Content Management and User Interface for Uneducated People

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Abstract. This study will be conducted to propose such system that contains contents that meet capability and preference of Un-Educated user of rural community of Pakistan by making the websites more interactive and understandable for them. Visually with pictures, video or text, acoustically with sound or spoken Language considering regional languages (*Voice* Directions gives you turn by turn *navigation* instructions in *voice), icons and menus*.Our Proposed interface will robust the needs of Un-Educated people including information retrieval and learning. It will meet needs of illiterates and deal with the barriers they face in communicating to web. This work will help them to reduce their anxiety and fear of technology. The proposed prototype will support Un-Educated users through an interface that does not require reading skills to understand or use.

Keywords: Web Contents, Uneducated people, Text-Free Interface, Auditory Interface, Sensor Based Interface.

1 Introduction

Most computer applications pose an accessibility barrier to those who are unable to read fluently. Excessive use of readable content hinders the illiterate or semi-literate users to have fruitful results from such computer applications [1]. It was realized that in order to achieve the significant economic contribution in development from rural community, we have to provide an effective and viable solution so that Un-Educated people can take advantage of the technology and compete with literate community. As cited in [4] the restrictions for the development of information technology are financial limitations. The countries that suffer the most financial hardships are third World countries. The ability to access technological and scientific information does not just give a nation power, but it enables that nation to lead a better life in all aspects .Effective information delivery system should be provided to ensure that service reach to target group according to their needs. Pakistan is sixth most populous country on globe and second largest country in South Asia, reported to have79% illiteracy [2][3].

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2 Literature Review

From literature review we found that many research have been conducted to provide interactive interfaces for Un-Educated users. Research work that investigates user interfaces [43][44][49] for Un-Educated users work is recent and few research groups have looked at designing for this population. As Cooper says, Different kinds of techniques are used to aid Un-Educated people in interacting with web content, as Un-Educated users are very different from the target user imagined by most user interface designers. Striving for digital society ensures an ICT driven knowledge-based society and in order to build a digital society it needs to reduce the gap between information rich and poor in the community[47]. It needs to build a system where information will be readily available online and people from different parts of the country will avail themselves of the information through different channels [4][45][46][48].The areas of study contributing to our research dimension are Text free interface with visual and graphic aids ,Auditory interfaces with voice navigations and Sensor based human-machine interfaces.

2.1 Text Free Interface with Visual Aids for Un-Educated

Less text- More graphics technique is commonly used for this type of interface. For information communication symbol systems have been introduced such as universal language to enable interpersonal communication between people speaking different languages. Charles Bliss developed his semantography in 1949, a communication system based on a set of symbols which can be used to break down language barriers. Every symbol is abstract meaningful; they can be placed together to form sentences [5][6]. Indrani, Toyama [7] Proposed the design for text free interface. They proposed ethnographic design in collaboration with a community of Un-Educated domestic laborers in three Bangalore slums. They designs text-free employment search engine matches domestic laborers with jobs in Bangalore, India.

Christer [8] proposed text free interface to make a prototype of an icon based menu for mobile phones that can support Un-Educated users through an interface that does not require reading skills to understand or use. He also discussed the design issue and revealed what factors are necessary in order for an iconic interface to have best possible chance of being correctly understood. Concreteness, proper amount of detail, intuitive placement of icons and icons with actions are factors that affect any user of the interface.

Medhi et al. [7] compared text-free interface designs for an employment search application and a map application to corresponding text-based versions. An evaluation with low literacy users (0 to 6 years of education) showed that the text-free versions were preferred and increased task accuracy.

Kentoy, Medhi, ravin [9] proposed the benefits of an asynchronous communication tool like email might be made accessible to populations with little to no literacy. Their goal was to create a communication experience built on standard email protocols. They presented the design and evaluation of a prototype video-mail application that uses a combination of graphics, animation and voice assistance to empower illiterate

users to be completely self-reliant right from setting up accounts through communicating using it.

Matthew [10] traces the initial stages of URSULA (User-Interface Recommendations supporting Universal Literacy Accessibility) work, and it demonstrates how a conceptual interface design approach, Hypothetical User Design Scenarios (HUDS), can be used to drive the design process. User-Interface Recommendations Supporting Universal Literacy Accessibility (URSULA) is a project to create user-interface guidelines for developers who are writing applications and websites that may be used by illiterate users. Simputer was a small information access device to be distributed in India. Because of low literacy levels among the target population for this device and the diversity of languages used throughout India, special considerations were exercised when designing applications such that they are understandable by users who lack written language literacy. Joy, Dipin [11] proposed an integrated solution using a mobile computing device suitable for use by illiterate people in mainly rural areas. Modifications in supported applications including telephony, messaging and browser to enable them to be used text free were described. The design combined the speech recognition and Image based approaches. It incorporated AI and speech recognition to translate speech into text, Siri like interfaces to invoke specific apps, interfaces for browsers and to invoke search engines, using Bluetooth or other technologies to send VCF cards to store in memory, way to make a call to an existing contact without pressing any numbers, apps to learn reading and writing, using images instead of text to convey information. Their approach was to use technology to empower illiterate people at a level which they can presently relate to, rather than focus on technology to promote literacy .The patent by Rama[12] speaks of various mobile phone based apps customized for the use of an agriculture worker, facilitating access to various agricultural services, with apps for labor markets for farmers, markets to sell their produce and social groups on the internet.

