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Design and Implementation of an Android SMS Virtual Keyboard for the Berber Language

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Abstract

Advances in mobile device have enabled a various types of mobile applications to be developed for users beyond mobile communication services. In recent years, there has been an increasing interest in text entry with less popular and minority languages on mobile devices since the arrival of on-screen input method, which known as virtual keyboard. This work presents the first attempt to design and implement an Android SMS virtual keyboard called Tifinagh SMSK, which supports the Berber text entry for Android devices, enables the Berber native speakers to create, send and read its Tifinagh SMS messages. This tiny application has been implemented and tested on Android based smartphones and the outcome shows that it works correctly as intended.

Index Terms: Berber Script, Android, SMS Keyboard, Smartphone, mobile device.

1. Introduction

This world hosts different human cultures and societies, making the people uses different types of languages to communicate among each other. Nowdays, the world has become a small village with the arrival of new telecommunication technologies like Computer, Internet and mobile devices. We can use these technologies to cross the language barriers that exist all around the world. Thus, in the past several years, the use of less popular and minority languages such as Berber language for sharing views with the help of telecommunication technologies has experienced huge growth around the world.

The Berber language or Tamazight is the ethnic language of North Africa west of the Nile. The Berber groups [1] is a member of the Afroasiatic language family, living in Morocco, Algeria, Niger, Mali, Tunisia, Libya, and Egypt. The berber script is called Tifinagh and it is a serie of Abjad and alphabetic scripts used by Berber groups to write Berber language. A touch modified version of the traditional script, called Tifinagh

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IRCAM [2], is used in teaching the Berber language at a number of Moroccan elementary schools. It is written left to right and consists of 32 basic letters and two labialized letters (ⵇ and ⵅ), composed of a base letter followed by the sign of labialization (ⷯ). All of Tifinagh IRCAM letters are illustrated in the Figure 1 [2].

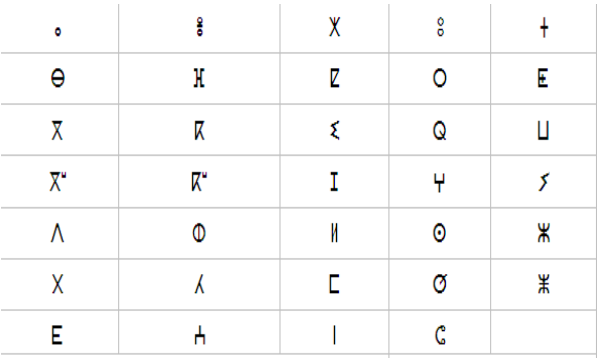

Fig.1. IRCAM Tifinagh letters.

A mobile device is an handheld computer which has an operating system or mobile OS which is the software platform on top of which application programs can run on this device. Nowdays, there are several different types of mobile OS used by a number of companies, such as: Apple iOS, Symbian, BlackBerry OS, Tizen and Android. The Android [3] mobile operating system was developed by Google and was based on open source product and Linux Kernel. Primarily, Android was designed for smartphone and tablet computers. Now, Android platform supports a wide range of devices such as TV, cars and wrist watches.

SMS message is the text communication service component of mobile device introduced by the GSM standard, which is a brief, effective, inexpensive means of communication and uses standardized communications protocols for exchanging of short text messages, typically 160 characters. Today, SMS message is the most popular and reliable message communication on mobile devices and most people carry their mobile devices with them wherever they go, so distinct Email, SMS messages can attain people when they are away from their offices. In addition, SMS message can be stored in the network operator if the mobile device is powered off or becames out of network couverture, and is delivered at next the time when the device is connected to the network. The mobile operating system has an on-screen input method or a virtual keyboard component that let user composes a text with multiple languages and this text can be sent as a SMS message to the corresponding destination.

The motivation for this research are many, and too numerous to mention. Taken into account that some twenty-five to thirty million Berber native speakers in North Africa. Berber language is considered as the second most spoken language in Morocco, and it is used in government, education, mass media and in every day communication. It should be note that, in the design and implementation of a virtual keyboard mapping for Tifinagh script based on Unicode standard, the berber language for which the virtual keyboard is designed has to be studied and will be developed in such way that the Berber people can send and receive SMS messages via Tifinagh SMSK Android Application.

