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An investigation into the problems of user oriented interfaces in mobile applications

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Abstract— The purpose of this paper is the analysis and evaluation of the mobile interface design. This study consisted of a random sample of 55 user interfaces for mobile applications. In addition, the restriction of all the components of the user interface quantified. An analysis was conducted of these interfaces, in order to represent graphically. Then, evaluated and produced the following results: First, the smaller number of pages in the application is better. Second, decreasing the navigation bars, buttons and menus in user interfaces for mobile applications gives additional space on the screen, making the application easy to use and maintaining the context. Third, diversity, the use of tools ensures good interaction with the user. Finally, a range of results for the design of the user interface and some ideas are provided about what should be taken of these results in mind when designing interfaces for mobile applications.

Keywords-User interface, mobile application

I INTRODUCTION

Mobile phones have grown to be overwhelmingly popular within today's modern society. Rising sales involving mobiles for that reason, has turned into an important goal for several corporations[1]. A lot of people have more than one mobile appliance such as smart phone, tablet and PDA [2]. The recent changes in the environment are to learn an important requirement in the event. Mobile phones have become popular in the community, many people can tolerate the cost[3].

However, a wireless network and computer network technologies has been developed, learn from face-to-face, distance learning, development evolved and mobile learning. Therefore, mobile learning is unparalleled in that it provides real and personalized learning everywhere, at any time, and so provides teachers and students a chance to get through the simple operation of any and all class materials on their mobile devices[4]. The particular raising quantity in addition to increasing functionality of such gadgets has generated pattern problems because of the modest sizing, insufficient one on one selection potential, in addition to moderate pattern standardization[5]. On the other hand, conventional user interface knowing is not adequate to develop efficient interfaces for cell phone applications, because the mobility context presents developers with many new challenges and peculiarities. [6]. Even so, quite a few usability complications have been earned by the multi-functionality regarding mobile phones.

There was an important raise for the UI usability and design. While using advantages regarding many different varieties and keypads inside cell phones, this user's need to have regarding controllability, grip-stability, and usability have been lifted from the user interface aspect[7]. User interfaces are still suffering of some problems including:

- Lack of making use of screen space.
- Small keyboard buttons result in errors when the user enters data.
- Congestion data reduces user interaction.
- Some user interfaces with an intricate design, making it lose its appeal to users.
- Lack of use voice and video in most applications.
- The problems introduced inside the habits collection will try to cover both the most common problems when making mobile UIs nowadays, as well as long term challenges similar to multi-modal (including utilization of gestures) in addition to contextual as well as adaptive UIs[8, 9].

This article aims to analyse the mobile phone interface design and evaluation. It debates many significant design problems, and describes emerging technologies to promote the effective design and development methods and user-friendly interface for mobile applications appear. Authors collected a random sample of 55 mobile user interface applications for analysis and evaluation.

II RELATED WORK

Nilsson structured that user interface design is proposed models of a collection of mobile applications. Also proposed the models collection of solutions to a number of problems may arise when design such solutions[8]. Bertelsen and Nielsen stated that defies phone models and user interface, classification and augmented reality interface technology used as a "thinking tool", the development of ideas and interaction for mobile devices[10]. Gong and Tarasewich argued that features and limitations of the current mobile apparatus interfaces, particularly as contrasted to a desktop environment[11].

Park et al suggested that specified proceedings and methods to assist manner directory the development of mobile phone user interface guidelines[12]. Jin and Ji proposed that availability of methods of risk assessment and the physical user interface used in this study can help designers identify and evaluate design features and physical user interface of critical materials[7]. Uzunboylu et al stated that the use of mobile technology and multimedia information systems combine and data

services, to raise the development of environmentally and mobile technology conscious[13]. Park et al Investigated two pilot studies to improve the emotional connection to our understanding of the movement of the reaction, the quality aspects of the mobile user interface touch screens[14].