There have been a number of articles related to technology access, using mobile phones, for illiterate people. Most of them speak of initiatives launched by various organizations such as TCS to identify the unique needs of such users and improving literacy with the help of technology [13].

2.2 Auditory Interface for Un-Educated

Speech assistance is also provided like voice auditory interfaces. There are research papers which have demonstrated the utility of auditory icons in addition to standard graphical feedback in communicating information to Un-Educated users. Alvin, Richard [14] developed the “Lingraphica” system. It was designed based on a database of”word-concepts” connected with an icon to enable communication for people with aphasia. Patients can point on these icons and drag them together on storyboards. Lingraphica automatically translates these sentence-like constructions into text and spoken words.

In Project Health Line [15] the target audience was low-literate community health workers. In rural Sindh province Pakistan research was conducted .The goal was to provide telephone-based access to reliable spoken health information and the speech interface. This project also highlighted the challenges in eliciting informative feedback from low-literate users. A joint project between researchers at Carnegie Mellon University (CMU) in Pittsburgh, Pennsylvania, USA and at Lahore University of Management Services (LUMS) in Lahore. They deployed a speech application, called "Polly", to Pakistan that allows users to access entertainment and information just by using voice over a simple (not smart) phone. Their work recently published at the ACM SIGCHI Conference on Human Factors in Computing Systems (CHI) [16]. More recently, in a study comparing participants' understanding of health information represented as text, drawings, photographs, videos or animation, all with and without audio, the conditions with audio resulted in higher understanding and task accuracy than conditions without audio [17].

Plauche [18] discussed a voice user interface designed to enable low-literacy farmers in the Tamil region in India to have access to market information on agricultural produce. In this design, the prompts were restricted to simple yes or no answers so that the interactions were simple enough for higher accuracy. The application was a Tamil spoken language system designed by Berkeley's TIER group to test speech interface in low-literacy environment .

. In the design of a financial management system for rural micro-credit groups in India, Parikh [19] conducted iterative design sessions with 32 women. The final design included numbers to leverage numeracy skills, icons, audio, and text in the local language. Audio augmentation was found to be useful for disambiguating items. Although the impact of different levels of literacy was not the focus of their research. Parikh [20] have also confirmed the importance of audio in the context of a cell phone application for capturing paper-based information. Rural literate users who tested a text-only version of the interface after using it with both audio and text preferred the version with audio.

Ravin [9] conducted research in Semiliterate and illiterate ability for audio text and text free interaction in Karnataka, India. They conducted two studies that explore how semiliterate users with very little education might benefit from a combination of text and audio as compared to illiterate and literate users. Results show that semiliterate users reduced their use of audio support, illiterate users showed no similar improvement. Semiliterate users should thus be treated differently from illiterate users in interface design.

Deepak [21] conducted a research in which he presented a framework that can be used to check the most important aspects required in designing an appropriate VUI (voice user interface) for low literate users. The research ends with successful paper prototype VUI for m-Event Organizer. This research helped other designers during the process of designing a VUI prototype for low literate users. Istanbul researchers [22] proposed a novel design for a basic mobile phone, which is focused on the essence of mobile communication and connectivity, based on a silent speech interface and auditory feedback. This assistive interface takes the advantages of voice control systems while discarding its disadvantages such as the background noise, privacy and

social acceptance. The proposed device utilizes low-cost and commercially available hardware components. Thus, it would be affordable and accessible by majority of users including disabled, elderly and illiterate people.

Researchers of Finland [23] studied the deployment of voice-based mobile educational services for developing countries, especially in India. Their research was mainly based on a Spoken Web technology developed by IBM Research Labs. In a program level they studied how in agriculture, primary healthcare, education, banking and microfinance and entertainment these services can be deployed. In this paper they focused on educational services. The results of the project can be applied for similar market areas, such as Africa and Latin America. It also provides a platform for the reverse innovation system building, especially in speech and symbol inter-face based applications for focused areas in developed countries.

Indian Researchers used a Featherweight multimedia device that combined audio with non-electronic visual displays (e.g., paper). Because of their low cost, customizability, durability, storage capacity, and energy efficiency, they are well-suited for education and information dissemination among illiterate and semi-literate people. They presented taxonomy of featherweight multimedia devices and also derive design recommendations from their experiences deploying featherweight multimedia in the agriculture and health domains in India. They found that with some initial guidance, illiterate users can quickly learn to use and enjoy the device, especially if they are taught by peers [24].

