with user bearable wait time factor.

Theoretical Foundation and Hypotheses

The theoretical framework that is going to be used in this study is the Attention-based model (Brown 1997; Casini and Macar 1997; Hicks 1977 & Lejeune 1998). This model suggests that more information should reduce time estimates and taking this illustration with displaying progress indicators while browsing the websites, it should reduce time estimation and the user won't feel long wait time. Also, this model states that there is a cognitive timer which people use to keep track of the passage of time, and nontemporal information distracts the individuals. Hence, I am going to propose the following two hypothesis:

H1: The use of determinate progress indicators can increase the BWT
H2: The use of Indeterminate progress indicators can increase the BWT

Figure 3 shows the research model.

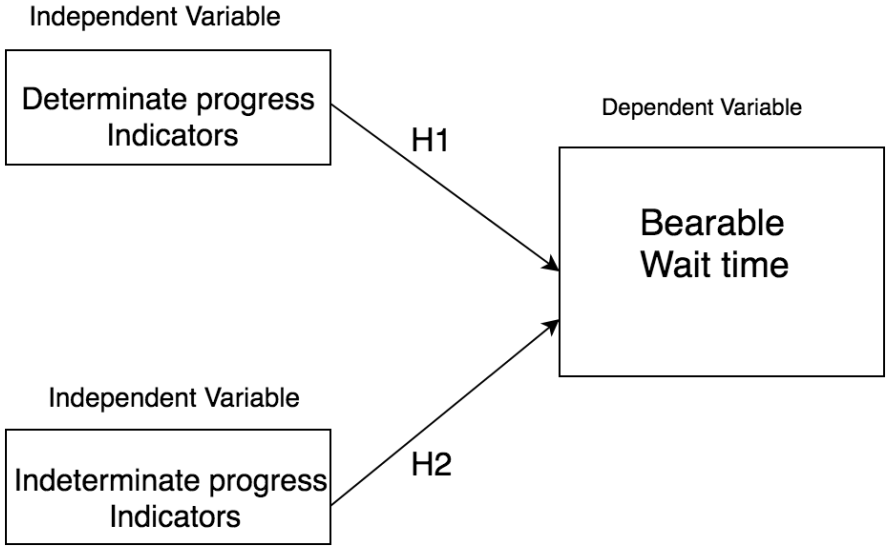


Figure 3: Research Model

Research Methodology and Task

For the experiment, I am going to use 2 * 2 factorial design to evaluate the hypothesis H1 and H2. Hence the experiment has 2 levels of time i.e. long wait time (240 seconds) and infinite wait time and 2 levels of progress indicators (determinate and indeterminate progress indicators)