Browne and Anand evaluated that three user interface used to play an iPod Touch scrolling shooter video game has been an experimental test of efficiency and capability to enjoy[15]. Morris and Tomlinson stated that the development of A graphical user interface, which is to improve the working mobile phones, other portable devices and personal digital assistants[5]. Liarokapis and Conradi discovered that portable navigation effective in the urban environment and find the path, when explore the possibility of using the user interface lightweight[16]. Lumsden and Global stated that focus on the different methods of user interface adaptation of equipment, with particular attention to enable architectures to adapt to the user's predilections and the environments[17]. Huber et al proposed that the use of the design space for mobile video browsing broaden horizons[18]. Motiwalla evaluated the fusion distance learning or traditional classroom environments of mobile technology[19]. Huang et al studied that provides Mobile Plant Learning System (MPLS) for teachers avenues and means to promote student learning cycle in botany at the primary level[20].

III RESULTS AND ANALYSIS

In this paper, these were collected a random sample consisting of 55 interfaces and mobile applications, where it was limited to the components of each user interface separately quantified. In addition, values were sorted on the basis of how much application use this tool from the sample as a whole. On the other hand, the calculated percentage looks like this: the number of applications that have used this tool divided by the total number of samples multiplied by 100. Accordingly, it has been the representation of these results in graphical forms for the purpose of analysis and evaluation.

Figure 1 displays the classification model components and user interface, which has been divided into three main parts: first, Process Control includes navigation bar, buttons, menu and toll bar. Secondly, contents included page, table, chart and text box. Thirdly, vision included text view, image view and video view.

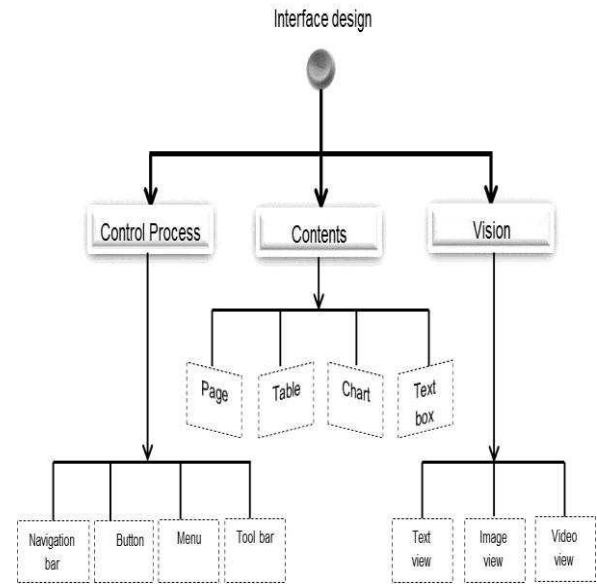


Fig 1. Model of user interface design[21]

$$\sum_{1}^n I[P \subseteq, C \subseteq, V \subseteq]$$

$P \subseteq \{p_1 \dots p_n\}, C \subseteq \{c_1 \dots c_n\}, V \subseteq \{v_1 \dots v_n\}$

I: interface, P: process, C: contents, V: vision

Navigation bar: varies from one application to another and according to the nature of the application and thinking designer. Sample reveals that 11 interfaces are not included navigation bar on their pages like Gigabyte's GSmart[22] and there are others in most of its pages, such as Smart pay[23].

Button: it seems clear from sample that one application does not contain buttons is TriplAgent [54], and another application that contains the largest number of buttons is Camera Genius 4.2[24] containing 63 buttons. For all other applications, the number of buttons was anisotropic due to the different purposes of these applications, such as Email.me.it[25] contains 4 buttons, TrustGo[26] contains 18 buttons, Viber[27] contains 30 buttons.

Menu: sample illustrates that 19 of the applications are not containing lists such as Smart pay, Samsung and SelfieCam[23, 28, 29]. This means that the multiplication of the menus within one application makes it complex and difficult to use and it becomes unattractive to the user. On the other hand, some applications contain 9 lists such as FlatPlayer[30], this shows that the application contains many options. In addition, the high number of menus in the application makes the user lose context so that it does not interact well with him.

Tool bar: sample displays that 19 of the applications only used this tool, as it gives more flexibility to the user and reduces congestion buttons on the page. In addition, enables the user access to plug-ins for the application.

Page: the sample shows that all interfaces contain at least one page like Dribbble shot[31] and a maximum of 12 pages such as Idökép[32]. This does not mean that

the application specified a certain number of pages, which determines the number of pages is the type of application and coverage of all the aspects that set-up for it, taking into account ease of use and clarity. But the smaller number of pages creates a better user interface and enables the user to maintain context and interaction with the application.

