Pilgrim Communication Using Mobile Phones

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Abstract—Many pilgrims (Hajjs) to Mecca in Saudi Arabia lack the basic knowledge of pilgrimage rituals and practices even though millions of ritual booklets are printed in different languages and distributed among pilgrims before they depart their countries. This paper presents a mobile translation application for Haijs with different languages to assist pilgrims in performing their Hajj correctly. The system will help pilgrims communicate easily with other pilgrims with different languages. Short message service will be used as a method of communication with the server to facilitate machine translation on mobile phone which is easier, faster, reliable and available in all network scans. The paper will present issues encountered during the development of the application and also reports some results on the "Translation Service" which translates Arabic sentences into other languages on mobile phones using short messaging service on Binary Runtime Environment for Wireless (BREW) emulator.

Index Terms—translation service, pilgrimage rituals, Hajj, mobile phone application, BREW

I. INTRODUCTION

Many dictionaries have been designed to serve particular disciplines such as business, engineering and medicine.

Nowadays mobile phones hold a basic call function and many other useful features like the electronic dictionary. The development of the mobile electronic dictionary will bring users more convenience and save more space to improve the efficiency of their work.

This paper presents an application dictionary that facilitates machine translation on mobile phones to help pilgrims in the Hajj rituals during the pilgrim season. It advocates input voice and uses multimedia to ease and simplify the Pilgrimage rituals for pilgrims. An application called "Translation Service" for mobile phones have been developed that can translate an Arabic sentence to other pilgrims' language sentence. In this application an experiment translation was done for specific Hajj domain. We have used plain rule based translation and dictionary in our database that contains more than 1000 words. For sentence formation, rules were written for simple sentences used in interpersonal

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communication. Binary Run Time Environment for Wireless (BREW) [1] has been used to run this application.

During Hajj season different languages are used by pilgrims. Technology can and should be used to help pilgrims communicate with each other. Looking at the ways that people achieve cross-language communication today, we can look for opportunities to use better machine translation interfaces to assist pilgrim.

The aim of this paper is to propose a solution to improve communication among pilgrims. User should be able to write sentence in a source language and specify target language, then the application would send this request to a server and returns the translation for the sentence in the target language. This application software can be effectively used by many companies, organizations and individuals for various purposes.

This type of software may certainly be proved to be more useful if becomes available on mobile phone of pilgrims. Voice recognition is employed to help people who don't know how to spell or have problem spelling some words. This feature depends on the capability of the mobile phone and language that is supported by the voice recognition system that is embedded within the mobile phone. The proposed application would predict the input of the pilgrim and tries to show pilgrims the expected words to minimize the used input to the first and second letters.

The paper is organized as follow: Section 2 presents a literature review; Section 3 presents methodology, Section 4 presents system design and testing, and Section 5 presents the conclusion and future work.

II. LITERATURE REVIEW

Time and information may cause the disappearance of paper based and static dictionary. Now a days the process of the information publication has been changed and it is now dynamically updated [2]. Perera [3] has developed an electronic educating dictionary to assist students studying English. The experience inspires authors to involve mobile computing in various fields such as Pilgrimage by giving guidance and educational information in addition to translation of Pilgrimage's rituals terminology that might be in the form of comprised rich multimedia content. Because dictionaries exist in mobile devices it can be utilized in education [3]. There is almost no future for printed version of dictionary [2]. There are around three types of electronic dictionaries available; portable electronic dictionary, DVD-based, and internet dictionary. Thus online dictionary overruns classic work of dictionary's and connects users to many related information supported by multimedia [2]. Lexicographic platform utilized in western dictionaries was revealed to minimize the process of updating dictionary to short period [2]. Arabic electronic dictionaries are designed poorly and do not utilize technology effectively [4]. Eventually; access to such dictionary is easy as it is installed in mobile devices or accessed from mobile devices that improves the portability and can access from anywhere wirelessly. There is also a technology adapted to recognize voice i.e. to use microphone instead of keyboard to help disabled persons or to implement special purpose operation in interaction between human and computer [5], [6]. To speed up phone calls voice recognition technology have been used in mobile phones since early days by using voice tag. Voice recognition technology lately performs effectively in Smartphones to do other functions rather than just quick calls. Here the purpose is to develop a mobile application that provides many options for input particularly voice to minimize input error as well as provide quick interaction with the user. A number of applications have been introduced to employ technology in pilgrimage [7]-[9].

III. METHODOLOGY

Fig. 1 shows the proposed system design architecture. The proposed system design methodology has the following phases:

- a) Conceptual interaction between the user and the system. The use case diagram consists of two actors. Each actor has his/her own responsibility towards the system, such that the user cannot update the database and so on as seen in Fig. 2.
- b) Creating a suitable database consisting of the relevant words and voices. Then the system extracts the features for the use of voice data which will be only for the selected language.
- c) Develop the Voice Recognition System (VRS) from the extracted words. After this, we started to build and design the electronic translator for the language.
- d) Test the application in different platform to see the robustness of the product.



