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(71) Applicant (for all designated States except US): **MO-
TOROLA MOBILITY, INC.** [US/US]; 600 North US
Highway 45, Libertyville, Illinois 60048 (US).

(72) Inventors; and

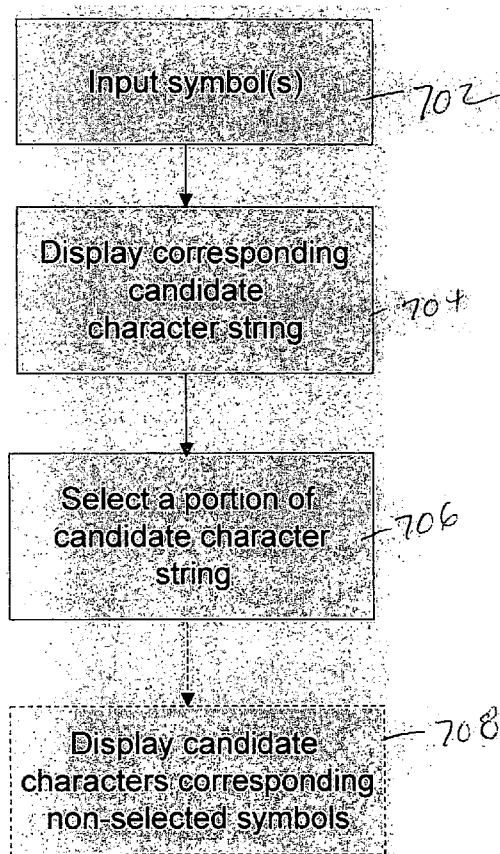
(75) Inventors/Applicants (for US only): **HU, Yong-Ge** [CN/
CN]; Apartment 6-4-602, Guan Ao Yuan Xiao Qu, Bao
Sheng Li, Qing He, Haidian District, Beijing 100192
(CN). **CHEN, Xu-Jin** [CN/CN]; Apartment 6-4-602,
Guan Ao Yuan Xiao Qu, Bao Sheng Li, Qing He, Haidian
District, Beijing 100192 (CN). **ZHANG, Xiang**
[CN/CN]; Wangjing East Road No.1, Beijing 100102
(CN). **ZHU, Yu** [CN/CN]; Rm2-103, No.8 Building,
Chaoyang, Beijing 100021 (CN).

(74) Agent: **CHINA SINDA INTELLECTUAL PROPER-
TY LTD**; B11th Floor, Focus Place, 19 Financial Street,
Beijing 100140 (CN).

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(54) Title: METHOD AND DEVICE FOR CHARACTER ENTRY



(57) Abstract: A method and device of predictive text input, comprises entering at least one symbol, displaying at least one candidate character string predicted from the symbol; and selecting only a portion of the candidate character string, which portion is not displayed independently as an entire candidate string.



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METHOD AND DEVICE FOR CHARACTER ENTRY

FIELD OF THE INVENTION

The present invention relates generally to entering text into an electronic device and more particularly to methods of predictive text entry.

BACKGROUND OF THE INVENTION

Personal devices typically provide predictive text entry methods that employ algorithms that present candidate characters, candidate words, candidate phrases, and/or candidate strings, after at least one character is input. Examples of such devices include cellular radiotelephones, smartphones, and personal digital assistants (PDAs), which employ predictive text applications to predict candidate characters, candidate words, candidate phrases, and/or candidate strings, in response to entry of alpha-numeric characters on a touch screen or keypad.

For example, for alpha entry mode using the Roman alphabet, a user selects the first symbol (letter) associated with a desired word, and in response thereto, a list of candidate words and phrases that correspond to that letter are presented on a display. The list is based on statistics of common use, for example, such that the most common words appear first and less common words are presented last. The user can select a displayed word or phrase, or continue entering symbols until their desired word or phrase is presented as a candidate. One advantage of such alpha character entry is it uses a relatively small number of symbols (the letters A-Z) that can be readily represented on a small keyboard, such as a 3X4 telephone keypad or a standard qwerty keypad.