Table: the sample reveals that the tables are almost non-existent in most applications, 3 applications only contain tables of 55 applications such Email.me.it, Smart pay and MIX[23, 25, 33]. This explains that most of the applications in this sample do not use tables to display data from the data source (database), but use other tools such as a text box.

Chart: note from the sample that 13 of the applications of the total sample used charts such as Tide, Reportly, Analytics and statistics[34-36]. Limited use of graphs of statistical data and represent it graphically.

Text box: this tool was used in 14 of the applications that you need to enter data, view or using a user name and password it also describes the sample, such as Email.me.it, Smart pay and Messenger[23, 25, 37].

Text view: the sample offers that the majority of applications contain a text view and some of them reached 17 like Viber, Quartier Senegalais and Taxt[27, 38, 39]. In addition, 8 applications are not contain text view such as Dribbble shot, FlatPlayer and Samsung[28, 30, 31]. Usefulness of text view displayed some of the details of the task or function illustrates a specific tool.

Image view: the sample shows that 20 of the applications did not use the image view because these applications display information, numbers or graphs. However, the rest of the other applications exposed images either as a means to illustrate, for the announcement or advertising applications such as cafe, restaurant or any other product like The porter beer bar, BurgerQuest[40, 41]. In addition, used widely in applications of image editor such as Camera Genius 4.2[24].

Video view: this tool is used with applications that display TV channels and video clips or sports applications, it also showed the sample that four applications only, use this tool of the total sample: a Discovery Channel, FlatPlayer, citizen.tv and Liga Moche[30, 42-44].

Figure 2 shows the number of pages used in applications. A closer look at the data reveals that applications using three pages had the highest percentage of approximately 22 per cent. In addition, followed by applications using a one-page reached 16%, and four pages of 14.5%. On the other hand, were lower rates for applications that used the 5,6, 8, 9, 10, 11 and 12 pages ranged between 2% and 5.5%. However, there were applications used two pages about 11%, while almost 9% of the applications used 7 pages.

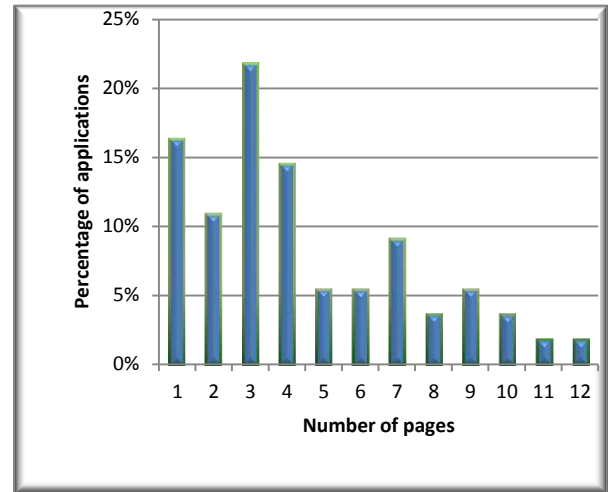


Fig 2. The number of pages for applications

Figure 3 illustrates the percentage of the number of times using the navigation bar in applications. The highest percentage was for applications that do not use navigation bar reached 20%, the second-highest percentage of applications that are used navigation bar once or twice reached 16%. 14% of the applications used navigation bar four times, and 13% used it three times. Some applications used five times by 5%. 4% for each of the applications are used 7,8 and 11 times, while the ratio is at least 2% of the applications that are used 6 and 9 times.