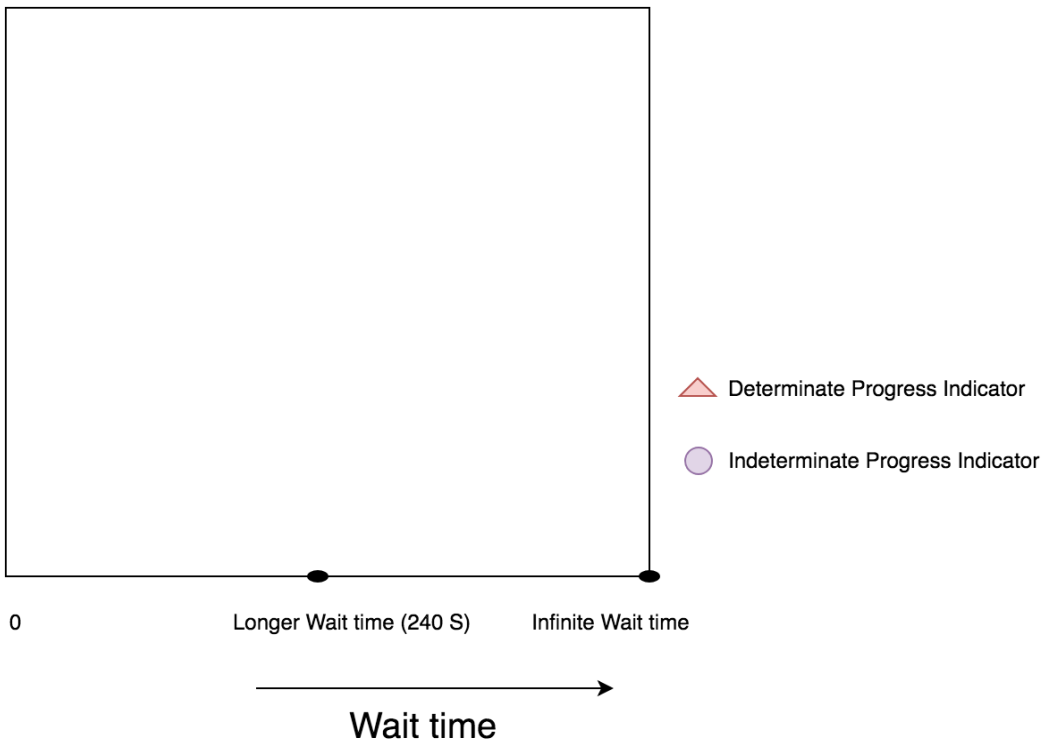


Figure 4: 2 * 2 Factorial Design

In this study, user's BWT was studied in the purposeful browsing. In this experiment, the task, user characteristics (Frequent web users), Web interface(Specifically prepared web designs), specific URL have been controlled. This preliminary experiment was conducted to study the BWT of users. Total 10 subjects of Graduate student have participated in the experiment. In this experiment, the specially designed website links were given to all the

subjects with all the instructions (Figure 5) and a list of questions (Figure 7). All the subjects were provided with the same web page consisting of 10 hyperlinks (Figure 7). Progress indicators are intentionally inserted between the clicking of a hyperlink and the next webpage associated with it. Also, the two broad categories of time, i.e. Long wait time (20 Seconds) and one infinite wait time. Infinite wait time is associated with the broken links and long wait time is associated with the rest of the working condition links. Out of 10, 4 hyperlinks (3rd, 6th, 7th, and 10th hyperlinks) are in broken condition and two (3rd and 7th hyperlinks) were assigned with determinate and another two (6th and 10th) were assigned with indeterminate progress indicators to check the user's BWT with this two types of indicators. The BWT is the time between the hyperlink was clicked and the moment the back button or stop button was clicked. The time data was captured and stored in the CSV file format. After collecting the data, mean of each link is calculated and then the mean of two broad categories has been taken.