Chinese and other character-based languages are more challenging to accommodate, as they do not have a manageable number of alphabet letters that can be overlaid onto a numeric keypad. For example, Chinese does not use an alphabet, but instead has about 5000 to 7000 commonly used characters. Advantageously, many phonetic systems have

been developed to standardize the pronunciation of, for example, Mandarin Chinese. Several of these phonetic systems use the roman alphabet as phonetic symbols, such as the Wade-Giles and the pinyin systems for Mandarin Chinese, and other phonetic systems use a unique phonetic symbol set, such as the zhuyin system for Mandarin Chinese which has a 37-symbol phonetic alphabet. Cantonese Chinese also has a phonetic system using the roman alphabet.

Although there are over 5000 commonly used Chinese characters, there are only approximately 400 basic phonetic syllables in Mandarin Chinese speech. Thus, many different Chinese characters use the same Mandarin Chinese phonetic syllable. An extreme example is the Mandarin Chinese pinyin word "yi"; this phonetic syllable represents over 100 different Chinese characters, each with a different meaning.

Additionally, Mandarin Chinese uses four standard tones to differentiate meanings. Thus, the same phonetic syllable, when pronounced using a different tone, has a different meaning. Using the phonetic word "yi" as an example, at least 20 characters use the first tone, at least 31 characters use the second tone, at least 16 characters use the third tone, and at least 63 characters use the fourth tone.

Although there exist various methods of entering Chinese characters into a computer system using a full-sized keyboard having keys corresponding to all of the phonetic symbols of one of the various phonetic systems and the four tones, there is a need for a reduced keypad entry method for characters for use in a portable hand-held device such as a cellular radiotelephone, a smart phone, or a personal digital assistant. Additionally, it is desirable to provide expedited input in a manner that uses fewer key strokes and easier selection with reduced user restrictions.

SUMMARY OF THE DISCLOSURE

A method of predictive text input, comprises the steps of entering at least one symbol, displaying at least one candidate character string predicted from said at least one symbol; and selecting only a portion of said at least one candidate character string, which portion is not displayed independently as an entire candidate string.

The method can further comprise the step of displaying sequel candidate characters, which are appended characters that correspond to the portion selected, to facilitate selection a next character following the selected portion in a text field.

The method can further comprise highlighting the portion in a sustained press, which for example can be implemented as a mechanical button press associated with a cursor positioning or a finger press on a display touchpad.

The method can further comprise committing to a text box when the user releases following a sustained press.

The method can further comprise inputting symbols in pinyin to produce candidate strings of Chinese characters.

The method can further comprise selecting a symbol in a symbol entry box other than the first symbol in the symbol entry box.

The method can further comprise a selecting a portion that does not include the first character in a candidate character phrase.

Additional, a device is disclosed in which the method is provided.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying figures, where like reference numerals refer to identical or functionally similar elements throughout the separate views, together with the detailed description below, are incorporated in and form part of the specification, and serve to further illustrate embodiments of concepts that include the claimed invention, and explain various principles and advantages of those embodiments.

FIG. 1 illustrates a mobile handset;

FIG. 2 illustrates the display of the mobile handset according to FIG. 1 after additional user actions;

FIG. 3 illustrates the display of the mobile handset according to FIG. 2 after additional user actions;

FIG. 4 illustrates the display of the mobile handset according to FIG. 3 after additional user actions;

FIG. 5 illustrates an alternate interface;

FIG. 6 illustrates another alternate interface; and

FIG. 7 illustrates a method according to one embodiment.

It will be appreciated that elements in the figures are illustrated for simplicity and clarity and have not necessarily been drawn to scale. For example, the dimensions of some of the elements in the figures may be exaggerated relative to other elements to help to improve understanding of embodiments of the present invention.

The apparatus and method components have been represented where appropriate by conventional symbols in the drawings, showing only those specific details that are pertinent to understanding the embodiments of the present invention so as not to obscure the disclosure with details that will be readily apparent to those of ordinary skill in the art having the benefit of the description herein.

