Design of an Interactive Bangla Mobile Keypad Based on Phonetics

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Abstract
Writing SMS text messages is very popular among the young people of Bangladesh. It is thought to be better, to have the mobile keypad with the Bangla characters and numerals printed on it; in order to, provide flexibility to the users to write SMS text message in Bangla through the cell phone. In this paper, we have proposed an interactive mobile keypad for Bangla, based on phonetics. The Bangla characters are mapped on to the keypad under their phonetically (similar sounding) equivalent English characters (with a few exceptions). There is a specific button considered as the 'link key' for producing conjunct/composite characters and another button on the keypad is considered as the 'Shift key' on the computer keyboard and it is used with another button on the keypad to produce about half of the total characters in the Bangla alphabet. The proposed keypad does not put any extra burden on the users.

Keywords
Mobile keypad, phonetics, SMS text message, Bangla characters, link key.

1. INTRODUCTION

The basic concept of cellular phones began in 1947 when researchers looked at crude mobile (car) phones and realized that by using small cells (range of service area) with frequency reuse could increase the traffic capacity of mobile phones substantially [1]. Today the usage of mobiles has increased drastically and people are trying to use it for every service. People are using it for phone calls, sending SMS text messages and some basic research is going on even to make it a web service provider [2].

The Short Message Service (SMS) is a special feature of cellular phones that allows text messages to be sent and received to and from mobile telephones. The text can comprise words or numbers or an alphanumeric combination. The messages are delivered immediately (or when the phone is turned on) and can be reviewed or stored in the phone for as long as one wishes [3]. It is ideal for sending vital information quickly and accurately. Today SMS messaging and chatting have become basic needs for our daily needs. Though being used so widely in Bangladesh, there is no option to type the SMS text message in Bangla. The reason behind is the lack of proper steps taken for the development of a Bangla mobile keypad, which can eventually solve the problem. Under such circumstance, in this paper, we have report the design of an interactive Bangla mobile keypad based on phonetics.

The rest of the paper is organized as follows: Section 2 enlightens the development of the Proposed Layout for Mobile Keypad, Section 3 deals with Performance Analysis and Evaluation and Section 4 concludes the paper.

2. DEVELOPMENT OF THE PROPOSED LAYOUT FOR BANGLA MOBILE KEYPAD

2.1. The idea behind

The Human Computer Interaction suggests that the design interfaces should not overload user's memories and they 'should promote recognition rather than recall' [4]. So, based on these principles, we have proposed the interactive Bangla mobile keypad, that is designed on the basis of phonetics. The Bangla characters are mapped on to the keypad under their phonetically (similar sounding) equivalent English characters (with a few exceptions). Our idea is to map the Bangla characters under the similar sounding equivalent English characters. Here, it is important to notice that, we have only eight buttons (as the twenty six English characters are mapped to eight buttons of the mobile phone) to map fifty Bangla characters. A simple calculation depicts that each English character has to be assigned at least two Bangla characters. To overcome this problem what we have done is that, we have taken two adjacent Bangla characters (with a few exceptions) as a cluster. These two characters are mapped to the corresponding equivalent sounding English character by making one character *default* character and the other *Shift+* character. A button on the keypad is considered as the *'Shift key'* to produce about half of the total characters in the Bangla alphabet

For example, ক is mapped on to k and খ is mapped under *Shift+k*. There are of course exceptions to this rule as not all Bangla characters have similar sounding English equivalent. For example a, b, c, d, etc. On the other hand, there are English characters that phonetically do not match any Bangla characters. For these non-matching characters, we have mapped them on the remaining unused keys.

2.2. The proposed layout

The layout for the proposed Bangla Mobile Keypad is depicted in Figure 1:

2.3. Some features of the proposed Bangla mobile keypad layout

Some features of the proposed layout are as follows:

2.3.1. Shift key

The numeric key '১' is used as the *shift* key. The *shift+* characters are obtained by simply pressing the shift key once and then pressing the desired character button. It should be noted that each button is assigned three (four for two buttons) *shift* characters. To type the third *shift+* character simply press the shift key once and press the corresponding button consecutively three times. A larger time gap in two consecutive keystrokes in the keypad would disable the shift key and the *default* character will be displayed in the next character position.

For example, to type ঈ press the shift key once and press the numeric key '8' thrice consecutively. But if there is a delay after pressing the key twice then the displayed characters will be ঝই.

2.3.2. Link key

There are a lot of composite characters in Bangle which are used frequently. Composite characters are formed by more than one primary character. Ferdous Khan [5] mentioned that there are 186 composite characters in Bangla. Khan, M. H. A [6] identified 302 composite Bangla characters. In another study Masum [7] claimed that 253 composite characters are in use in Bangla. Since, there are a lot of composite characters; all composite characters are not possible to be accommodated in the mobile keypad. In order to facilitate the service of composite characters we have assigned the numeric key '0' as *link* key. To type any composite character, the user just needs to type the first character in the above discussed process and then type the second character just after pressing the *link* key.

For example, to type the composite character ক্ষ just type ক first, then press the *link* key once and then type ষ.