Instructions Webpage

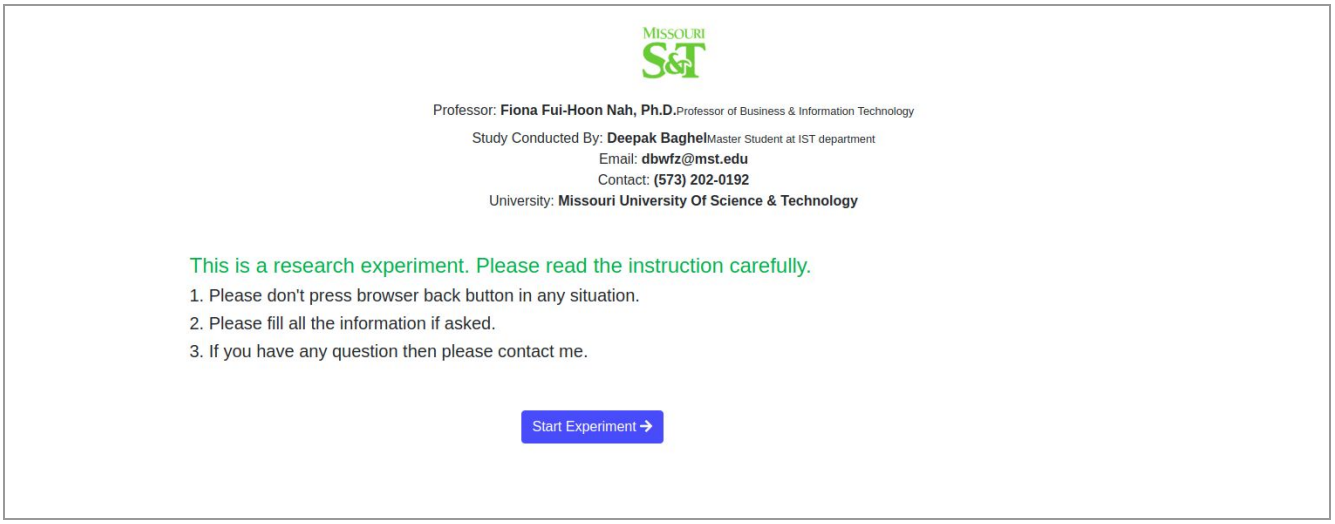


Figure 5: Instruction webpage

Basic Information Webpage

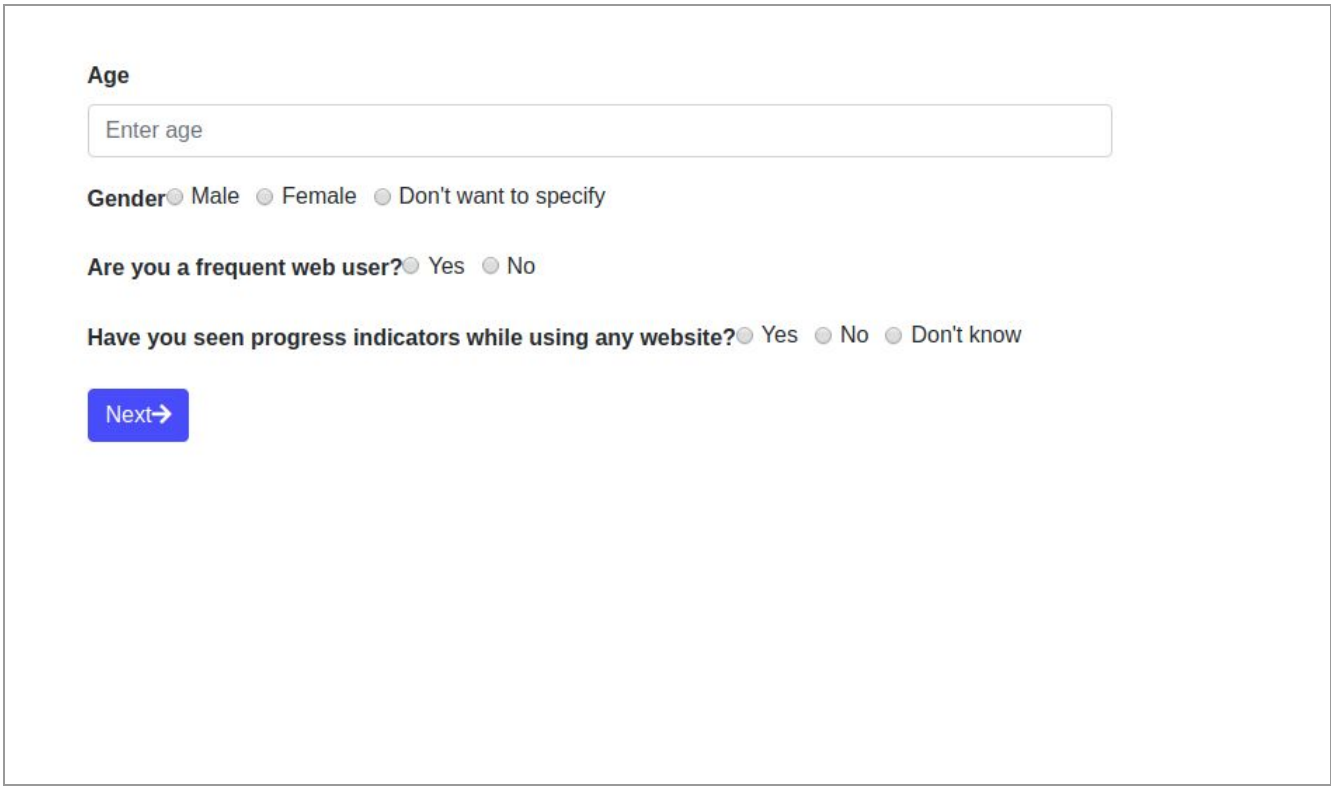


Figure 6: Basic Information webpage

Home Webpage

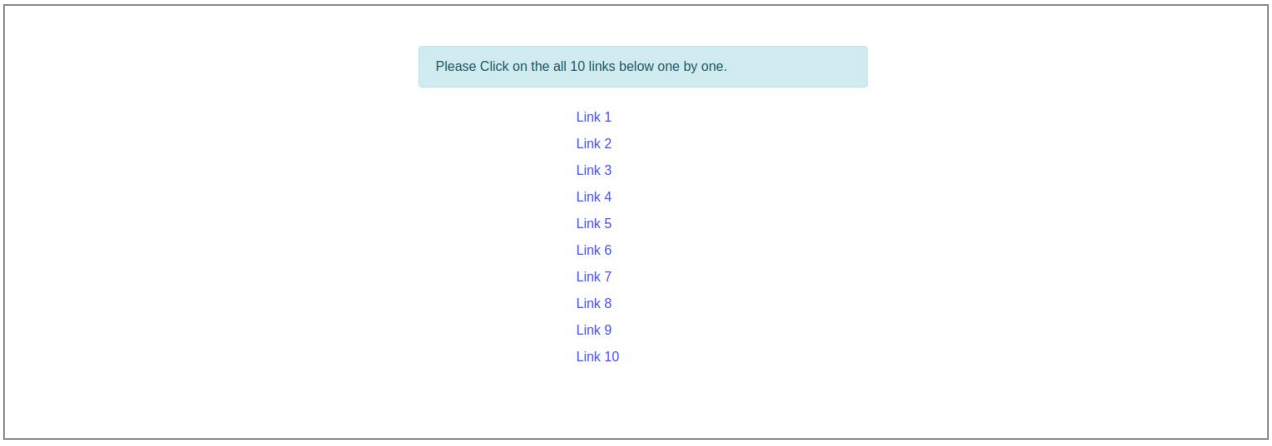


Figure 6: Home webpage

Webpage with Indeterminate Progress Indicator

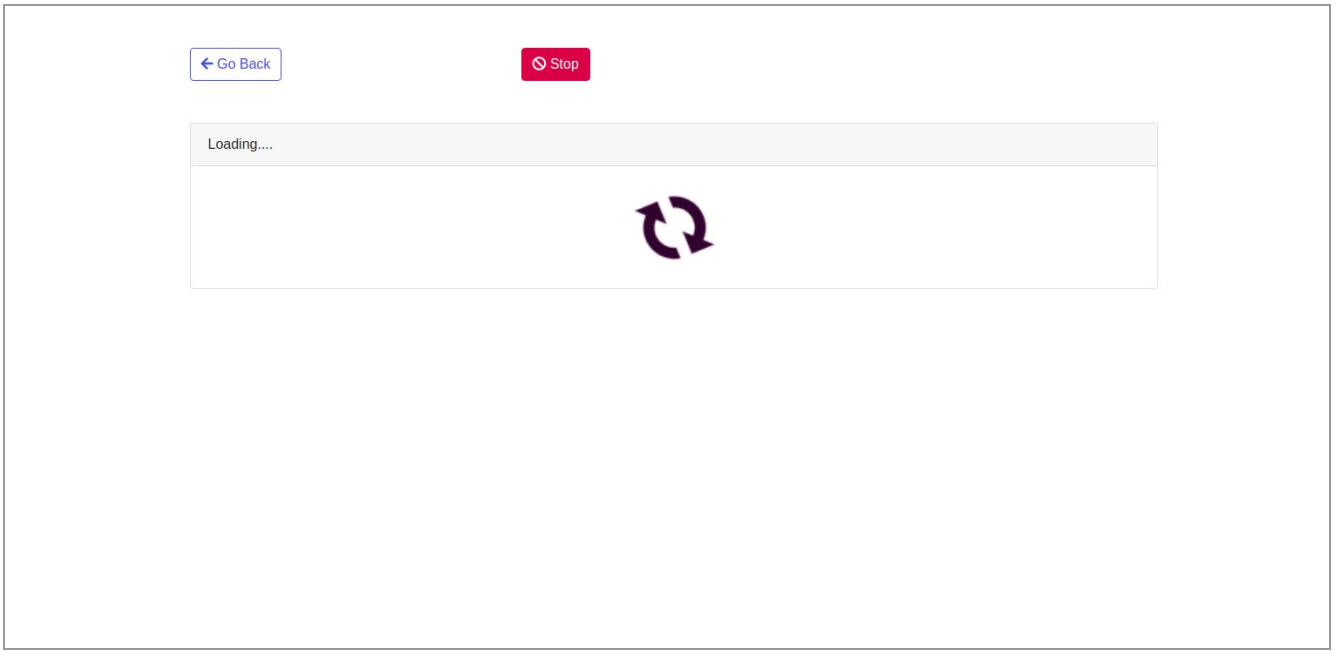


Figure 7: Webpage with Indeterminate Progress Indicator

Webpage with Determinate Progress Indicator

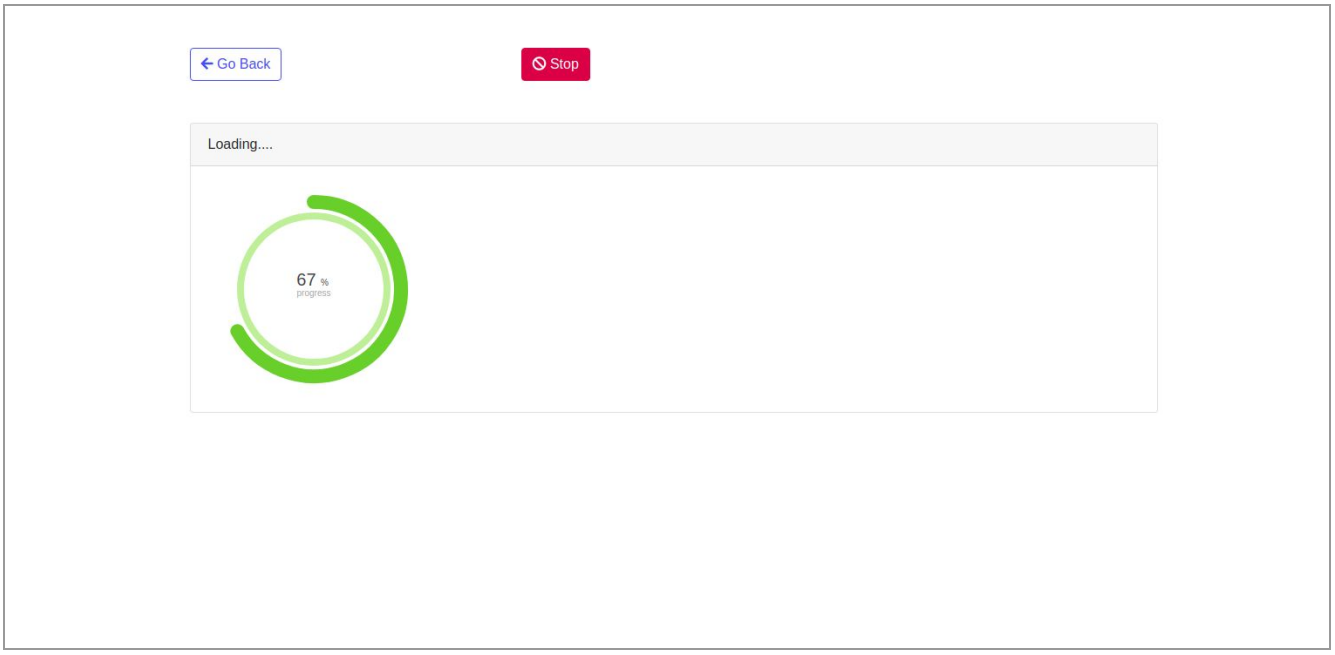


Figure 8: Webpage with Determinate Progress Indicator

Preliminary Research Findings

Statistics on bearable waiting time (With broken links)				
	1st Broken link with DPI Indicator (Link 6th)	2nd Broken link with DPI Indicator (Link 10th)	3rd Broken link with IPI (Link 3rd)	4th Broken link with IPI (Link 7th)
10 Subjects	Mean 11 s	Mean 12 s	Mean 9.9 s	Mean 11.3 s
	Final mean of DPI with non functional link **11.5 s**		Final mean of IPI with non functional link **10.6 s**	

DPI = Determinate Progress Indicators, IPI = Indeterminate Progress Indicators