DETAILED DESCRIPTION OF THE DRAWINGS

The present invention allows the user to quickly enter symbols and popular phrases to produce a targeted candidate list in the candidate character field that is more relevant to the desired character output, and then to select any portion of a character string that appears in the candidate character field to expedite the selection process.

A communication device 100 (FIG. 1) includes a display 102 having a touch screen device associated therewith. The communication device includes circuitry, not shown, to enable operation. For example, the device 100 may include a transceiver, antenna, a controller such as microprocessor, a memory, a microphone, a speaker, and a battery, or other conventional components. The exemplary device 100 includes a touch screen associated with display 102 that can be implemented using a resistor and/or a capacitor sensor, as is known in the art and conventional to cellular telephone devices. Those skilled in the art will recognize that the device could alternatively have a display and a traditional mechanical keypad and navigation key (not shown), such as found on the Motorola RAZR or other handsets that employ poppet keys, or any other suitable input mechanism. The device may include other, additional circuitry, or a portion of the circuitry. In any case, the device 100 includes applications stored in memory which are executed by the controller to perform the methods described herein. The illustrated device also includes a speaker port 160, a microphone port 162, and three mechanical buttons 164, 166 and 168, which are provided for illustrative purposes.

Somewhat more particularly, the illustrated display 102 uses a touch screen, by way of example, to allow direct finger control of images presented on the display. The display includes a text field 104, a symbol entry box 106, and a candidate character field 108. The display also includes a simulated keypad 110 presenting a 3 X 4 matrix keypad of the type found on telephone handset, which presents numbers and letters in a manner familiar to those who use a telephone. The display also includes a dynamic pinyin character and word keyset 112. The dynamic pinyin character and word keyset presents pinyin to the user for selection by tapping the display. The display is also controlled according to the

device applications stored in memory to present to the user control keys, which are illustrated to include a delete key 114, an enter key 116, a space key 118, and keypad selector key 120. The keypad selector permits the user to toggle the keypad between qwerty and telephone keypads, for example.

The illustrated display includes an address field 128 for a message recipient to be entered in the text field 104. The user enters the message recipient in the address field in conventional manner. The text field 104 is a field in which the text that is being constructed is presented to the user, and may for example be a short message such as used in short messaging service (SMS), an email message, a social networking post such as a status message, or a text field for any other application on the device 100.

The symbol entry box 106 displays the user's input, such as the pinyin symbols, words or strings entered by the user in the illustrated example. As used herein, pinyin words, characters or strings are the individual phonetic characters for sounds that are associated with Chinese characters, and will be referred to herein as pinyin words. Pinyin phrases refers to a plurality of such pinyin words with appropriate spaces between words. The symbol entry box 106 provides feedback to the user that facilitates symbol entry and confirms to the user that the device application is using the correct words or phrases to generate the candidate characters in the candidate character field 108. Those skilled in the art will recognize that although illustrated using pinyin, wherein the application is advantageously employed to produce Chinese characters, the symbol entry box will contain whatever form of text the user is inputting via the keypad, and this can contain Zhuyin, or any other desired input language selected by the user, and supported by the device 100 applications.

The candidate character field 108 is a continuous field that presents continuous input candidate characters, words, strings and/or phrases to the user that correspond to the symbols entered and displayed in the symbol entry box 106. The candidate characters can correspond to the characters of a single word, such as the multitude of characters that correspond to the pinyin word "yi", or to a string of words, such as a common phrase or

combination of words, as illustrated in FIG. 1, wherein the characters displayed in candidate character field 108 correspond to the pinyin phrase “wo men dou you shi”. Additionally, the candidate field includes arrow keys 122 and 124 that permit the user to scroll to candidate characters not displayed in the field, and thus expands the number of characters available to the user for selection. For example, as described above, if the user only inputs the word “yi” in symbol entry box 106, 100+ characters correspond to this word. The device application will present the most common characters in the candidate character field 108, but the user can employ the arrow keys to scroll through all of the 100+ characters that correspond to the word “yi”.