The tiny Android application for SMS messaging with Berber text entry called Tifinagh SMSK, has been developed using Android 1.6 SDK development tool. This application contains virtual keyboard software component and user can enter Tifinagh characters by tapping graphical keys displayed on touch screens. In other words, Tifinagh SMSK lets user write anything in Tifinagh on his android phone and share it via SMS text messages. It should be noted that the Tifinagh SMSK application is the only software that is used in the world to send and recieve Tifinagh SMS on mobile devices.

2. Literature review

The Mobile device manufacturer offers an operating system with most popular languages support through which user can input text in Latin, Arabic, Japanese, Chinese and Korean languages. But around the world, there are other ones considered as minority languages that can be written in different scripts which are actually unavailables in mobile device for technical reasons. Many virtual keyboard projects for mobile devices have been developed in the last several years, in aim to bridge the language barriers that exist all around the world. Most of mobile application developer choice Android platform for the mobile application development, since this mobile platform becoming increasingly popular and considered as one of the recent, free and complete platform created specifically for mobile devices. Only few scientific publications can be found which specifically identify the design and implementation a virtual keyboard for local languages such as [4] which describes the EVKB development of mobile application represents an Ethiopic Virtual Keyboard System. Actually, there are many free mobile Android applications offering virtual keyboard for unpopular language such as Panini Keypad [5] which is an IME used to type Malayalam SMS, messages, chat, facebook, another one called Ezhuthani [6] which is a virtual keyboard for Tamil language.

Nowdays, the transliteration of Berber words in Latin characters has become familiar in Morocco through the use of mobile phone SMS and it is only way to communicate in the Berber language for sending messages via mobile devices when the actual Berber alphabet called Tifinagh is unavailable for technical reasons, since no input method solution has existed so far in Android Mobiles for Non-Latin languages like Berber language that uses the Tifinagh script. Therefore, development of application for mobiles device becomes possible with arrival of open source software development kit, we can surely develop an application that can be used to send SMS message in locale script such as Tifinagh script.

3. Overview of Tifinagh SMSK application

The Tifinagh SMSK application is written in the Java programming language using the Android SDK tools version 1.6 and was developed under Eclipse IDE. Before describing the full function of this application, we take note here, that in Android, there are two methods to send SMS messages to the given mobile device. The first one uses Built-in SMS application, where the second consists of using the SmsManager API interface where an objet of this class can be created by calling the static method SmsManager. get Default(). The last one is used in our Android application to send SMS message which includes Berber script. On the other hand, Android offers additional directory where we can keep files which also will be included in package. This directory called "/assets" we need to specify relative path and name for files inside "/assets" folder. We can easily access any file inside the Assets directory or any sub-folders inside it, by using Asset Manager class. In this paper, The Tifinagh Unicode font called Tifinagh_ircam.ttf [2] was used to render text using Free type on the Android platform and was placed into assets directory of android application. To access "/assets" content and so to use the Tifinagh font, we need to use Asset Manager as described in the following code:

```
AssetManager tifinagh_font=this.getAssets();
try{
tifinagh_font.open("Tifinagh_ircam.ttf");
Target.setTypeface(Typeface.createFromAsset(tifinagh_font,"Tifinagh_ircam.ttf"));
…
```

Some Tifinagh letter forms, their names and the corresponding java code obtained from [7], are presented in the following table:

Table 1. Presentation of Java code associated to some Tifinagh chars and their names.