Paul, Jason [25] presented two experimental prototypes that explore technical solutions and identify an application architecture suitable for literacy e-Learning. E-Learning has been defined as the use of Internet technologies to deliver a broad array of solutions that enhance knowledge and performance and can provide benefits such as reducing travel, infrastructure and training expenses, while allowing wide access and scalability.

It was estimated in OECD International Adult Literacy Survey that up to 500,000 Irish adults were functionally illiterate, that is many people had difficulty in reading and understanding everyday documents. They addressed this problem by allowing users to interact with speech enabled e-Learning literacy content using multimodal interfaces. The implementation of an evolutionary prototype that uses client side technology was described and feedback from that phase of the project was reported [26]. Tucker [27] developed a framework for localization of text to speech(TTS) for voice access to information, describing various components of a TTS solution. Plauche, Nallasamy [28] designed a text free system for farmers in Madurai using speech recognition technologies, and also studied barriers for designing such a system. Among the barriers they identified were dialectical variation, multilingualism, cultural barriers, choice of appropriate content, and the expense of creating the necessary linguistic resources for effective speech recognition.

2.3 Sensor Based Human-Machine Interfaces

LeBlanc, Ahmed, Selouani, Bouslimani and Hamam [29] proposed an infrared sensor based cost effective human-machine interface interpreting the user's hand or head

gestures. This system targets people suffering from reduced mobility as well as specific professionals operating in constraining situations. This design allows using simple head movements to perform basic computer mouse operations, such as moving the mouse cursor on a computer screen. The proposed design was based on infrared distance measuring sensors which detect the head movements and convey that information to the PC by means of a microcontroller and a USB connection.

Deo [30], Lalji [31]and Parikh [32] also studied issues related to technology usage and needs of illiterate and semi-literate users. Katre [33]focused on the usability of thumb as the means of interaction for illiterate mobile users and made some design recommendations .Yulia, Oleg and Veikko [34] presented a novel vision-based perceptual user interface for hands-free text entry that utilizes face detection and visual gesture detection to manipulate a scrollable virtual keyboard. The system gave a reasonable performance in terms of high gesture detection rate and small false alarm rate. A majority of the proposed vision-based interfaces provide point-only functionality by tracking face/head or facial features and using the location of the tracked object as a camera mouse [3][36][37][38].

Betke [39] tested normalized correlation template feature tracking in a typing board application. The reported text entry speed was 31 cpm (chars per minute) when a dwell time of 0.5s was used. Hansen [40] used a marker-based head tracking for typing with a dwell-based dynamic typing application. The reported speed of communication on the first day was ~25 cpm for Danish keyboard and ~44 cpm for Japanese keyboard. Several authors developed point-and-click visual-based interfaces which combine both camera mouse and visual gesture detection to eliminate the use of dwell time and to emulate a computer mouse's "single click"functionality. Grauman et al. (2003) utilized voluntary blinks and brow raises detected by motion analysis and normalized correlation template matching as selection gestures. The interface was tested in a letter-scanning application that required two selections to enter a single character. The typing speed (selection-only) was 5.7 cpm [41]. Varona [42] designed a system that used nose tracker to move a computer pointer and eye wink detection to execute mouse click events. The interface was applied in menu selection tasks; its text entry performance was not tested.

2.4 Problem Statement

Content and interface of web is not easy to understand and appropriate for Un-Educated people. Un-educated people are certainly part of the group which has been referred to as the "Information Poor". With weak reading skills they cannot navigate, explore, and use the web effectively and understand information presented there.

2.5 Research Question

A detailed review of the accessible literature leads us to the question "How to enhance the information gathering (from web) method for un-educated user?"

This study will be conducted to propose such system that contains contents that meet capability and preference of Un-Educated user of rural community by making

the websites more interactive and understandable for them. Visually with pictures, video or text, acoustically with sound or spoken Language considering regional languages (Voice Directions gives you turn by turn navigation instructions in voice), icons and menus.

- To examine the rural community's need of information gathering
- Provide interaction styles for information presentation

The one objective of this research is to find out how to manage the content on web that are useful and understandable for Un-Educated people. That is why we need to use such content management system that manages the content in a way which effectively and efficiently deal Un-Educated people. This method will provide highest level of satisfaction and minimal frustration. Another objective is to define interactive user-friendly interface that can be used for Un-Educated people, as poor interface cause catastrophic errors and may people leave using any web because of poor user interface design.

3 Research Methodology

This study will be conducted in rural community. Questionnaires will be designed to get information from target community, to find out the level of web services usage in that community. We will also conduct sessions for presenting voice recordings, videos, animations, and pictorial representation to identify the reaction of target community to what extent they understand the delivered information. Regional languages will also be considered.

4 Expected Results

Our Proposed interface will robust the needs of Un-Educated people including information retrieval and learning. This work will help them to reduce their anxiety and fear of technology. The proposed prototype will support Un-Educated users through an interface that does not require reading skills to understand or use.

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