In the illustrated example, the user enters symbols by touching the display at the keys of the keypad 110 (FIG. 1), as indicated in box 702 (FIG. 7). For example, the user can enter pinyin string “wo” by pressing the “9wxyz” key repeatedly until the “w” is displayed in entry field. A list of candidate characters will appear in candidate character field 108 as indicated in block 704 (FIG. 7). The user can then press the “6mno” key repeatedly until the “o” appears next to the “w” in the symbol entry box 106. At this time, a plurality of characters that correspond to the pinyin string “wo” will appear in the candidate character field 108. The user can select one of these characters by tapping their finger on the desired character, causing the desired character thus selected to be committed to the text field 104 as the next character.

Alternatively, if the user desires to input a phrase, such as a common phrase beginning with the pinyin string “wo”, after “wo” is displayed in the symbol entry box 106, the user can press the space key 118. In the illustrated example, the user can then press the “6mno” key repeatedly until the “m” key appears on the symbol entry box 106. The user continues to enter symbols and spaces using the keys 110 in the same manner until the phrase “wo men dou you shi” is displayed in the symbol entry box 106, as shown in FIG. 1. The Chinese candidate character string will be “我们都有是” as shown highlighted in the candidate character field 108 in FIG. 1. If this is the desired character string that the user wants entered as text, the user can simply tap on the highlighted region of the

candidate character field and the entire highlighted phrase 我们都有是 will be selected and committed to the text field 104.

However, if the user wants to input “我们都有事” instead of the Chinese candidate character string “我们都有是”, the user can select and commit only the “我们都有”. This is accomplished by the user placing their finger on first character “我” and holding their finger down and running it across the “们都有” keys, thus producing a held or continuous press. Partial selection is represented by box 706 in FIG. 7. The device application responds to the continuous press to produce the bubble 130 (FIG. 2) displaying the string selected as each character is crossed until the bubble displays 我们都有 above the final continuous character of the candidate string to be selected, as shown in FIG. 3. When the user lifts their finger after this sustained press, the device application commits the character string in the bubble to the text field 104. The pinyin characters and string that correspond to the selected characters will be removed from the symbol entry box 106, and thus “wo men dou you” is removed from the field.

A new list of candidates corresponding to “shi”, which is a pinyin word in the symbol entry box 106 that was not selected, will be displayed. As “shi” was in the symbol entry box but a corresponding character was not selected, the candidate characters for “shi” reflect the character being appended to the previous selection. Thus, the candidate characters that have the highest probability, when associated with the previously committed phrase, will be presented to the user, as indicated in box 708. In other words, the most likely candidates for “shi” will be those that go with the phrase “wo men dou you”. Other characters corresponding to “shi” but less likely in view of the phrase will be accessible using the arrow. The user can thus continue to select the “事” from the Chinese candidates for the PinYin “shi” by simply tapping the “事” symbol in the candidate character field 108.

If the user continues entering pinyin words in the symbol entry field adjacent “shi”, without selecting the character for “shi” as described in the previous paragraph, the

device application will modify the predictive candidate character string in response to the symbol phrase now residing in symbol entry box 106.

Thus, it can be seen in the above example, the start word is the first word touched by the user that is followed by a persistent touch (a sustained press). The application responds to the sustained press to change from the tap select mode, wherein the entire highlighted candidate character string is selected and committed regardless of where in the highlighted region the user touches, to a variable input mode, wherein only the user selected character or characters are selected and committed. The variable mode uses the character from the start to the end of the sustained press, or a single character if the cursor does not move during the held touch, and furthermore displays the characters to be selected when the user lifts their finger in a pop-up bubble. It is envisioned that a time threshold can be used as the trigger for changing from the tap selection mode to the variable mode.

