www.ijecs.in
International Journal Of Engineering And Computer Science ISSN: 2319-7242
Volume 5 Issue 5 May 2016, Page No. 16714-16718

Automatic Mathematical and Chronological Prediction in Smartphone Keyboard

G. Indrajith, K.Vijayakumar
Computer Science and Engineering
St. Joseph's Institute of Technology
Chennai, India indrajithg@gmail.com

Associate professor
Computer Science and Engineering
St. Joseph's Institute of Technology
Chennai, India mkvijay@msn.com

***Abstract*- Artificial intelligence is the mechanism which makes human work very easy by making the devices to process from the perspective of a human being. Predictive text is a feature in smart phones, which runs on Operating Systems such as iOS, Android, Windows etc. This feature plays a major role in helping the individual to select the word that succeeds the current word of their text message or statement. In the proposed system, the concept of predictive mechanism is taken to the next level by predicting *mathematical solutions* and *chronological data*. Thus, the system automatically does the mathematical calculations in the middle of a chat, without making the user switch to the calculator application; and also finds chronological data such as date and day, without having to switch to the calendar application.**

Keywords- Mathematical prediction; date and day prediction; predictive text; chronological prediction; smartphone keyboard; predictive keyboard;

I. INTRODUCTION

The proposed predicitive keyboard system is sub-divided into two parts:

1.Mathematical Prediction System :

The proposed keyboard system automatically predicts and displays the solution for the *mathematical data* entered by the user, while using any application. This avoids the inconvenience faced by the user from having to switch to the actual calculator application, to find the respective *mathematical solution*.

2.Chronological Prediction System :

This part system automatically predicts and displays the required *chronological data*, by interpreting the *date or day* entered by the user. This avoids the user from having to switch to the actual calendar application, to find the respective *date or day*.

II. RELATED WORK

In [1], the original method of using predictive text completion for text messaging in mobile phones is explained. Initially, the user is made to enter the required text. The text is entered/ received letter-by-letter, but in a continuous fashion. The existing systems showed the general method of text entering, where the devices were provided with twelve main keys and nearly 5 to ten additional function keys. The process of entering text by pressing these keys was found to be less efficient; provided the number of keys were less. Hence, the current system introduced the new method of single-key press per letter together, which was provided with a large dictionary of words, in order to avoid ambiguity and confusion. This method was provided as a service

for many mobile companies and it was also aided by them.

In [2], the experience of using mobile phone based SMS messaging is improved by measuring the key-strokes and constructing time-level models for certain users. This information is maintained in order to analyze the users and improve the predictive text input method. The information that is studied from the users is used to improve the 12-key keypad method of SMS messaging by revamping the existing system that matches the text to the keys of the keypad and also the predictive text suggestion method by avoiding disambiguation and misconceptions.

In [3], the process of using the inbuilt dictionary for entering input text is refined by using the existing documents as the source for the dictionary. The system refers the contents of the documents for picking or suggesting the words that follow the current word. The texts that are already used by the users are stored using a new document storage system and the predictive text system refers and makes use of this document storage system.

In [4], the facilities that are provided by the existing T9 input text system is improved by the creation of a new system 'PreText'. This system predicts the word that follows the current word with much precision than T9 by reducing the number of key taps by the user and also suggests the words by the frequency usage of words. Thus the disadvantage of suggesting words that do not go with the current context or words that the user is not intenting to enter currently is the T9 system is eliminated. Also, the number of keytaps is reduced in this system when compared to T9.

In [5], the method to input mathematical formulas is done in an efficient manner. This was done as an attempt to reduce the difficulties that are involved while entering mathematical formulas. The paper uses a N-gram model that is quite popular in natural language processing. Here, the mathematical formulas are entered just like normal text but the processing is done in a hierarchical manner. Hence, the system combines the series of mathematical formulas in a hierarchical manner in order to form the predictive model. In addition to this, the efficiency and accuracy with which the characters that are entered for the formulas is improved.

