

Character Inputting Method and Character Inputting Apparatus

Field of the Invention

The present invention relates to a character inputting method and a character inputting apparatus, which are particularly suitable for relatively small-sized electronic devices, such as a mobile phone terminal.

Background Art

A small-sized electronic device, such as mobile phone terminal and pager includes a display unit composed of LCD (liquid crystal display) etc. for displaying various information including numbers, characters, pictures and the like. For example, in the case of a mobile phone terminal, there has been a kind of device with a function of so-called electronic telephone directory, capable of storing hundreds of telephone numbers. Meanwhile, for each of the stored telephone number, a personal name or a company name is stored so as to indicate whose telephone number it is, and the stored telephone numbers and names etc. could be displayed. Also, in the case of a mobile phone terminal with the function of character message transmission, character messages input to the mobile phone terminal can be sent to another telephone, or the mobile phone terminal can receive character messages sent from another telephone and display them on the display unit.

Here, when it is considered to display Chinese characters of Chinese language on the display unit of such an electronic apparatus, since there are more than 6000~7000 frequently used Chinese characters, a method for inputting these characters is desirable. For example, in the case of a relatively large electronic apparatus with a keyboard by which letters



could be inputted, the keyboard can be used to input the pronunciation of the desired Chinese characters, by typing letters, and candidate characters having the pronunciation are displayed successively on the display unit, and the desired character can be selected from among them.

However, in a relatively small-sized electronic apparatus, such as a mobile phone terminal, the number of keys, which can be provided on the terminal is limited. Usually, only dial keys corresponding to the numbers 1, 2, 3, ..., 9, 0 and several function keys are provided. Therefore, the process of inputting Chinese characters by means of letter keys, whose number is identical to the number of letters, is not suitable for a small-sized electronic apparatus such as a mobile phone terminal. In the case of a mobile phone terminal, the inputting of letters is realized by assigning three or four letters to each dial key of a terminal, and pressing the dial key for different times.

In the past, in the practical process of Chinese characters of Chinese language at mobile phone terminal, there exists a process for inputting for example in which the strokes of radicals (部首) of Chinese characters are assigned to respective dial keys, thus a radical can be specified by specifying the strokes successively according to the order of the strokes, and then, the desired character can be found and inputted on the basis of the radical. For example, when the radical “王” is to be specified, since it is composed of strokes “一” and “丨”, the stroke “一”, “一”, “丨”, and “一” are successively inputted according to the order of strokes (an example of Chinese order of strokes), thus the radical “王” is specified through these operations. Those Chinese characters including the radical “王” as candidate characters are displayed as “王, 汪, 美, ...”, and the desired character is found from the displayed Chinese characters and is determined as the input character. This kind of inputting

method is called stroke input manner.

However, the stroke order of each radical should be born in mind correctly in the input process of specifying the strokes of the radical according to the order of strokes, even if only one stroke is wrong, the corresponding radical can not be found. In addition, in the inputting method, in the case of a radical with relatively more strokes, the desired character can not be found swiftly and then inputted because of too many times of key operation.

Here, although above description is made with reference to the problem of inputting Chinese characters in case of a mobile phone terminal, the same problem exists when Chinese characters of Chinese language and etc. need to be inputted in various relatively small-sized electronic devices similar to the mobile phone terminal which can not be configured with a letter keypad.

Summary of the Invention

The object of the present invention is for conveniently inputting characters such as Chinese characters in an electronic device with limited space to arrange operational keys etc.

In order to achieve the above object, the present invention includes:

a storage means for storing characters as search objects, and attaching the information concerning class 1 and class 2, wherein class 1 classifies with the order of the strokes constituting characters, and class 2 is based on pronunciation elements of characters.

an operation means, at least capable of inputting the items of said class 1 and class 2;

a display means for displaying the prescribed characters specified by

operations of the said operation means; and
a control means for performing the following controls: displaying the candidate characters from among the characters stored in said storage means on said display means when specifying at least one item of said class 1 by the prescribed operations of said operation means, and reducing the scope of the displayed candidate character on said display unit from said candidate characters to the characters corresponding to items of class 2 when said operation means has such an operation as specifying pronunciation elements classified by said class 2 under the status of displaying the candidate characters.