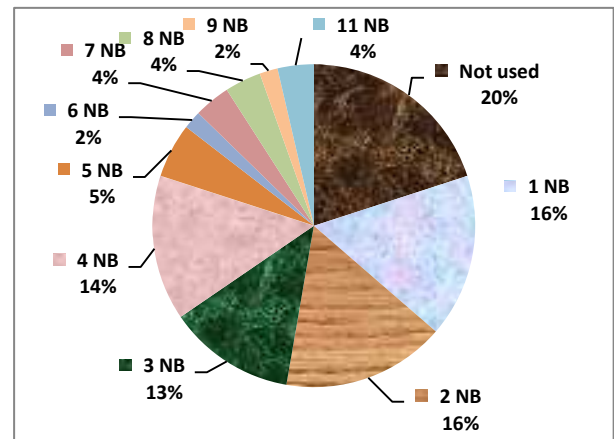


Fig 3. Percentage to use the navigation bar in applications

From Figure 4 that the values of the buttons of varying and capricious, and starts from only one application does not contain any button such TriplAgent[45], while another application has the highest value of the buttons and reached the 63 buttons such as Camera Genius 4.2[24]. Also note that most of the applications contained 2-21 buttons like Tidean and Half Centric[34, 46]. At the same time, eight applications included 22-37 buttons such as Free Ringtones and Liga Moche[44, 47].

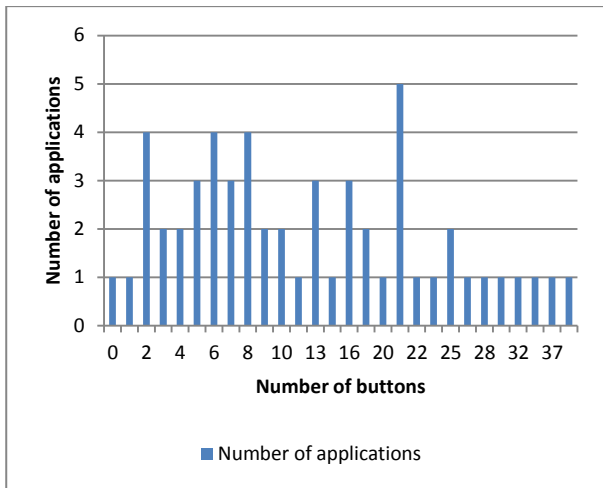


Fig 4 Number of buttons for applications

The graph provided reveals the percentage to use menus in UI for mobile applications [Fig 5]. It is noted that most of the user interfaces for mobile applications do not use menus by 34%, while 27% reached for user interfaces using a single list. Followed by applications that use three menus of 13%. On the other hand, there are a small percentage of applications that use a large number of menus, where it was 9% of the applications used four lists and 4% used five menus, while the rest of the applications that used 6, 7 and 9 menus were 2%.

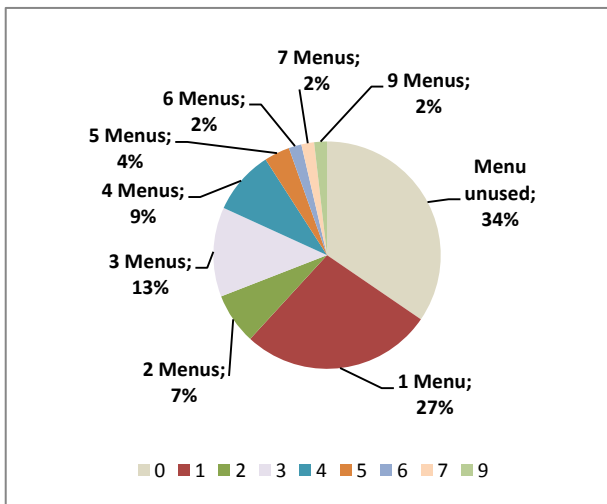


Fig 5. The Percentage to use menus in applications

A glance at the graph provided reveals the percentage to use some tools in UI for mobile applications [Fig 6]. Most applications have used the text view tool where the largest percentage about 85.5%, followed the image view tool almost 64%. On the other hand, a smaller percentage of the table tool was 5.5%, followed by a video view tool 7%. The applications used a chart tool were modestly compared with the rest of the tools almost 24%, and 27% of the text box tool. 35% of the applications have used the toolbar tool.