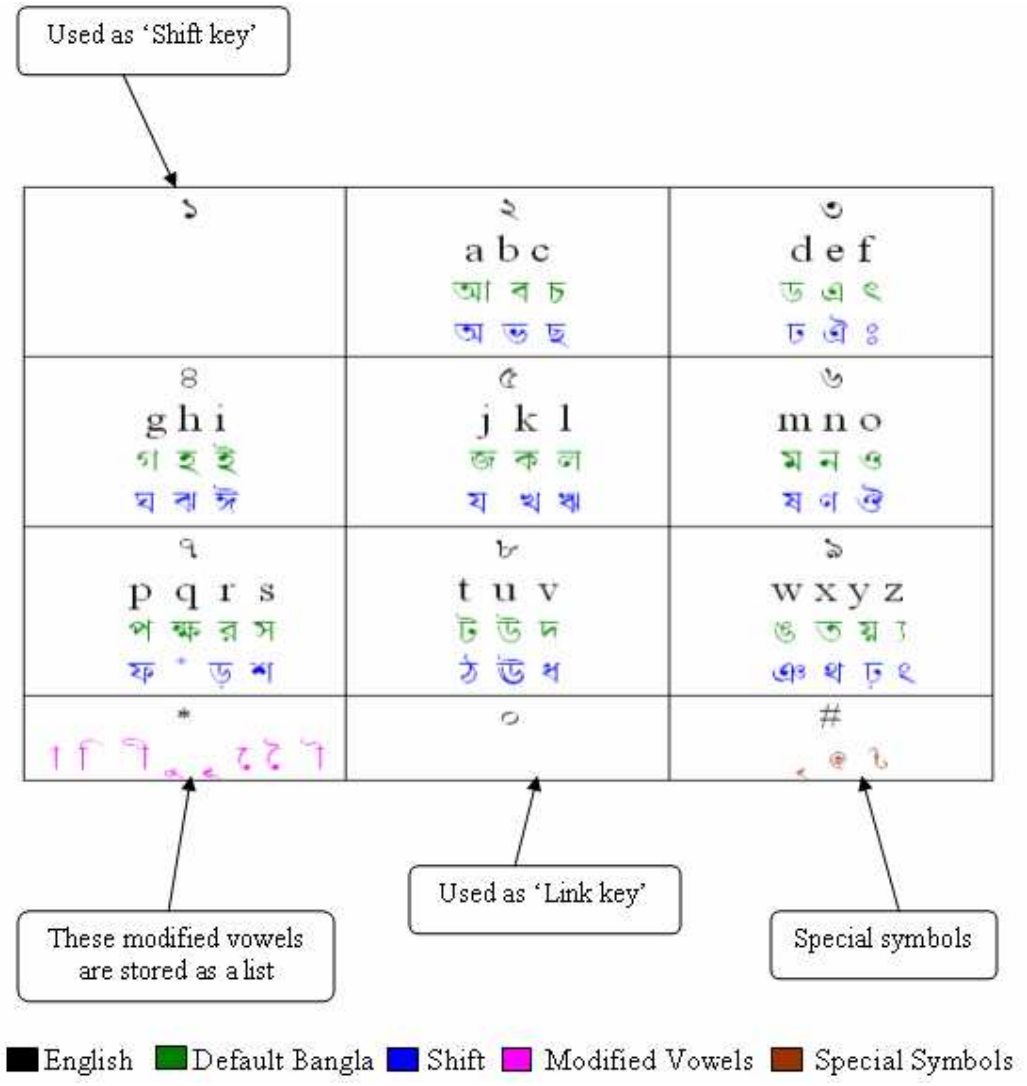

Figure 1. The layout for the proposed Bangla mobile keypad.

2.3.3. Placement of modified vowels and special symbols

The modified vowels and the special symbols are grouped separately. The eight modified vowels (া, ি, ী, ু, ূ, ৃ, ে, ৈ, ো) are mapped to the *asterisk* '*' button and the special characters such as ঃ, ঁ are mapped to the *hash* '#' button.

2.4. Example

Words that do not contain any composite characters can be typed as simply by finding the Bangla characters from the keypad. For example, কলম is typed by typing 'klm' আমার is typed by typing 'am<*>r', notice that the modified vowel া is typed by using the * key. মারুফ is typed by typing 'm<*>r<*>P, notice that the character ফ is typed by using the *shift* key (Numeric '1').

As mentioned earlier, any word that contains composite characters has to be typed with the aid the *link* key (Numeric '0'). Let us look at some examples of how such words are typed in our proposed mobile keypad layout.

আবদুল is typed by typing 'ab<0>v<*>l'
শ্রাবন is typed by typing 'S<0>r<*>bn'

3. PERFORMANCE ANALYSIS AND EVALUATION

The proposed Bangla mobile keypad has a number of advantages as stated below:

- The main advantage of our proposed keypad layout is obviously that for the first time it facilitates to write an SMS text message in our mother tongue Bangla. As we know there are more than 1.5 million mobile phone subscribers in Bangladesh and the SMS text message is hugely popular because it is cheap and also quick. It would be very helpful for the mobile phone subscribers if they can write their SMS text messages in Bangla because there is no better way to express your feelings other than your mother tongue.
- Another advantage of the proposed keypad layout is that the users need not to memorize the layout because the Bangla characters are mapped on to the keypad under their phonetically (similar sounding) equivalent English characters (with a few exceptions). Only the exceptions need to be memorized.
- A few changes need to be made in the circuitry of the mobile phone. The *shift* key and the *link* key are totally new concepts in the mobile phone era. But only a few simple changes would facilitate these.

4. CONCLUSION

A mobile keypad with the Bangla characters and numerals printed on it provides flexibility to the users to write SMS text message in Bangla through the cell phone. As we discussed earlier, it provides advantages to the user from the users' point of view; since most of our people do not feel comfortable in writing other than their mother tongue. If they are provided with the proposed system then they will obviously accept it because of the simplicity and clarity of the proposed keypad and which in turn will result increase the usage of SMS text message. From the vendors point of view also it will provide benefit in the sense that the usage of SMS text message will increase and it provides the existing mobile companies with a way to earn more profit.

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