According to the invention, the characters as search objects are stored and attached with the information concerning class 1 and class 2, wherein class 1 classifies with the order of the strokes constituting characters, and class 2 is based on pronunciation elements of characters. At least one of items of class 1 is specified by the operation of the operation means. The candidate characters are displayed according to the information stored in the storage means. Under the status of displaying the candidate characters, items of class 2 are specified by operations of the operation means so as to reduce the scope of the displayed candidate characters, and the inputted characters are searched from the candidate characters with the reduced scope and determined so as to input desired characters.

Brief Description of Drawings

Fig.1 is a structural diagram of an exemplary mobile phone terminal according to an embodiment of the present invention;

Fig.2 is a perspective diagram of an exemplary profile of a mobile phone terminal according to an embodiment of the present invention;

Fig.3 is a flowchart of an exemplary character input process according to an embodiment of the present invention;

Fig.4 is a flowchart of an exemplary character input process (the example of radical selection) according to another embodiment of the present invention;

Fig.5 is an illustrative diagram of the first example of the candidate character strings and determination characters when inputting characters in the example of fig. 4;

Fig.6 is an illustrative diagram of the second example of the candidate character strings and determination characters when inputting characters in the example of fig. 4.

Detailed Description of the Preferred Embodiment

An embodiment of the present invention will be described with reference to the attached drawings.

This embodiment is applicable to the case of inputting characters in a mobile phone terminal capable of performing wireless communication with a base station for wireless phones through prescribed wireless phone lines, and performing calls through voice data transmission and various data communication.

First, the structure of a mobile phone terminal will be described. Figure 1 shows the internal structure of the mobile phone terminal of the present example. The mobile phone terminal has a central processing unit (CPU) 31 composed of a microprocessor, and performs communication as a wireless phone and various functions of the terminals under the control of the CPU 31.

In the structure of performing wireless communications, a voice signal picked up by a microphone 11 is subjected to baseband processing by an amplifier 12 etc. The baseband-processed voice signal is converted into

digital voice data with a prescribed format by an A/D converter 13. The digital voice data converted by the A/D converter 13 is supplied to a data processor 14, and is converted into a structure of transmission data. The data processing unit 14 is composed of, for example, the integrated circuit referred to as DSP (Digital Signal Processor). When data processing unit 14 is subject to the data processing for transmission, the control data etc. supplied from the CPU 31 is also attached to the transmission data. The transmission data processed by the data processor 14 is supplied to a modulator unit 15 to be modulated for transmission. The data signal modulated by the modulator unit 15 is supplied to a transmission HF (high frequency) circuit unit 16 to be subjected to transmission frequency conversion. The transmission signal after frequency conversion by the HF circuit unit 16 is supplied to an antenna 18 via an antenna switch 17 and is wirelessly transmitted from the antenna 18.

Also, a signal received by the antenna 18 is supplied to a reception HF circuit unit 19 via the antenna switch 17 to be subjected to high frequency processing, thus the prescribed frequency signal is converted into an IF (intermediate frequency) signal (or a baseband signal). The IF signal converted by the HF circuit unit 19 is supplied to a demodulator unit 20 to be demodulated for reception. The signal demodulated by the demodulator 20 is supplied to the data processor unit 14. In the data processor unit 14, the demodulated signal is processed, and voice data and control data are extracted from the received data. The extracted voice data is converted into an analog voice signal by a D/A (digital /analog) converter 21. The voice signal converted by the D/A converter 21 is subjected to baseband processing by an amplifier 22 or the like and then is played from a speaker 23. Also, the control data extracted by the data processor 14 is supplied to the CPU 31.