In [6], a new type of Web Browser that is of the likes of Google's AutoLink and Microsoft's SmartTags is created. This browser takes input from the user and refers a huge database of semantic information that has been maintained, in order to induce new personalized texts. The semantic information generation is done in order to improve the efficiency of the user interface and also the user experience while making use of the browser.

III. OBJECTIVES

The concept of predictive text has made typing in smart phones extremely easy for the end users, making them type the context in a much faster manner, than required originally. The concept of predictive texting involves the process of comparing the entered text with a set of words that are previously stored in the dictionary; suggesting the words that are of closest match to the one that has been entered. This method involved the concept of suggesting words, depending on the combination of letters that had been entered. Also, this method involved the concept of prioritizing the words for suggestion, depending on the frequency of the usage and also the set of words preceding the current word. This later went on to the growth of *auto-completion*, where the words get completed automatically depending on the set of letters entered.

Now the proposed system has taken the predictive text system to the next level, by predicting mathematical calculations and chronological data. The proposed system is divided into two main parts to illustrate those two prediction techniques. They are:

1. Prediction of Mathematical data:

This part of the proposed system is enhanced to predict the mathematical solution by interpreting the *mathematical key strokes* entered by the user. The system also does the calculation by applying *'BODMAS'* rule. It automatically displays the answer for the data entered at that instance. Once the user starts typing again, the prediction is carried over from the beginning. This process is repeated till the user stops entering mathematical data. For instance, if the key strokes entered by the user are "**(36000 + 36000) * 48**", then the corresponding

DOI: 10.18535/ijecs/v5i5.64

answer "**3456000**" will be displayed in the prediction space.

2. Prediction of Chronological data:

This part of the proposed system is enhanced to predict chronological data by interpreting the *'date'* or *'day'* entered by the user. The system does this operation by comparing the entered data with the calendar database and predicts the relevant option. It comprises of both predictions such as from *'date to day'* and *vice versa*. This system is explained with two examples given below,

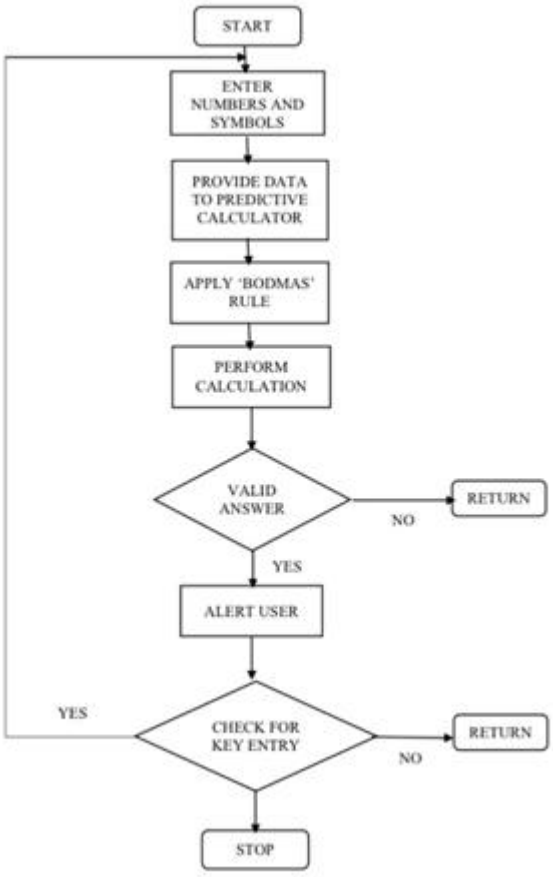
Example I (Date to Day): If the user entered key stroke is "**13/03/2016**", the system compares the entered data with the calendar database and gives the corresponding day, i.e. "**SUNDAY"** as an option in the prediction space.

Example II (Day to Date): If the user entered key stroke is "**Next Sunday**", the system fetches the current date. With the help of the current date, the system finds the relevant date by comparing with the calendar database; finally giving the option "**27th March 2016**" in the prediction space.