Tifinagh letter	Name	Java code
ⴰ	ya	"a"
ⴱ	yab	"ⴱ"
ⴳ	yag	"g"
ⴹ	yadd	"\u00c4"
ⴻ	yey	"e"
ⴼ	yaf	"f"
ⴽ	yak	"k"
ⵀ	yaa	"o"
ⵇ	yaq	"q"
ⵊ	yazth	"j"
ⵣ	yaz	"z"
ⵢ	yay	"y"

Development of an Android application is very different from development of traditional software, because the design complexity of an application that can be run in Android platform is usually very high due to the characteristics imposed by the operating system and the hardware specifications. In aim to shorten the development time of an Android application we can take advantages of using UML (Unified Modelling Language) [8] models which is known as the standard modelling language for object orient software, but this solution still inapplicable at this moment. Because there is not any tool that can be able to generate a full code of an Android application from UML model. Nerveless, there are many free or commercial UML tools, for modelling traditional software such as Rational Rose [9] and Eclipse Model Tool [10], but unfortunally those tools cannot be taken into account the special specifications and requirements of Android application developpement. In this paper, we use the Model-Controller-View design pattern to design the appropriate virtual keyboard GUI compenant that helps Berber native speakers to interact with the SMS service through the Berber language. The architecture of this virtual keyboard is presented in the following figure:

As we can see in the Figure 2, the Tifinagh virtual keyboard has been implemented by a Model-Controller-View design pattern. So, three layers has been considered for this virtual keyboard: the Model, the Controller and the view. The last one attaches to a given model and renders its contents to display surface by managing the graphics onto a device. A controller accepts input from the user and instructs the model and view to

perform actions based on that input. In other words, the controller is the mean by which the user interacts with the Android application. The virtual keyboard of our application is shown in Figure 1, containing a set of buttons, each one is used to insert a single Tifinagh char into the text that user will send it as SMS message.

This text is inserted into an Edit Text conponent, where the second one is filled by the target phone number. The send button let the user to send SMS message shorter than 160 chars.

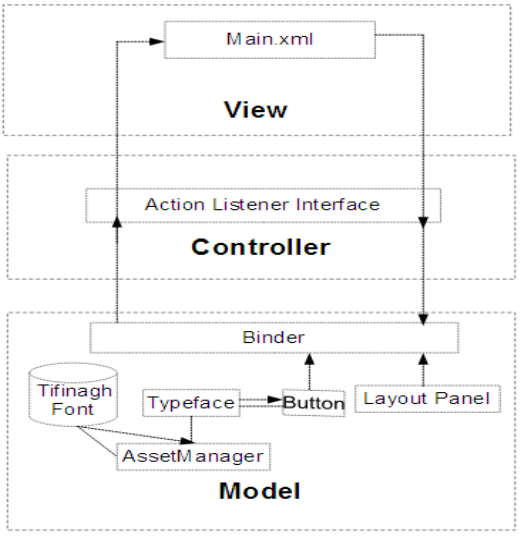

Fig.2. Architecture of Tifinagh virtual keyboard.

Fig.3. Snapshot of Tifinagh SMSK virtual keyboard.

It should be note that, both sender and receiver must have this application. In addition, the user can read its sms messages, displaying either Latin or in Berber alphabet as we can see in the Figure 2.

Fig.4. Example of reception Tifinagh SMS by using Tifinagh SMSK application.

4. Conclusion and future work

Mobile devices are becoming more powerful and less costly and are getting more user acceptance. Providing local applications on these devices would increase much more the number of users and also let the users interact with it using the languages they know. In this context, a virtual keyboard for Berber language has been designed and implemented in on Smartphones with Android operating system, and can be used everywhere and anytime and also help native speakers of Berber language to communicate with each other easily via SMS message. For the first time on any Android Smartphone, now user can send and receive their Tifinagh text messages (SMS).

We believe the work has a contribution towards facilitating smooth information exchange among Berber people, and also enhancing the bond between the minority languages and the current telecommunication technology. To continue the research presented in this paper, we intend to enhance our Android application, especially by incorporating an IME for berber language to let user types Tifinagh sms, messages, chat, facebook, etc.

Finally, This application can be directly used on the limited resource system like smartphones and tablets and can be downloaded freely at [11].

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Jaafar EL Bakkali, recenly award a PhD in Radiation and Nuclear Systems by the faculty of sciences Tetouan in Morocco. He has extensive experience in software development with many programming languages including Delphi, Java, C++, python. His research areas include developing open source scientific softwares, parallel computing and Monte Carlo simulation for medical and nuclear fields.

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