The CPU 31 is connected to a memory 32 which stores in advance the operation program necessary for a wireless phone. Also data set by users' operation, such as electronic phone directory data or character message information etc. which will be described later, are stored into the memory 32 under the control of the CPU 31. Here, in the case of mobile phone terminal of this example, in addition to characters such as letters, Chinese characters, such as those in Chinese language, taken as the electronic phone directory data or the character message information can also be stored, the mobile phone has the function to store Chinese characters in prescribed codes. Also, the information necessary for search process when the Chinese characters are input is also stored in the memory 32. The information necessary for search process of Chinese characters input, the classification information related to the order of strokes constituting the strokes of each Chinese character, and the classification information related to the pronunciation of each Chinese character are additionally stored on the character code of each Chinese character, and each classification information can be used to conduct search. Here, focusing on that for example the pronunciation of each Chinese character is composed of the combinations of a pronunciation element called *shengmu*(声母), which is the initial consonant, and a pronunciation element called *yunmu* (韵母), which contains the vowel, the information related to the pronunciation of Chinese characters is classified into pronunciation elements of shengmus and yunmus so as to be stored.

In addition, the mobile phone terminal includes an operation keypad 33 configured with dial keys corresponding to the numbers 1, 2, 3, ..., 9, 0 and the symbols #, *, and several function keys such as a transmission key and an end key. In the meantime it includes a rotary operation unit 34 capable of inputting by operations of rotating and pressing.

In the case of this example, 26 letters are assigned to number dial keys 2-9 in the dial keys constituting the operation keypad 33, and under the status of specifying the letter inputting mode, the letters can be inputted by the operation of the keys to which letters are assigned. That is to say, three letters "A, B, C" are assigned to key 2, three letters "D, E, F" are assigned to key 3, three letters "G, H, I" are assigned to key 4, three letters "J, K, L" are assigned to key 5, three letters "M, N, O" are assigned to key 6, four letters "P, Q, R, S" are assigned to key 7, three letters "T, U, V" are assigned to key 8, and four letters "W, X, Y, Z" are assigned to key 9. The three or four letters assigned to a key are distinguished by number of times the key has been pressed. The assigned letters is printed on the surface of the key.

Further in the case of this example, five strokes as typical strokes in the strokes constituting Chinese characters are assigned to number dial keys 2-9 in the dial keys constituting the operation keypad 33, and under the status of specifying the Chinese character input mode the operation of the keys to which respective strokes are assigned can be used to input strokes. That is to say, stroke "—" is assigned to key "2", stroke "|" is assigned to key "3", stroke "ノ" is assigned to key "4", stroke "丶" is assigned to key "5", and stroke "フ" is assigned to key "6". The assigned strokes are printed on the surface of the keys.

Here, the above-mentioned keys to which letters are assigned and the keys to which Chinese strokes are assigned are for common use. But the keys to which letters are assigned and the keys to which Chinese strokes are assigned can be used as different keys. For example, the keys to which Chinese strokes are assigned can be various kinds of function keys other than the number keys. In addition, while 5 strokes are set here to act

as the strokes for Chinese characters input, the strokes with other shapes can also be assigned.

The rotary operation unit 34 is an apparatus referred to as “jogdial” , which can be subject to rotary operation and pressing operation. The operation with the rotary operation unit 34 can be used for letters input or Chinese character strokes input. When the operation keypad 33 and the rotary operation unit 34 are operated, the operation instructions are supplied to the CPU 31.

Also, the mobile phone terminal of this example includes a display unit 40 composed of an LCD, and can display numerals of preset digits, characters or pictures in several lines (for example about 4 lines) on the display unit 40, under the control of the CPU 31. Backlight, for example, is provided on the display unit 40, thus the display can be recognized even in a dark place.

An exemplary profile of the mobile phone terminal of this example is shown in figure 2. On the front surface of a casing of the mobile phone terminal 10, a microphone 11 is provided at the lower parts, a speaker 23 is provided on the upper part, and the operation keypad 33 and the display unit 40 are provided therebetween. On the dial keys corresponding to numbers etc. in the operation keypad 33, numbers 1, 2, 3, ..., 9, 0 and the symbols #, *, are printed. Also, three or four letters assigned as described above are printed on the number keys 2~9, and the above-mentioned assigned Chinese strokes are printed on the number keys 2~6.

Also, a rotary operation unit 34 is provided on the left side where the operation keypad 33 and the display unit are provided. The rotary operation unit 34 is a rotary switch called “jogdial” with a part of a

round plate portion protruding slightly outside the body of the terminal. The portion can be rotated in the upward direction as indicated by the arrow "a", be rotated in the downward direction as indicated by the arrow "b", or be pressed toward the body side as indicated by the arrows "c". When each of the operations is performed, the corresponding operation information is supplied to CPU 31. When the mobile phone terminal 10 is held by for example a left hand, the rotary unit 34 can be rotated upward or downward or be pressed only with the thumb of the left hand.