IV. SYSTEM ARCHITECTURE

MATHEMATICAL PREDICTION KEYBOARD SYSTEM

Figure 1.1 illustrates how the mathematical key strokes entered in the text space are converted to mathematical solutions.



CHRONOLOGIC AL PREDICTION KEYBOARD SYSTEM

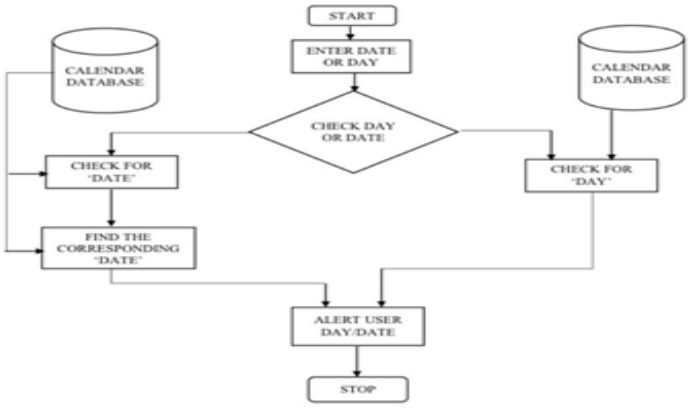


Figure 1.2

Figure 1.2 illustrates how the 'day' is converted to 'date' or the 'date' is converted to 'day' in the system.

The architecture diagram of mathematical predictive system is represented in the figure 1.1.

DOI: 10.18535/ijecs/v5i5.64

This system analyzes and process the mathematical key strokes entered in the text space and convert it into the corresponding solution. The calculation is done in a step by step manner and the solution is calculated and returned to the user. After this, the input is checked for the further entry of more date.

Similarly the architecture diagram of the chronological prediction system which is represented in figure 1.2 explains how the chronological key strokes entered in the text space are converted into its corresponding predicted solution. This calculation and processing is performed by using a Calendar

ce. Some of the important components of the architecture are explained below.

Applying BODMAS Rule:

Not all mathematical calculations can be done by ordinary calculation. Complex mathematical calculations require some set of rules to be applied. If a mathematical problem has a series of multiple operations then the order in which the calculation has to be performed is decided by applying 'BODMAS' rule, expanded as 'Bracket

Of Division Multiplication Addition and Subtraction'. Thus this component helps the system in case of multiple mathematical operations by performing it in the order functions in bracket, division, multiplication, addition and subtraction respectively.

Check Day or Date:

This activity's condition is to analyze the entered text and find if it is a 'day' or a 'date'.

This is done because, the system involves two different processes of finding if the input is a date and returning the corresponding day and the other way round of analyzing the day entered as input and returning its corresponding date.

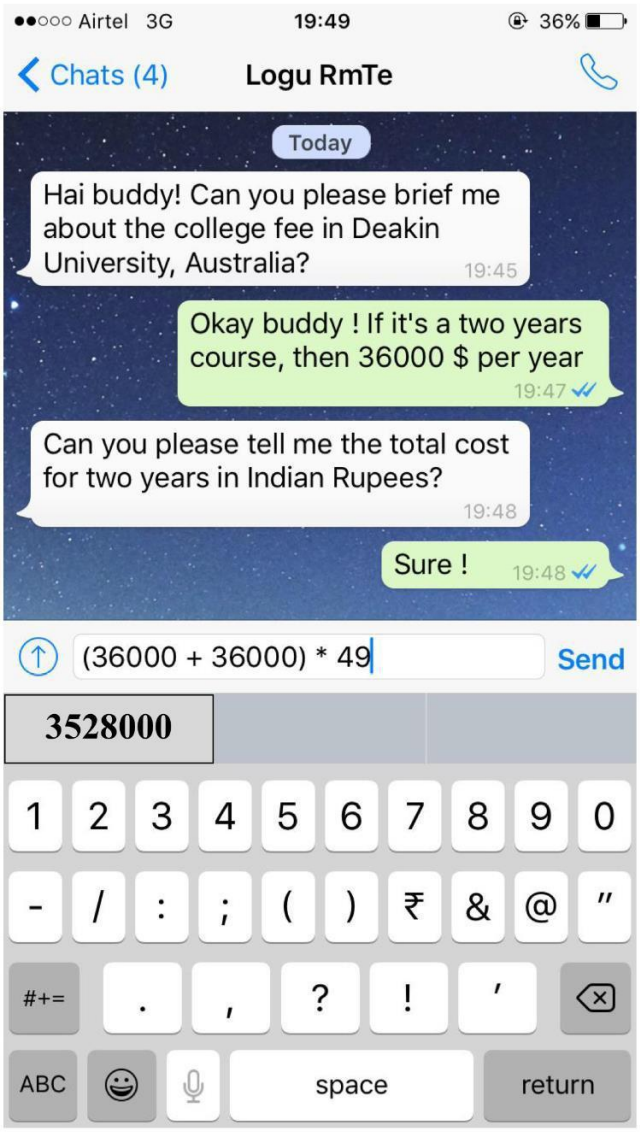
retrieves the current date and then calculates the day. Then, it calculates the difference between the system date and the day that has been entered as input after processing the text that has been entered by the user. Then from the difference that had been calculated, the corresponding date is returned as the solution required.

