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Software Usability for Different Age Groups

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ABSTRACT

The writers of software are the people who have sound knowledge about all the technicalities that take place behind the scene. But these people are not the sole users of software. In this modern era of scientific evolution, the usage of software in day to day life is inevitable. The scientists have been working for ages to make human lives better and the creation of smart software has boosted this advancement to a great extent. Majority of the world population has access to some sort of software that they use irrespective of their age and gender. However, the real question is, as the rate of software usage is increasing rapidly, are there any effort being made to simplify the way user should interact with software? In this paper we propose a guideline for developing age-neutral software interfaces. For the sake of limiting the scope of this study we will only consider software systems that we use in our personal devices such as desktops, laptops, tablets, cell Phones, notepads, and kindles etc.

Keywords: Software usability, Generalized usage of software, Age-neutral software

INTRODUCTION

Usage of personal computers and/or smart devices is very prominent these days. These devices come with various kinds of software that have different purposes. The users of these devices mainly deal with 'Application' and 'Utility' software. Once upon a time, usages of computation devices were limited among scientific community. Software was only used for scientific computation and official purposes. After the introduction of personal computers in the 70s, mass people realized how important it is to have device that server numerous purposes. The users who have technical backgrounds do not take time to master the usage of software. But on the other hand, mass peoples' ability to grasp the know-how of software is still inadequate. The reason for this is the trend of developing software has mostly targeted the technical community or a certain group of users. If it is not, even then it is somehow influenced by it. This tendency makes it very hard for novice users of software, especially users with certain limitations. In this paper, we are mostly going to talk about how we can develop age-neutral software which will be user friendly to people without technical background.

'Software usability', a well-defined term in the field of software engineering, mainly refers to the ease of use. Software usability denotes the quality of software that puts user to the front. To provide maximum usability to the users the design is done keeping users comfort in mind. It is the degree to

achieve several quantifiable objectives e.g. effectiveness and efficiency of the software. It cannot be compared with other software qualities such as utility and likeability, because software can have a lot of utility and may be likeable by many, but its true performance lies within its usability (Microsoft, 2000).

Software is designed keeping the user in the center. But when we are saying that software is usable, how are we actually measuring the usability? There is a certain type of test called 'Usability Testing' that exists but that do not involve people from different age-groups so we cannot say that the software is 'usable' for mass people.

There exist several platforms where the software is run on. So, when developing software the developers already have to put extra effort to compile several version of the same software to make it available for several platforms. If the type of software is generic then the developers also have to make sure people from several age groups are able to use its functionality properly. In this way, no extra effort is needed to introduce extra age –specific features. This saves a lot of time and cost. This style can be further adopted to provide better software to the end users. This will also help to expand the number of users for a specific application. And the popularity and business also grow with the increasing number of users.

RELATED WORK

Software Usability Analysis

Software usability plays a crucial role while we are considering the acceptance of software to its users. Vast research work has already been done that define several parameters for measuring software usability. Some of the prominent methods for evaluation are logged data, questionnaire, interview, and verbal protocol analysis (Henderson et al., 1995).

Henderson et al. (Henderson et al., 1995) performed a study on three groups of people (elderly, children and disabled) and found out that all of the users required some common attention to increase usability of that software. Numerous researches have also been done on how users interact with the system by means of input devices. Chung et al. (Chung et al., 2010) shows the error rate and ease of use of using two versions of ATM machines, one having a touch screen input panel and another having a traditional keystroke by two group of users (older and younger).

Researchers have proposed an index (Lin et al., 1997) for performing relative comparison of usability among different software systems. This index includes several methods namely laboratory testing, thinking aloud, formal modelling, Guidelines/checklists, Heuristic evaluation and deduced the following criteria that need to be satisfied to have usable interaction with users.

- Compatibility: With user expectation
- Consistency: of displayed components
- Flexibility: customization allowed?
- Learnability: Logical ordering of menu options
- Minimal action: For task completion
- Minimal memory load: For technical knowledge

- Perceptual limitation: Takes care of exceptional case
- User guidance: Provide help and support

A dedicated research laboratory at Wichita State University) named 'Software Usability Research Laboratory (SURL)' has been providing several insights on how several aspects of software affect its usability and how it can be improved. One of their studies shows that it is possible to select certain font and size which is appealing to people from all age groups (Bernard et al. 2002). Another study brought out pretty interesting points. Users from two age groups were selected for a study, one from college students (19-27 years) and another one from elderly users (64-87 years). They were told to perform some task on two different webpages, one having more graphical interface another having more text–based interfaces, even though the task-completion time were more for the elderly people, the accuracy of the task wasn't perfect for the young group of people. This demonstrates that there are room for improvement on the both sides (Groff et al., 1999).