Also, as shown in figure 2, the display unit 40 provided on the mobile phone terminal of this example is configured to have several display lines, such as the display line 41 and the display line 42, to display numbers and characters. Also, a display line 43 is arranged to display reception level or the residual amount of the batteries with pictures.

In the display line 41, 42 of the display unit 40, for example, when a transmission operation is performed by the terminal, or when the terminal is called, the phone number of the receiver or the phone number of the transmitter is displayed with numbers on the second display line 42, under the control of the CPU 31. Also, when the phone number of the receiver is registered by the function of electronic phone directory, the two display lines 41, 42 are used to display the registered phone number with numbers and the personal name or company name etc. related to the phone number with characters, under the control of CPU 31. Here, in the case of this example, numbers, and characters such as Chinese characters or letters etc. can be used to display the name related to the phone number.

In the mode of displaying the registered phone numbers on the display

unit 40, the displayed phone numbers and names are changed successively in the prescribed order or its reverse order, under the control of the CPU 31 based on the upward or downward rotation operation of the above rotary operation unit 34. When the desired phone number is displayed on the display unit 40 by such an operation, the rotary operation unit 34 is pressed, so that the CPU31 performs the transmission processing to the said phone number.

Likewise, when the phone numbers of a receiver or transmitter is displayed, in the case that the phone number has been registered in advance by the function of the above electronic phone directory, the registered name etc. are also displayed in addition to the phone number thereof.

Also, the mobile phone terminal of this example can transmit or receive a character message under the control of the CPU31. In the case of receiving a character message, the received character message is stored into the memory 32, and the stored character message is displayed on the display unit 40. Also, the character message input by user operation and displayed on the display unit 40 can be transmitted to a receiver with any phone number, under the control of the CPU 31. Similar to the above case of electronic phone directory, the character message can also be displayed with characters such as Chinese characters or letters etc.

Next, the process of inputting characters by using the mobile phone terminal of this example will be described. Here, the case of inputting Chinese characters of Chinese language is described as an example of inputting characters to register a name etc. by the above function of electronic phone directory, or to prepare a character message to be transmitted.

First, the Chinese character codes of Chinese language are classified according to the order of strokes of each character, and stored in the memory 32 of the mobile phone of this example; also the Chinese character codes of Chinese language are classified according to the pronunciation of each character, and stored in the memory 32 of the mobile phone of this example.

For the classification based on order of strokes of characters, here the classification is made according to which stroke of for example such 5 strokes as “一”, “丨”, “丿”, “丶” and “㇇” the first written stroke in the case of handwriting the Chinese characters is. Also the information of the second written stroke, the third written stroke, ... is also stored as required. Then when specifying strokes through key operation, the searching of Chinese characters (or the radicals constituting the Chinese characters) can be conducted according to the order of strokes, i.e. so-called stroke input can be conducted. Here such 5 strokes as “一”, “丨”, “丿”, “丶” and “㇇” are used for classification, but other strokes can also be added into the classification.

Furthermore, besides the information of the order of strokes, the information of pronunciation of each Chinese character is also stored. Here, based on the fact that the pronunciation of each Chinese character of Chinese language is composed of a pronunciation element called *shengmu*(声母), which is the initial consonant, and a pronunciation element called *yunmu* (韵母), which contains the vowel, the classification and storage can be made using the letters indicating the pronunciation elements, shengmus and yunmus.

That is, the shengmus from the pronunciations of Chinese characters, as

denoted by the letterized indicators in the shengmu row of the following table 1, basically include 21 different pronunciations. Also, the yunmus, as denoted by the letterized indicators in the yunmu row of the following table 1, include 35 different pronunciations.

Table 1 Contents of Shengmus and Yunmus

Shengmu	basic	b p m f d t n l g k h j q x zh ch sh r z c s
	additional	basic shengmu + a o e + w y
yunmu		a o e ai ei ao ou an en ang eng ong i ia ie iao iou ian in iang ing iong u ua uo uai uei uan uen uang ueng ü ü eü an ün n

With the combining of the letterized shengmus and yunmus indicated in the table 1, the pronunciation elements of Chinese characters of Chinese language can be expressed.