Hence, the basic idea of analyzing the input and calculating the necessary mathematical values and chronological data and suggesting it to the user as the final solution is done using the two flow diagrams.

V. SYSTEM DESIGN

Figure 2.1

DOI: 10.18535/ijecs/v5i5.64



VI. CONCLUSION

Thus, the proposed system gives an easy way to interpret and integrate mathematical solutions and chronological data, without switching to other applications in smartphones. The main advantage of this system is that, it avoids wasting time in switching applications and also, the typing experience in smartphones is taken to the next level.

VII. LIST OF REFERENCES

1. "Predictive text entry methods for mobile phones", Mark D Dunlop, Andrew Crossan.

2. "Optimizing predictive text entry for short message service on mobile phones", Yijue How, Min-Yen Kan.

3. "Corpus-based predictive text input" - H. Komatsu; Tokyo Inst. of Technol., Japan; S. Takabayashi; T. Masui.

4. "PreText: A Predictive Text Entry System for Mobile Phones", Deepti Nalavade, Tushar Mahule, Harshvardhan Ketkar.

5. "Predictive Input Interface of Mathematical Formulas" - Yoshinori Hijikata, Keisuke Horie, Shogo Nishida1 Graduate School of Engineering Science, Osaka University, Toyonaka, Osaka

6. "A goal oriented Web Browser"- Alexander Faaborg, Henry Lieberman, MIT Media Laboratory, 20 Ames St., Bldg E15, Cambridge, MA 02139 USA.

7. Darragh, J.J., Witten I.H., James, M.L., "The Reactive Keyboard: A Predictive Typing Aid", IEEE Computer (23)11 (1990), 41-49.

8. Silfverberg, M., MacKenzie, I.S., and Korhonen, P., "Predicting Text Entry Speed on Mobile Phones", Proc. CHI 2000, CHI Letters 2(1), 9-16.

9. Pavlovych, A. and Stuerzlinger, W. (2004), "Model for non-Expert Text Entry Speed on 12-Button Phone Keypads", In Proc. Of CHI 2004.

10. Silfverberg, M., Mackenzie, I.S. and Korhonen, P. (2000), "Predicting text entry speeds on mobile phones" in Proceedings of the ACM Conference on Human Factors in Computing Systems – CHI 2000, New York : ACM, 2000, pp. 9-16.

11. Tulsidas, D. (2002), "Optimal Predictive Text Layout for Mobile Phones", Master's thesis, Imperial College of Science, Technology and Medicine. September.

12. H. Komatsu, S. Takabayashi, and T. Masui, "Context-aware predictive text input method using dynamic abbreviation expansion", IPSJ Joumal, 44(11):2538-2544, 2003.

13. Zweig, G., Platt, J. C., Meek, C., Burges, C. J. C., Yessenalina, A., and Liu, Q., "Computational approaches to sentence completion", In ACL (1),