Mobile or Desktop Websites? Website Usage on Multitouch Devices

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ABSTRACT

Mobile Internet is nearly a standard nowadays. Due to former bandwidth, input and screen limitations, website providers often created special versions of their websites for mobile devices. New hardware and interactions techniques like multitouch gestures enable a new way of browsing the original versions of websites. However, companies still spent effort and money in creating secondary versions of their original pages. With the rapid deployment of new mobile devices, the usefulness of mobile versions of websites becomes questionable. To investigate on users expectations, we conducted an online survey with 108 participants about their browsing habits and preferences on mobile devices.
In a follow-up user study with 24 participants. The results of the survey show that more and more people prefer using original content instead of the mobile version, especially for users of new generation mobile devices like the iPhone or Android phones. Those results are supported by the user study, which shows no significant performance increase when comparing both versions – the mobile and desktop one – performing a visual search task.

ACM Classification Keywords

H.5.4 Information Interfaces and Presentation: Hypertext/Hypermedia

Author Keywords

Mobile internet, mobile devices, multitouch

INTRODUCTION

Over the last decades, the web has gained immense importance not only on desktop computers but recently also on mobile devices. With mobile data traffic rising on average 4.7 times in 2008, mobile browsing and hence the importance of websites on mobile devices increases[1].

[1]http://www.reuters.com/article/idUSTRE59Q20O20091027

NordiCHI 2010, October 1620, 2010, Reykjavik, Iceland.

Figure 1. An example how a mobile tailored website (left) could look like compared to the respective desktop style website (right) on an iPhone.

With low bandwidth (i.e. GPRS) and old-fashioned devices (i.e. low-resolution displays), many big companies started creating special mobile versions of their Internet sites. Usually, those sites were adapted in size, design and content to fit on small screens and to require smaller amounts of data to be transmitted. Currently, third generation transmission technologies like UMTS enable mobile phone users to download data at high speed. In terms of bandwidth, the problems of mobile browsing have been more or less overcome. Partially the same is true for device evolution. In contrast to former text-only displays with few lines of text, current devices have increased display size and resolution. Due to new input technologies for mobile devices, the field of mobile browsing is permanently changing. Standard displays are more and more replaced by touch screens that support multi-finger input. With those so-called multitouch displays, users browsing websites can make use of different new gestures to zoom or move page contents. Although device performance is getting closer to what we are used from our desktop computers, many companies still offer mobile websites. The technological development and the evolution that mobile browsing went through during the last decade encourages a new thinking. If the development continues like this, do mobile versions of websites still have their right to exist or are they rendered useless? In this paper, we want to bring this discussion forward by providing results from

an empirical approach. We conducted an online survey with 108 participants as well as a first consecutive user study with 24 participants. Results of both evaluations show that users do still appreciate mobile versions of websites even though they generally like desktop versions much better. However, quantitative results of a visual search task support our discussion when showing that there is no significant performance difference of mobile versus desktop versions when used on a multitouch device.

RELATED WORK

Research in usability of mobile web browsing is as old as mobile web browsing itself. In 1997 one year before the release of the WAP 1.0 specification[2] Bickmore and Shilit [1] already thought of ways for "device-independent access to the World Wide Web". The categorization they set back then is still important today as it describes four general approaches for displaying web content on small screens. Most mobile web browsers offer the alternative between "client-side navigation" – scrolling the content – or "automatic re-authoring" – fitting the page to the screen width whilst distorting its layout. Another approach is the "device-specific authoring" which means that a special version of a web page is created that suits mobile devices better. This idea has been taken a little further as some web page providers not only create special mobile versions of their web page but also a device-specific application running separately on the mobile device without the need of a web browser (e.g. Facebook).