Here, in the case of this example, by letterizing the pronunciations of the Chinese characters stored in the memory 32 and storing them, the inputting of these letters can be used to search a Chinese character.

Here, in this example, by combining the input by strokes, which specifies the strokes constituting Chinese characters with order of strokes, with the input by shengmus, an efficient character search can be achieved. The character search can be performed by for example the process of the flow chart of figure 3 under the control of CPU 31. When the characters are inputted, CPU 31 use, for example, the display line 42 of the display unit 40 as the display position of the inputting process. The user performs the inputting operation of characters while watching the display contents of

the display line 42.

Next, the process of character input combining the stroke input and shengmu input will be described with reference to flowchart of figure 3. First, CPU 31 determines whether the mode of inputting characters is selected (step 101). Here, if the mode of inputting characters is selected, it is determined whether there is the input of the first stroke from the stroke order of the character desired to be input according to the prescribed key operation or the operation of the rotary operation unit 34 (step 102). As the input operation of the strokes here, the input mode of a dial key for example is set to stroke input mode and the operation of the dial key is used to input the stroke printed on the key. Further, the operation of the rotary operation unit 34 can also be used to display a list of strokes on the display unit 40, the operation of the rotary operation unit 34 is used to determine the stroke to be input from the displayed strokes so as to perform the input operation of strokes.

Then, a standby state is kept in case there is no stroke input operation in step 102, and when there is the input of a stroke, the CPU 31 searches from the stored data in the memory 32 for a string of candidate characters with the stroke being the first stroke of the stroke order selected through the operation. The characters searched out are displayed on display line 41 of the display unit 40 according to a prescribed order (step 103). At this time, the parts constituting characters, i.e. radicals, can also be displayed as the displayed content of candidate character string. Further, when displaying candidate character string, the display can also be according to for example the order of pronunciation, or the order considering the frequency of use of characters in the past.

In this status, it is determined further whether there is the input of the

second stroke of the character desired to input (step 104). When there is the input of the stroke, the CPU 31 searches from the stored data in memory 32 for the string of candidate characters taking the stroke inputted in step 102 as the first stroke of the order of strokes and the stroke inputted at this time as the second stroke, and displays the character searched out on display line 41 of the display unit 40 according to a prescribed order (step 105).

Thus, the first stroke, the second stroke, ... of the order of strokes are inputted. Each time a stroke is inputted, the scope of candidate characters is reduced successively. By keeping inputting the strokes constituting the character desired to input until the last stroke of the order of strokes, the candidate scope can be reduced to the character desired to input. This manner to reach the character desired to input is stroke input manner. But in case of this example, at any stage displaying the candidate character string, it is determined whether there is any operation of shengmu input.

That is to say, when there is no stroke input operation in step 104 or under the status of displaying the candidate character string in step 105, it is determined whether there is any input operation of a letter corresponding to a shengmu (step 106). A standby state is kept in case there is no input operation of shengmu. As the input operation of shengmu here, for example, the input mode of dial keys is switched from the input mode of strokes to the input mode of letters, and the letter corresponding to a shengmu is inputted by dial key operation. Or alternatively, the rotary operation unit 34 can also be operated to display a list of shengmus in display line 41 of the display unit 40, and the shengmu to be inputted is from the listed shengmus determined by operation of rotary operation unit 34, so as to conduct the input operation of shengmus.

Subsequently, when there is a shengmu input, the scope of candidate characters is reduced to the characters with the their pronunciation possessing the inputted shengmu from among the currently displayed characters as candidate character string, and the scope reduced candidate character string is displayed in display line 41 of the display unit (step 107). Under the status, it is determined whether the operation of selecting specified characters as the characters to be inputted from the displayed candidate character string by using prescribed keys or the operation of the rotary operation unit 34 is performed (step 108). In case of no said input operation, a standby state is kept; in case of the said input operation is existed, the selected character is determined to be the input character and displayed in display line 42 of the display unit 40 for example (step 109). When one or more determined input characters are displayed in line 42, the selected input character in step 108 is displayed at the end of the displayed character(s).