Additionally, as the user moves their finger, the selection changes (as illustrated by the bubble 130 changing from “我们都” in FIG. 2 to “我们都有” in FIG. 3 in response to movement to the next character). When user lifts their finger, the selected candidate “我们都有” is committed to the text field. Next the candidate for the remaining pinyin “shi” is displayed in the candidate character field. The target character “事” is the third item, which is marked by the red circle in FIG. 4. The user taps this character for easy commit to text field 104, as illustrated in FIG. 4.

According to another aspect of the invention, the user can utilize the present method to select a particular character from a pinyin phrase. For example, where a pinyin word, or string has many associated characters, such that selection requires scrolling through many candidates, the present method can permit the user to enter a popular phrase that includes the desired character associated with the pinyin word. To accomplish this, the user enters the pinyin phrase into the symbol entry box 106 as described above. For example, if the user wanted to enter “是” into text field 104 without “我们都有”, the user can press

and hold their finger on “是” in the candidate character field 108 in FIG. 1 until the bubble above the candidate field displays “是” . The user can then lift their finger and only “是” will be moved to the text field 104. The user can thereafter continue to input text.

FIG. 5 presents a display according to an alternative embodiment. In this embodiment, the user employs a qwerty keypad 502 to input alpha symbols. As illustrated, the user types the symbols “it is ve” directly into the text box 504 by tapping keys on the qwerty keypad. At the same time, candidates are displayed in candidate list 506. The user can tap entire candidate words from the list 506, or the user can use a sustained press and slide to select a portion of a candidate word from the list (such as “vehi”). The user selection is committed to the text field when the user’s finger is released following a held touch.

FIG. 6. shows another alternative embodiment. In this embodiment, upon entering the symbol “F” using a qwerty keyboard, for example, symbol F appears in the symbol entry box 602. A plurality of phrases appear as candidate phrases. The user, employing a computer mouse, can move a cursor over any location on a candidate phrase and click to select the entire phrase string and thus launch a search for the entire candidate string on a search engine such as Google™ search site. In this way, the user can launch a search of “Food network” by clicking anywhere on the string “Food network”. Alternatively, the user can slide the cursor down and highlight any portion of the candidates on the candidate list 604, such as a desired string “food net” or the word “network.” When the user releases the sustained press of the right mouse button, the Google search for the highlighted portion is launched. Thus, it can be seen that a navigation device, such as a mouse, can be used instead of touch screen.

A method and device disclosed herein provide functionality to let the user select the Chinese characters that are part of one candidate character string in a candidate list and commit the symbol string without requiring selection of a complete character string or repeated input of symbols. The method and device also lets the user indicate the start and

end of a Chinese character string, referred to herein as a phrase, such that the Chinese words between the start and end characters can be selected and committed to text. The method and device allow users to select a portion of the candidate Chinese characters by highlight the characters that the user desires. The application can highlight any character, or continuous string of characters, within a continuous character candidate string. When the user releases their finger from the touch-screen or releases a stylus control (e.g., right button of a mouse or button associated with track pad), the highlighted content will be committed as the text being created.

Existing input methods can estimate a result when a user presses the keys one-by-one and generates a real-time candidate list to be used for the selection. However, when the device prompts user to select from the candidate list, the user can only select a complete string from the candidate list. Existing applications preclude the user from selecting a partial string. There are a number of reasons why this requirement restricts the user. The desired character or characters may not be a high probability candidate, as it is not commonly used, which forces the user to scroll through an extensive candidate list or enter the entire character string. Additionally, the user may not have pressed the key accurately (for example mistaken key when entering characters using a 3 X 4 telephone keypad, known as the “Bell Keypad”, or a missed a key using a touchpad over a display screen), as a result of which the candidate character strings may not meet the user’s expectation.

Known systems do not provide flexibility to the user to select a portion of a full item as the correct result which degrades the user experience – especially in a Chinese sentence continuous input mode. When the user finds only part of the Chinese characters in the candidate character field, the user is forced to either scroll through the candidate field to find a desired character, commit the character, and then repeatedly enter, search, find and commit each remaining Chinese character, until the text is completed.