Most of the work presented so far deals with the issue of re-authoring web pages. Lam and Baudisch stated that reformatting websites to fit on smalls screens totally distorts them resulting in the fact that the main information usually is found several screens downwards [2]. When displaying a thumbnail of a web page instead, the user is getting a good overview of the page but is usually unable to read any text. As a solution they proposed a technique called "Summary Thumbnails" rendering the main body of the page as a thumbnail but increasing the font sizes in a way that not all but at least the first part of a text got readable. In 2007, Shrestha compared browsing webpages on both devices – desktop computers and mobile phones – by actually performing tasks with test subjects [5]. Results showed that mobile browsing still was much slower than browsing the same pages on a desktop computer. This study used the online standard versions of a website on both devices. Existing mobile versions of a website were not used. A recent study from Schmiedl et al. examined the mobile web in 2009 [4]. Using different research methods they tried to answer five big questions on mobile phone surfing, one of them being: "Do the mobile optimized versions really have an advantage in comparison with the full version when viewed on a mobile phone?" To answer this question, Schmiedl et al. set up different test tasks on five different websites. One or two test subjects were assigned to the tasks of one specific website. Each site was tested on the mobile device in its normal and its mobile phone specific version. In some cases participants were not able to complete the task [3]. The outcome of this study was that on average mobile website versions were better than the desktop ones.

Research in the area of mobile website usability has been carried out for many years. But as hardware and software of mobile devices changes, the need for new research arises. One thing that is important regarding the development in this sector, is the question whether mobile tailored or converted webpages could eventually get obsolete in the future especially when looking at the new types of touch screen devices capable of recognizing gestures. Our approach now focusses on this issue with a survey and a small user study.

SURVEY

Focus of the survey was on touch screen device users and their knowledge of mobile tailored websites. The survey consisted of two parts. The first part was about mobile device usage and the second part focused on mobile browsing with touch screen devices. Only people which stated they had used a touch screen device in the past answered the second part of the survey. The survey was distributed online using different channels like mailing lists or social networking sites.

Survey Results

108 participants (36 female) completed the survey which was online available for approximately one week. In the following, the results we received regarding each of the four question groups are described. The participants' age ranged from 20 years to 50 years (avg. 26 years). All but one participant owned a mobile phone, on average for about 8.1 years (sd 3.5). On a Likert scale from 1-'never' to 5-'very often' one third never used their phone for mobile Internet access but 25 percent did it 'very often'. 59 percent had already operated a touch screen device. Only those 63 touch screen users were asked to answer the remaining questions. Members of this group owned their mobile devices in average one year longer (9.2 years). More than half of the touch screen users were experienced with the iPhone or the iPod touch (rating their experience either 4 or 5). 57 % of the touch screen users owned a touch device themselves with 19 % owning an iPhone.

People were asked to compare mobile tailored and desktop style web sites. Two screenshots were used to explain the idea of two different versions (see figure 1). When having the choice of using either a mobile tailored version or a normal version 44 percent of the users preferred the mobile version while 30 percent did not care which version they would use and at least 25 percent of the users preferred to use the standard version using their mobile device, too. In case participants had a preferred version they were asked why they did so. People preferring mobile versions mostly stated the better

[2]http://www.wapforum.org/what/technical_1_0.htm

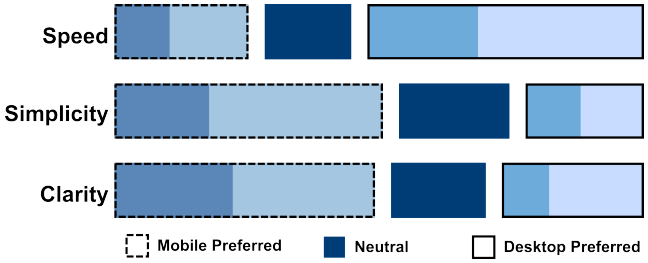

Figure 2. Likert value distribution for website version preference (from 1-'mobile' to 5-'desktop')

readability or the fact that they did not have to zoom in and out using such pages. People preferring the normal version mentioned the recognition value of the desktop version and the fact that the normal website offered more information than the mobile version did. Interestingly both groups had the impression their favorite version would provide better clarity. The 28 participants preferring a mobile version were additionally asked if they would relinquish such a version or whether they would switch to a different website. For four of them, the mobile version was such an important criterion that they would look for another website offering similar content.