Another study by the same lab involved elementary school students aging from 6 – 12 years. The study showed that just because these users are under aged it does not mean that having a lot of images and animation will help them understand the interface better, rather these confused them. So did too many tabs and options in the interface (Naidu, 2005). Certain type of layout in software interface, for example, text spacing and line length of an article can affect users over all age groups.

System Usability Scale (SUS) is a parameter measured during development cycle to gather usability ratings from users. SUS contains 10 questions each having five response options for the people responding (options ranging from strongly agree to strongly disagree. This scale has been proven to be a highly robust tool for usability measurement (Kurosu, 2015). It is a very simple to that can provide reliable results even with smaller sample size responses.

Specific Usability Studies for Older People

A complete research related to age-specific software usage issues has been done by S. Wirtz et al. (Wirtz et al., 2009). In their research, they brought out all the age related factors that play a role in the performance of older people with software. They also considered a vast set of user interface components to analyse the level of interaction and effect older people (> +55 years of age) have with them.

Gregor et al. (Gregor et al., 2002) propose a dynamically diversified design paradigm to adopt needs for older people. A large portion of older people are the users of mobile devices. There are some age specific issues involved while using application in a cell phone. The well-known icons of a mobile application may not appear obvious to elderly people (> +65), in which case these icons need to be more generalized (Leung et al., 2011).

Elderly people spend majority of their time browsing on the internet. There has been numerous research works related to the usage of web pages by elderly people. Considering their limited vision and cognitive skills, several design principles have been proposed by Smith et al. (Smith, 2008) and Kurniawan et al. (Kurniawan and Zaphiris, 2005).

Specific Usability Studies for Younger People

The usage of software among children has been seen mostly from an educational perspective. In this case, the software usability mostly depend on how much learning a child is getting from using that software. This measurement also takes into account how computer-assisted methods are helping children to learn (MacFarlane et al., 2005) (Sim et al., 2006).

Children having the age range from 6 to 10 years are not very expressive about their views on certain software. To get reliable feedback from these young users, a think-aloud method is used so that we know how they are responding to the system. Post-usage interview also helps us understand was the software usable to them or not (Baauw and Markopoulous, 2004).

PROPOSED IDEA

The idea we are presenting here is to develop software in such a way that it can be 'Age-neutral'. This age-neutralism can be achieved by introducing several components to the core unit of a software model which will make it age-neutral. Software does not always have to be a single component. The idea is not about how the younger/older people interact with the existing system, it is about how we can change the way existing systems are built to make it more usable to the mass people.

Motivation

Existing research revolves around adding additional features to customize software to certain age groups. There exists no idea of generalizing the way software is written without targeting a certain age-groups. Taking existing software and adding addition features or attributes to accommodate more users is not an easy task. This method takes a lot of time and also not cost effective. The responses from the minority users have also not been enough to bring up the concept of age-neutral software.

Age-Neutral Software

Here are couples of examples of software that are used by people regardless of their age:

- Browser (Firefox, Chrome, Safari)
- Email client (Yahoo, Gmail, Hotmail)
- Image Editor (Paint, Adobe Photoshop, GIMP)
- Document Editor (MS Word, Libre Office, Xword)
- Presentation Software (Power point)
- Computation Software (Excel)
- Utility Software (Antivirus, Configuration Management)
- Entertainment Software (Audio/Video Player)

Area of Improvement

Some of the concepts that can be useful when we will consider building age-neutral software are given below:

- Putting an users' guide and help in the software system that is understandable by any age-group
- Reduction of technical jargon and making the terminologies more generic so that general people can understand it
- Reducing clutter on the screen so that it is clearer to visualize and also flexible to perform actions depending on mouse button click or touching
- Using abstract concepts to simplify things, interested users can get to know the elaborative definition on demand
- Avoiding designing a complex user interface that is confusing
- Reducing the amount of or eliminating text and replacing it with a simple picture to make it more understandable
- Putting visual and/or audio tutorials
- Clear and simple navigation paths
- Designing software component a little bigger than normal
- Having similarities with real life component.

Significant Impact

Building age-neutral software can have numerous impacts on the existing software trend and industry. Because of this, the existing number of users will be increased. With the increased number of users we will also have an increase in productivity of the users of that particular software. Older users will be more independent while using any technical systems. The time people takes to use software will be definitely reduced. Also, no extra time or cost will be involved to make software user friendly to a certain group of people. Because of extensive usage, the popularity and business of that software will also be increased

CONCLUSION AND FUTURE WORK

We have demonstrated in this research work how age-neutral software design can increase the usability of software among older people. However, there are some limitations in this work such as we have not been able to use established age-neutral software features. It is really necessary to use certain measurement for age-neutrality. Surveys definitely help towards achieving these goals. Also, we have not also been able to explore the area where a certain group of users will have knowledge gaps.

In future, this idea of age-neutral software can be used to create generalized software for disable people. A large number of participations and prototyping of age-neutral features will boost up the outcome of this research. Gender-neutral approach for creating software is also another area to be explored.

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