In the foregoing specification, specific embodiments have been described. However, one of ordinary skill in the art appreciates that various modifications and changes can be

made without departing from the scope of the invention as set forth in the claims below. Accordingly, the specification and figures are to be regarded in an illustrative rather than a restrictive sense, and all such modifications are intended to be included within the scope of present teachings.

The benefits, advantages, solutions to problems, and any element(s) that may cause any benefit, advantage, or solution to occur or become more pronounced are not to be construed as a critical, required, or essential features or elements of any or all the claims. The invention is defined solely by the appended claims including any amendments made during the pendency of this application and all equivalents of those claims as issued

Claims

1. A method of predictive text, comprising the steps of:
entering at least one symbol;
displaying at least one candidate character string predicted from said at least one symbol; and
selecting only a portion of said at least one candidate character string, which portion is not displayed independently as an entire candidate string.
- 2 The method as defined in claim 1, further comprising the step of displaying sequel candidates which correspond to said portion selected, to facilitate appending a sequel character to the selected portion.
- 3 The method as defined in claim 1, wherein the step of selecting comprises highlighting the portion by a sustained press associated.
- 4 The method as defined in claim 3, wherein the portion is committed to a text box when the user releases following the sustained press.
- 5 The method as defined in claim 1, wherein the candidate string input includes pinyin words, and the candidate string includes Chinese characters.
- 6 The method as defined in claim 1, wherein the portion selected corresponds to only a symbol in a symbol entry box other than the first symbol in the symbol entry box.
- 7 The method as defined in claim 1, wherein the portion selected does not include the first character in a candidate character string.