Rating speed, simplicity and clarity for mobile vs. desktop version, participants preferred the desktop version for speed. Clarity and simplicity were rated higher for mobile versions. Figure 2 shows the corresponding Likert distributions. In the end participants were shown a small animation explaining the different gestures available for browsing on an iPhone. 98 percent already knew the swiping gesture – used to scroll –, 94 percent knew the pinching gesture – used to zoom in and out – and 84 percent knew the double tap gesture – zooming to a specific region. Regarding the like-ability of those gestures, swiping was liked best with an average of 4.67 (sd 0.54) on the Likert scale (1-'I don't like it'; 5-'I like it very much'). The pinching gesture (sd 1.14) and the double tap gesture (sd 1.16) had both an arithmetic mean of 4.0 in like-ability. Finally we asked how far people agreed to the fact that gestures make mobile browsing easier. In this case the arithmetic mean on a Likert scale from 1-'not at all' to 5-'much easier' was 4.37 (sd 0.94) with 57 percent selecting the highest value of 5. When asking people whether those gestures make it possible to waive mobile versions of Internet sites the results were nearly balanced (see figure 3).
Summarized our findings of this survey show that users of touchscreen devices normally know about the different types of websites that exist, but when asking them which type they prefer and why, they do not agree with each other. Some do like mobile tailored versions better, some like using the original desktop ones.

USER STUDY

To get first insights on how people perform using mobile or desktop websites we additionally conducted a small user study. To measure how users interact with

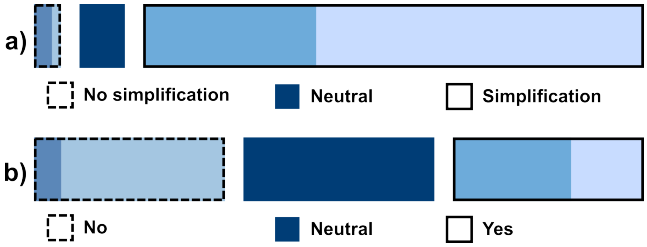

Figure 3. Answer distribution for: a) "In how far do gestures simplify browsing?" (1-'not at all', 5-'very much') and b) "Does using gestures render mobile version obsolete?" (1-'no', 5-'yes')

a website while looking for a specific information, the users had to perform a visual search task. Each participant had to find a keyword in a news article on a fictional news site. Website measures have been derived as an average from some real existing news sites (e.g. bbc.co.uk, nytimes.co.uk, cnn.com) whilst the content itself was chosen to stay the same for both mobile and desktop version.

The article's position on the site and the design of the website changed resulting in four different test conditions: desktop + target inside the first screen, desktop + target outside, mobile + inside and mobile + outside. Two columns with 10 news entries were shown on the desktop website whilst the mobile version had the two columns underneath each other with altered font sizes (see figure 1). To minimize learning effects people knew the complete news article and the keyword beforehand. The four test conditions were counterbalanced leading to a number of 24 tested subjects. We did not use real webpages because this would result in a high number of independent variables. To be able to properly measure quantitative data we chose creating our own website. The study was conducted using an iPod touch with the Safari web browser. People had the possibility to browse an existing news site as long as they wanted and were explained the different possible gestures before starting the actual task.
After reading the target news item and finding the target word they had to perform the tasks under the four different conditions whilst all touches, gestures and actions they did were recorded to compute the exact task completion times. After the users had performed the four conditions they had to fill out a short questionnaire similar to the one previously explained. Our hypothesis was: (H1) *Using the desktop version people will be able to locate the information faster.*

Study Results

The four tasks formed a repeated measure user study with 24 test subjects (14 female) aged from 19 to 30 years ($m = 22.7$). 20 subjects were right handed and four were left handed. All of them owned a mobile device in average for 8.5 years (sd 2.29). Anyhow, only 14 (58 percent) of all participants previously used a touch screen device. 71 percent of the participants thought that they found the contents more quickly using the

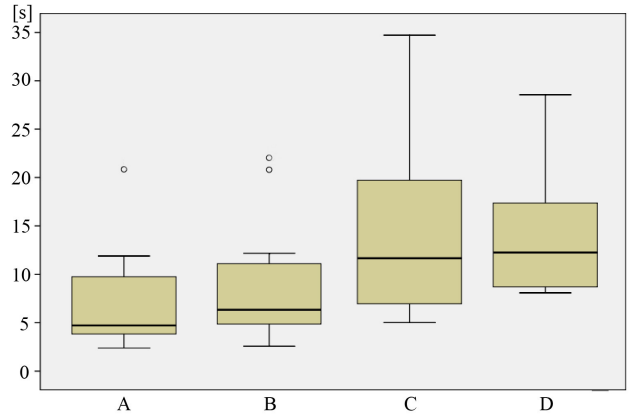

Figure 4. Medians and sd for the different user study tasks displayed as a box plot. A (mobile + target inside), B (desktop + target inside), C (mobile + target outside), D (desktop + target outside)