Table 1: BWT with broken links

Statistics on bearable waiting time (With functional links)						
	1st working link with DPI Indicator (Link 2nd)	2nd working link with DPI Indicator (Link 4th)	3rd Broken link with DPI Indicator (Link 8th)	4th Broken link with IPI Indicator (Link 1st)	4th Broken link with IPI Indicator (Link 5th)	4th Broken link with IPI Indicator (Link 9th)
10 Subjects	Mean 9.9 s	Mean 11.4 s	Mean 12.2 s	Mean 8.4 s	Mean 9.9 s	Mean 8.7 s
	Final mean of DPI with functional link **11.16 s**			Final mean of IPI with functional link **9 s**		

DPI = Determinate Progress Indicators, IPI = Indeterminate Progress Indicators

Table 2: BWT with functional links

From the first table data, it is very clear that mean BWT for determinate progress indicators is 11.5 Seconds and it is less for indeterminate progress indicators i.e. 10.6 seconds. so we can give some predictions that the chance of leaving the website will be less with the use of determinate progress indicators. Also, the second table shows the same type of implications for using the determinate progress indicators and the average time is found to 11.16 seconds while it is less in case of indeterminate progress indicators. In the small experiment, it is found that use of determinate progress indicators will be increasing user bearable time and can save the user’s tendency to leave the website in case of the long wait or broken functionality of any website.

Expected Contributions and Conclusion

To make sure that people don't be getting leave the website while waiting on the website. Offering some distraction with progress indicators can catch a user's attention for a long time to make users ignore long loading times. Progress indicators reduce the uncertainty by giving feedback of working state to the user and increase the chance of stay till all the information is loaded. So it is very important to the web and user interface designer to choose progress indicator wisely. Selection of good indicators can improve the user experience with the web pages.

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