Figure 1. System architecture



Figure 2. E-Hajj of use case diagram

IV. SYSTEM DESIGN AND TESTING

The mission of system development is to design a dictionary system to help the pilgrim using Windows Mobile Platform. The system has common functions of an electronic dictionary; mainly it includes a small English-Arabic dictionary, a small Arabic-English dictionary and also help information for the dictionary as shown in Fig. 3.



Figure 3. Procedures for the main window

Mobile dictionary for Hajj is designed to be simple as much as possible. Advanced techniques such as pivot language have been avoided to reduce developing time and not effect of mobile device performance [10]. To add unique features, Mobile dictionary tries to focus on pilgrimage rituals and basic needs for pilgrims and provide useful and interactive information that can assist pilgrims in performing Hajj with minimum physical assistant. Mobile dictionary for Hajj is designed to utilize voice recognition technology to accept voice input and display the closest words to the input pronunciation.

In the field of voice recognition system, a large number of algorithms and methods have been proposed for developing the recognition process. The designing of voice recognition system involve phases that need to be completed in order to achieve high performance and desired accuracy. However, in order to create the best voice/speech recognition engine the design must involve many techniques and approaches. In this section some of the underlying techniques are discussed. Fig. 4 shows a typical voice recognition architecture. Generally, the process of designing and building voice recognition engine require the following steps [11]: a) **Pre-Processing phase**: organize the information and simplify the recognition words.

b) **Feature extraction phase**: extracting measurements from the input to differentiate among classes.

c) **Feature classification phase:** words or phrases are classified based on the object of interest into one of a number of category classes.



Figure 4. Voice recognition architecture

Related information about the dictionary software implementation is as follows:

1) About development environment

Operating system

Microsoft Windows Professional Service Pack 2 Windows Mobile 5.0

Development Environment

Java program

Windows Mobile 5.0 Pocket PC SDK

Windows Mobile 5.0 Emulator Images for Pocket PC – ActiveSync 4.5

Database Management System

Microsoft SQL Server 2005 Mobile Edition

- 2) For inquiries, function design into the small English-Arabic dictionary interface Prompts users to enter the word or the first few letters of a word into the input box. Automatic matching process with all the words will then be done. User clicks on the word then the program would display in the window the meaning of the selected word to show in detail the Arabic meaning of the word. Operation of the interface is shown in Fig. 5.
- "Help" module design: This module introduces the use of procedures and precautions. The operation interface is shown in Fig. 6.

To understand how this dictionary can be used, imagine that an English speaking pilgrim is in a restaurant in Makah for dinner where local people can understand only Arabic language. To solve the problem of cross language communication, before entering into the restaurant the English speaking pilgrim would download English to Arabic translation interface into his mobile. After entering the restaurant he/she types his/her order on mobile in English and gets its equivalent in Arabic written in English script. Then the pilgrim has to just read out the sentence to get his dinner. Fig. 7 shows the mobile screen (emulator) shots for a sample sentence. It makes the cross language communication easy without assistance of a third party. This is just a simple example, but such translation service may be used very effectively in various situations in public places like railway stations, airport, theaters etc.



Figure 5. Small English-Arabic dictionary query window

Dictionary for Hajj		
Help		
		•••• •••
		الدعم الفوري
	Support System	تحكم في كمبيوتر الطرف الآخر كما لو كنت تجلس أمامه مباشرة الترجمة من لغه الى لغة
Alter		tra ha da dhacana ta sa i i a ki a d
1	translation Services	ادرجمه فوریه او صبط إطانات التمپیونر المدرنی محدد اللغة الهدف
	<u>Target language</u>	المما المستعمل المشاركين مع العديد من المشاركين عقد المشاركين
	<u>Restaurant order</u>	الطلب من مطعم
Aller		جدولة بكل الكلمات الاساسية التحادية في الرجاد
	airport	ليتعامل في المصار
		جدولة بكل الكلمات الاساسية
Return Exec		

Figure 6. "Help" window



Figure 7. Steps in using translation service

V. CONCLUSION

What has always driven the market for portable electronic devices is the unquenchable consumer demand for access to virtually unlimited amounts of information anywhere and anytime. Wireless phones are no longer just for voice communications. The growth of mobile devices brings new challenges and opportunity for computational support for cross language communication. This proof of concept Translation service is just a beginning in the direction of efficient, convenient, anytime and anywhere machine translation. In future many newer mobile technologies can be used in domain specification for easy and perfect translation and distribution of computation on user side and server side for faster and efficient translation. Even speech recognition technology combined with mobile computing could be used to communicate in more natural way across language barrier.

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