mobile page. 66 percent of the participants had the impression that the mobile version was easier to use than the desktop one. Asking for clarity the mobile version was preferred by 58 percent of the users. Consecutively we did a statistical analysis of the execution times derived from the user study. All data – except for the condition mobile + target inside – is normally distributed. Median and sd for all cases are depicted in figure 4. A two-way repeated measures ANOVA was applied to the data. There was no significant main effect for the independent variable design ($F_{1,17} = .72; p > .4$) so hypothesis 1 has to be rejected. Instead visibility showed high significance ($F_{1,17} = 20.9; p < .001$). No significant interaction effect for $design \times visibility$ could be found ($F_{1,17} = .18; p > .6$). Consequently only visibility had a verifiable effect on the results.

The survey showed that users tended to advocate for either one of the designs giving some plausible arguments for their preferred version. 'Clarity' for example was claimed by both groups as an advantage of their chosen design. We argue that those subjective opinions do not hold against actual usage performance on multitouch devices. There are mainly three observations of our studies that support this assumption. A visual search task on an iPod touch did not show any advantage (regarding speed) for mobile websites. Most participants of the survey agreed that in their opinion, gestures highly simplify the browsing task on mobile devices. And finally (and more importantly), 45% of participants of the user study did not realize that they were interacting with two different versions of the news website, which have been designed based on the main news websites of nowadays Internet (see figure 1).

The user study and its results can only give a first insight on users' behavior. Several limitations like the small number of participants and the fact we used one non-existing website reduces applicability of the results. Multitouch events, interactive content and other things definitely need to be taken into account before general conclusions on this topic can be drawn. The results gathered so far do not allow to finally pronounce mobile website versions dead nor do users see those versions as a must. In this light, the momentary trend to offer different websites for different kinds of devices (even different mobile versions) seems debatable. With new device sizes coming up every day (i.e. tablet computers) the possible number of different web site versions will have to be limited in the future.

CONCLUSIONS AND FUTURE WORK

The mobile device market is changing quickly. Together with these devices, the users' habits change, too. With our survey and the user study we tried to get an insight of the impact of new touch screen phones on current Internet browsing habits. Are mobile tailored versions still important? The findings of the survey show that people start to like using standard websites whereas still some appreciate the extra effort put in creating mobile versions of websites. Looking at our user study in terms of finding information fast, we cannot attest an advantage to mobile tailored websites but neither for desktop versions.
While in other work (e.g. [4]), authors argue that mobile websites are still important and highly appreciated by users, we take a different point of view. Users expectations were mostly formed in a time when mobile Internet was a painful, expensive and hardly joyful experience. However, those times have changed. From a technical point of view there is no need anymore to limit user experience this way. With a broader range of device screen resolutions ranging from full HD over netbook resolutions down to mobile phones, something should be done to be able to properly display web content on all different screens. To identify future trends similar studies should be conducted and should be compared with the results gained here.

REFERENCES

1. T. Bickmore and B. Schilit. Digestor: device-independent access to the world wide web. *Computer Networks and ISDN Systems*, 29(8-13), 1997.

2. H. Lam and P. Baudisch. Summary thumbnails: readable overviews for small screen web browsers. In *Proc. of SIGCHI*, New York, NY, USA, 2005. ACM.

3. G. Schmiedl, J. Baumert, M. Seidl, C. Dobiasch, R. Religa, J. Eder, Johannes ans Jaworski, C. Winkler, C. Graf, C. I. Freudenthaler, P. Salmutter, N. Hellenpart, and M. Gunacker. Verwendbarkeit und verwendung des mobilen webs, 2009.

4. G. Schmiedl, M. Seidl, and K. Temper. Mobile phone web browsing: a study on usage and usability of the mobile web, 2009.

5. S. Shrestha. Mobile web browsing: usability study. In *Proc. of Mobility*, New York, NY, USA, 2007. ACM.