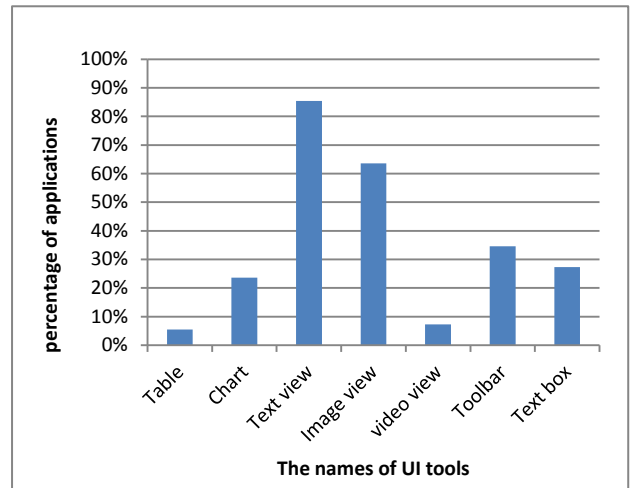


Fig6. Percentage to use tools in applications

IV APPLICATIONS EVALUATION

In figure 2 the most user interfaces for mobile applications consists of one page to four pages. This means that the lower the number of pages the more it increased user interaction and affinity and achieve the desired goal of the application such as Samsung Smart Home and Smart pay[28, 48], because enjoy clarity and ease of use and distribution tools are well on the small screen. On the other hand, there are some user interfaces contained 12 pages, this number of pages cause fatigue to the user and make him lose his focus as well as within the context of these applications are Camera Genius 4.2, Yummly and FlatPlayer[24, 30, 49].

The largest proportion of applications that are not using the navigation bar, and this is because of either a user interface for the application of a single page or to refer to the page will be via a button, and this is usually in applications with a small number of pages, such as Racks by the Tracks, Trivia and Simple life[50-52]. In addition, applications that used the navigation bar one, two, three or four such Kuliahmu, Email.me.it, Mail and Free Ringtones [25, 47, 53, 54]. However, the navigation bar in the majority of applications that have a large number of pages. Number of navigation bars depends on the type of application and is designed to think in order to achieve the goal [Fig3].

It seems clear from Figure 4 that most of the applications contained 2 to 21 buttons like Tidean and Half Centric[34, 46]. Meanwhile, some of the applications contained 22 to 63 buttons such Free Ringtones and Camera Genius 4.2[24, 47], the number of buttons is too large and leads to a lack of access to the entire area of the screen. In addition, makes the user lose context. Therefore, the smaller number of buttons in the application provides extra space on the screen and ensuring the user interaction with the application.

From Figure 5 concludes that most applications are not used as menus in applications or a maximum one list such as Messenger, Reportly and Graph[35, 37, 55]. Increase the number of menus in applications confuse the user and does not interact with the application as

well lose context like Half Centric, Free Ringtones and FlatPlayer[30, 46, 47]. In addition, the reduction of the menus makes the application simple and easy to use to attract the user.

Although the programming languages provided many of the tools, it was not taken fully exploited. From Figure 6 illustrates that tools used is text view and image view in most applications, that means applications which use these tools, such as MIX, The Porter Beer Bar, Tide and Ideabox[33, 34, 40, 56] are static. However, the authors note the use a few of the table and video view tools. In addition, when used to make a dynamic application this leads to attract the user because the information is always renewed these applications are Smart pay, citizen.tv, Email.me.it[25, 43, 48].

The user interface have to be easy to use from the first interactive user. Functionality to the user must be limited to what the user needs to reach its destination. When they interact with the user interface a matter of expectations should happen.

V CONCLUSION

In this article, researchers provide a random sample of user interfaces for mobile applications. Giving an overview of the user interface should be designed for mobile applications, and the problem to be solved to some extent. In addition, the designer should take full advantage of the screen and ensure buttons are placed in a harmonic situation on the screen displays important information only on the surface, and avoid details. Researchers are analysed user interfaces to represent graphically. Then, evaluate the results, which were the most important, the results were as:

- The best applications, which included a one-page to four pages.
- The less use the navigation bar in interfaces provide extra space to exploit due to the small size of the screen.
- The number of buttons whenever less on a single page gives more space to display the information and become more attractive user interface and check a better user interaction.
- Minimizing the menus in applications makes the application easy to use and helps to attract and user interaction, and stays within the context of the application.
- Diversity in the use of tools and good distribution to maintain most important factors to ensure the user interaction with the application.

Finally, designers should be taken of these results in mind when designing interfaces for mobile applications, so as to make the user interface is simple and easy to use, with a nice view to attract the user interacts with it.

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