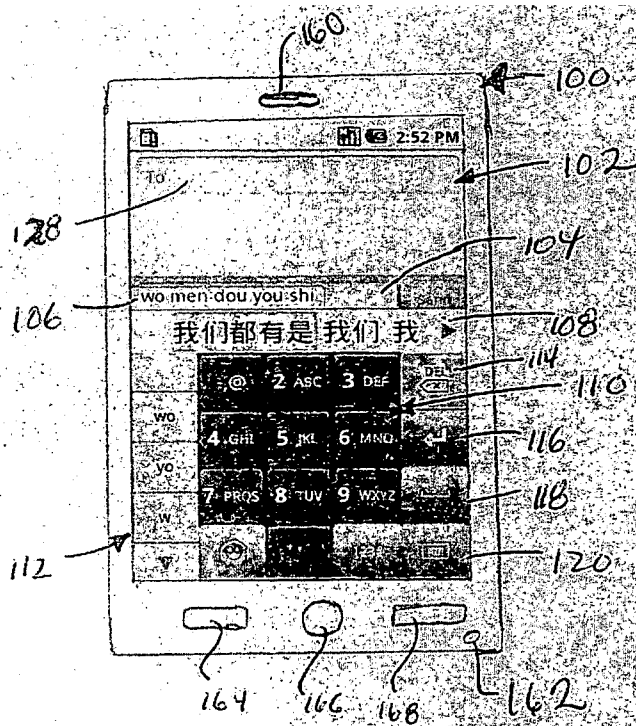


FIG. 1

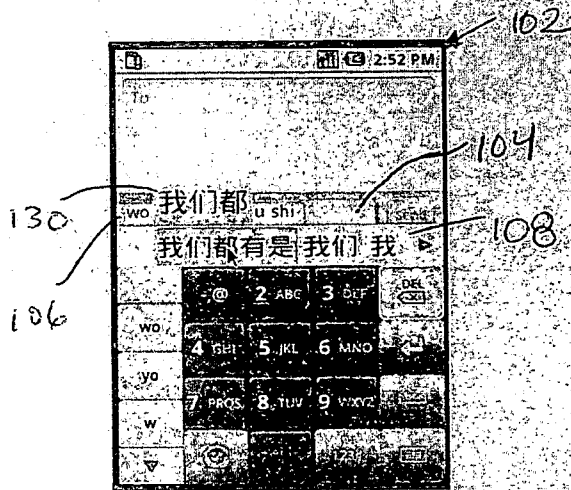


FIG. 2

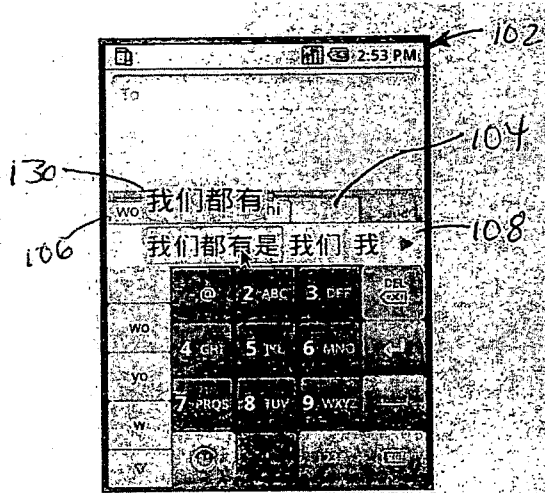


FIG. 3

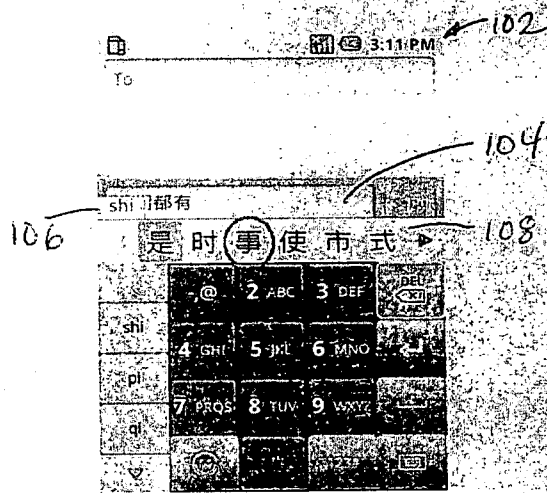


FIG. 4

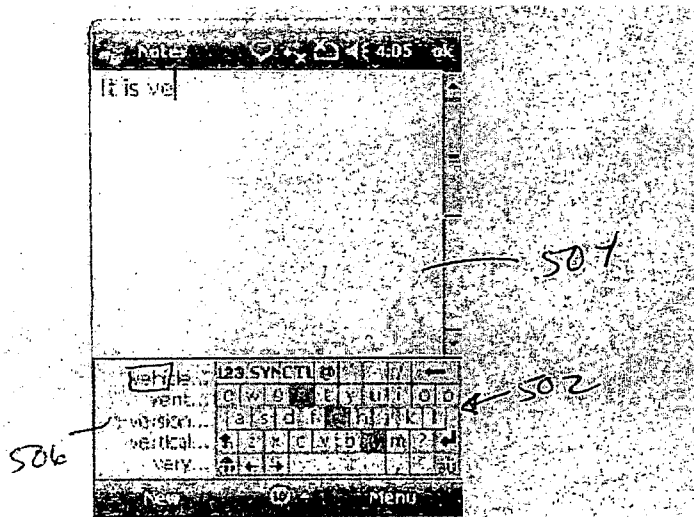


FIG. 5

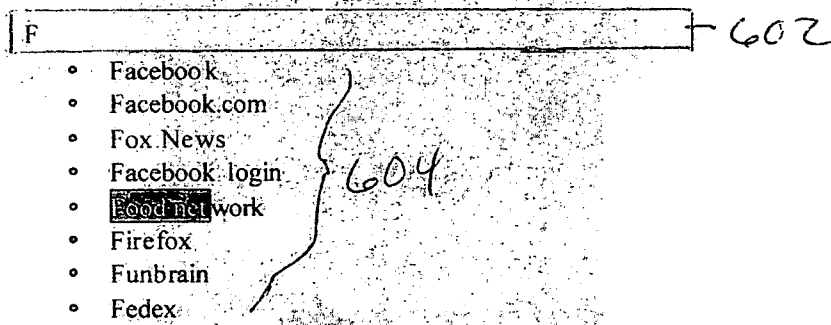


FIG. 6

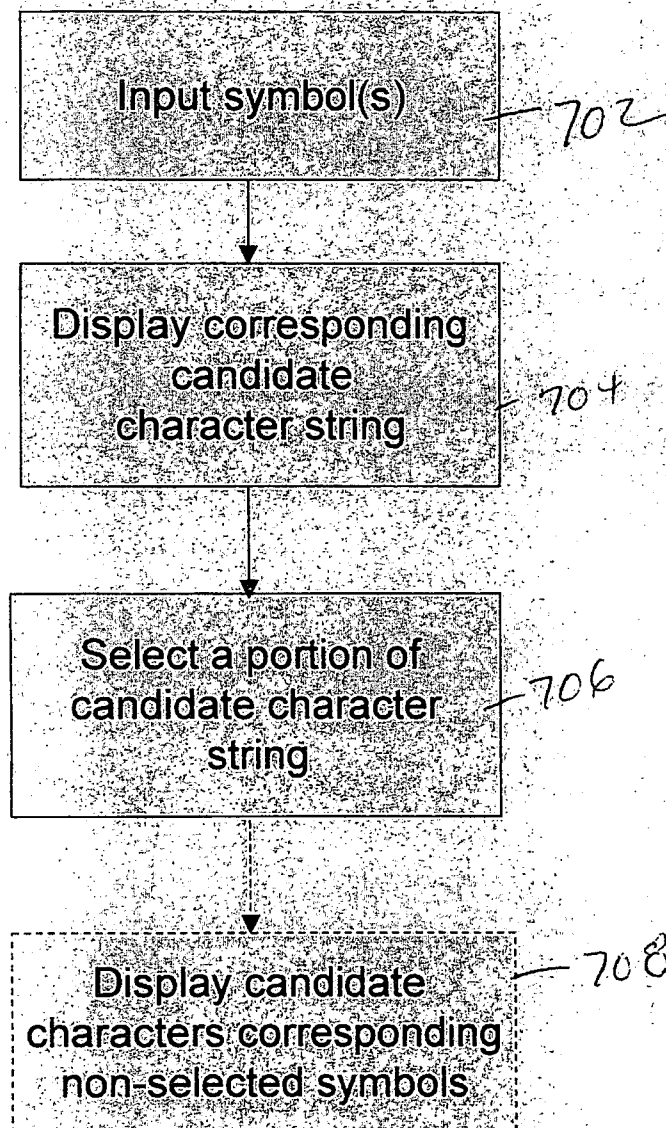


fig. 7

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2009/001585

A. CLASSIFICATION OF SUBJECT MATTER

G06F 3/023(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: G06F,H04M,G06K,G10L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNPAT,CNKI,WPI,EPODOC: text, character, string, phrase, word, symbol, letter, entry, enter, input, candidate, edit, select, predict+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US2008/0294982A1 (LEUNG, B. et al.) 27 Nov. 2008(27.11.2008) description paragraphs 18-21, figure 2B	1-7
Y	CN1779608A (HUANG, Jinfu) 31 May 2006(31.05.2006) description page 1, lines 15 – 17, page 3, line 27 – page 4, line 32	1-7
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☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:	“T” later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
“A” document defining the general state of the art which is not considered to be of particular relevance	“X” document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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“L” document which may throw doubts on priority claim (S) or which is cited to establish the publication date of another citation or other special reason (as specified)	“&”document member of the same patent family
“O” document referring to an oral disclosure, use, exhibition or other means	
“P” document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search 10 Sep. 2010 (10.09.2010)	Date of mailing of the international search report 21 Oct. 2010 (21.10.2010)
Name and mailing address of the ISA/CN The State Intellectual Property Office, the P.R.China 6 Xitucheng Rd., Jimen Bridge, Haidian District, Beijing, China 100088 Facsimile No. 86-10-62019451	Authorized officer YANG, Jibin Telephone No. (86-10)62413491

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2009/001585

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