After the processing of determining the input character in step 109, it is determined whether there is the input of next character (step 110). In case there is the input of next character, the input processing beginning with step 102 should be performed again. When finishing the character input processing, the processing of the flow chart is exited.

Then, taken as the information corresponding to the current operation mode, the determined input character string is processed. For example, in case of the mode of the input characters' being sent to any receiving party as character message, the input characters as character message information are stored in memory 32, and after the sending operation of character message, the stored character message information is read out from memory 32 and sent to a receiving party through wireless phone line. In addition, in case of the mode of using characters to input the name or

title which is regarded as part of electronic telephone directory registered along with the telephone numbers, the input characters as the name or title are stored in the memory 32.

By the character input processing in this way, it is not necessary to bear in mind completely the order of strokes to be inputted. As long as at least the first stroke or the order of strokes of the input object character and the pronunciation of the character is born in mind, then the corresponding character can be reached by a very few key operations. Further, after the input of the first stroke of the order of the strokes, the second stroke and the subsequent strokes are successively input, and in the stage when the scope of the candidate characters is reduced to a certain extent, the pronunciation of the shengmu can be input which can further reach the corresponding character more effectively.

What is displayed when using stroke input can also be the radicals as the component of a character instead of candidate characters, and after the initial selection of radicals, the candidate characters can be displayed. The flow chart of figure 4 is the one of the exemplary processing in case of selection of radicals. The following description will be according to figure 4. First, the central control unit 31 determines whether it is the mode of character input (step 201). Here, in case of the mode of character input, according to the prescribed key operation or the operation of rotary operation unit 34, it is judged whether there is the input of the first stroke of the order of strokes of the radical which is possessed by the character to be inputted (step 202).

In case that there is no stroke input operation in step 202, a standby state is kept, and when there is some input of the strokes, the central control unit 31 searches for the string of candidate radicals with said selected

stroke by the operation as the first stroke of stroke order from among the stored data in memory 32, and displays the character searched out in display line 41 of the display unit 40 according to a prescribed order (step 203).

Under this status, it is further determined whether there is the input of the second stroke of the order of strokes of the radical possessed by the character to be inputted (step 204). When there is the input of strokes, the central control unit 31 searches for the string of the candidate radicals with the inputted stroke in step 202 as the first stroke of the order of strokes and with the inputted stroke at this time as the second stroke of the order of strokes, from among the stored data in memory 32, and displays the radical searched out in display line 41 of the display unit 40 according to a prescribed order (step 205).

Thus, the first stroke, the second stroke, ... are inputted, and each time the stroke is input, the candidate radicals scope is successively reduced. By inputting the strokes constituting the radical possessed by the character to be inputted until the last stroke, the candidate scope can be reduced to the radical possessed by the character to be inputted. Here, on the stage of displaying any candidate radical string, it is judged whether there is the operation of selecting radicals (step 206). When there is no selection of radicals, a standby state is kept. When there is the operation of selection of radicals, the string of the candidate characters capable of being combined with the selected radicals is displayed (step 207).

Afterwards, under the state of displaying the candidate character string, it is determined whether there is the input operation of the letter corresponding to a shengmu (step 208). When there is no input operation of a shengmu, a standby state is kept. When there is the input of a

shengmu, in the currently displayed character as candidate character string, the scope of the candidate characters is reduced to the character with the pronunciation possessing the inputted shengmu and the candidate character string with reduced scope is displayed in line 41 of the display unit 40 (step 209). Under this state, it is determined whether there is the operation of selecting specified characters as the characters to be inputted from the displayed candidate character string by using prescribed keys or the operation of the rotary operation unit 34 (step 210). When there is not the input operation, a standby state is kept, and when there is the input operation, the selected character is determined as the character to be inputted and displayed for example in display line 42 of the display unit 40 (step 211). When one or more determined input characters are displayed in display line 42, the selected input characters in step 210 is displayed at the end of the displayed character.

After the processing of determining the characters to be inputted in step 211, it is determined whether there is the input of a next character (step 212). In case that there is the input of a next character, the input processing beginning with step 202 is performed again. In case of finishing the input processing of characters, the process of the flow chart is exited.

Then, the characters determined to be inputted are processed as the information corresponding to the current operation mode. For example, in case of the mode of the input characters' being sent to any receiving party as character message, the input characters as character message information are stored in memory 32, and after the sending operation of character message, the stored character message information is read out from memory 32 and sent to a receiving party through wireless phone line. In addition, in case of the mode of using characters to input the name or

title which is regarded as part of electronic telephone directory registered along with the telephone numbers, the input characters are stored in the memory 32 as the name or title.

Thus, the candidate radicals are displayed by way of stroke input, the radical possessed by the character to be inputted is selected, and the candidate characters capable of being combined with the selected radicals are displayed so as to input shengmus and reduce the scope of candidate characters, therefore capable of conducting efficient search for input characters according to the input of radicals and shengmus. In the processing shown in the flow chart of figure 3, in case that the candidate characters displayed in step 103 are mixed with a radical, on the stage of displaying the candidate character string containing the radical, when conducting the processing of the specified radical in the course of selection and displaying, the process moves to step 207 of figure 4 to display the candidate character string possessed by the selected radical.

Here, the example of input and display will be described with reference to figure 5 and 6.

Figure 5 is an example in case of searching for “霜” as the input character. Under the circumstance, first the processing of the searching for the initial radical of character “霜”, i.e. “雨” is conducted. So, in order to search for the “雨”, as the input of strokes, “一” is designated as the first stroke of the order of strokes, “丶” is designated as the second stroke of the order of strokes. Through such inputting as shown in figure 5 for example, the candidate characters with the first stroke of the order of strokes being “一” and the second stroke of the order of strokes being “丶” will be displayed as “来, 雨, 平, 需, 雪...” . The display of “雨” here is displayed in form of a radical.

Under this state, through the processing of selecting the radical “雨”, the string of the candidate characters with the radical “雨”, such as “霈, 雪, 露, 震, 雷” is displayed. An example of the candidate characters with the radical “雨” and the pronunciation is shown in figure 5. The data of the pronunciation are stored in memory 32.

Further under the state of displaying the candidate character string, through inputting letter “s” as a shengmu, the scope of the displayed candidate characters is reduced to the characters with “s” being the shengmu. In the example of figure 5, it is the two characters of “霰, 霜” that are displayed as the state of candidate characters, and through conducting the operation of selecting a certain character from the 2 characters, “霜” for example can be determined as the input character.

Figure 6 is the example of the case of intending to search for another character. Under this circumstance, first the processing of the searching for the initial radical of character “耳” is conducted. So, in order to search for the “耳”, as the input of strokes, “一” is designated as the first stroke of the order of strokes, “丨” is designated as the second stroke of the order of strokes, “丨” is designated as the third stroke of the order of strokes. Through such inputting as shown in figure 6 for example, the candidate character string with the first stroke of the order of strokes being “一”, the second stroke of the order of strokes being “丨” and the third stroke of the order of strokes being “丨” will be displayed.

Under the state, through the processing of the selection of the radical “耳”, the candidate character string with the radical “耳” is displayed. Further under the state of displaying the candidate character

string, through inputting letter “n” as a shengmu, the scope of displayed candidate character string is reduced to the characters with “n” being the shengmu. By the operation of selecting a certain character from the scope-reduced display, the selected character can be determined as the input character.

In the above-described processing, the so-called stroke input manner is used as the input for initially displaying candidate character string or candidate radical string. But other kind of input manners such as the one based on the pronunciation like shengmus can also be used.

In addition, for the specified pronunciation under the state of displaying candidate characters or candidate radicals, the pronunciation elements besides the above-mentioned shengmus can also be designated. In addition, as mentioned above, in case of the inputting of the letters corresponding to the shengmus, for the shengmu which can be expressed by multiple letters, it is also applicable to only input the first character of these multiple letters. For example, as shown in the above [Table 1], there exist such shengmus which are expressed by two characters as zh, ch, sh, for which such one character input as z, c, s can be used respectively and the searching can be conducted according to the common classification with the shengmus z, c, s and etc.

In addition, the above-mentioned structure of mobile phone terminal is only an example, other kinds of structure of mobile phone terminals can also be used.

Further, the above embodiment is applied to the case of inputting Chinese characters of Chinese language in a mobile phone terminal, but it can be applied to the case of inputting Chinese characters in other kinds of

electronic devices, for example, it can be applied to the case of inputting title of a piece of music with Chinese characters in a reproducing apparatus for reproducing music or the like from a prescribed recording medium.

Further, the above-mentioned embodiment is applied to the case of inputting Chinese characters of Chinese language, but in case of inputting the characters of other kinds of languages, the input can also be processed according to the order of strokes and the pronunciation elements of the characters.

According to the character inputting method of the first aspect of the invention, candidate characters can be specified by the combination of the order of strokes constituting characters and the pronunciation elements of characters, the scope can be reduced to the candidate characters with a very few characters by a very few operations, the characters to be inputted can be searched with high efficiency, and the characters searched out are determined as the input characters. Therefore, the character input such as Chinese characters of Chinese language can be conducted swiftly and simply.

According to the character inputting method of the second aspect of the invention, in the first aspect of the invention, the candidate characters displayed through specifying the first classification items are candidate radicals of the characters; under the state of displaying the candidate radicals, by selecting a specific radical from the displayed content with prescribed operations, the candidate characters containing the selected radicals are displayed; from the displayed candidate characters, the prescribed pronunciation elements classified according to the second classification method are designated so as to reduce the scope to the

candidate characters with a very few characters by way of selecting radicals and specifying the pronunciation elements in the characters constituted by the selected radicals, thus capable of selecting input characters from candidate characters more simply.

According to the character inputting method of the third aspect of the invention, in the first or second aspect of the invention, the pronunciation elements classified by the second classification method are shengmus, therefore the desired characters can be inputted simply by way of specifying shengmus through letter inputting and etc.

According to the character inputting method of the fourth aspect of the invention, in the first, second or third aspect of the invention, the character string constituted by inputted characters as character message information is sent to a receiving party via a prescribed communication line so as to conduct the input operation of the characters sent as character message.

According to the character inputting method of the fifth aspect of the invention, in the first, second or third aspect of the invention, the character string constituted by inputted characters is registered as the information of the names or titles corresponding to telephone numbers, i.e. the information of telephone directory, so as to conduct the inputting operation of the information of telephone directory.

According to the character inputting apparatus of the sixth aspect of the invention, candidate characters can be designated by the combination of the order of strokes constituting characters and the pronunciation elements of characters, the scope can be reduced to the candidate characters with a very few characters by a very few operations, the

characters to be inputted can be searched with high efficiency, and the characters searched out are determined as the input characters. Therefore, even if for such small-sized electronic devices as a mobile phone terminal, the input of such characters as Chinese characters of Chinese language can be performed swiftly and simply.

According to the character inputting apparatus of the seventh aspect of the invention, in the sixth aspect of the invention, the candidate characters displayed through specifying the first classification items are candidate radicals of the characters; under the state of displaying the candidate radicals, by selecting a specific radical from the displayed content with prescribed operations, the candidate characters containing the selected radicals are displayed; from the displayed candidate characters, the prescribed pronunciation elements classified according to the second classification method are designated so as to reduce the scope to the candidate characters with a very few characters by way of selecting radicals and specifying the pronunciation elements in the characters constituted by the selected radicals, thus capable of selecting input characters from candidate characters more simply.

According to the character inputting apparatus of the eighth aspect of the invention, in the sixth or seventh aspect of the invention, the pronunciation elements classified by the second classification method are shengmus, therefore the desired characters can be inputted simply by way of specifying shengmus through letter inputting and etc.

According to the character inputting method of the ninth aspect of the invention, in the sixth, seventh or eighth aspect of the invention, the character string constituted by inputted characters as character message information is sent to a receiving party via a prescribed communication

line so as to conduct the input operation of the characters sent as character message.

According to the character inputting method of the tenth aspect of the invention, in the sixth, seventh or eighth aspect of the invention, the character string constituted by inputted characters is registered as the information of the names or titles corresponding to telephone numbers, i.e. the information of telephone directory, so as to conduct the inputting operation of the information of telephone directory.

CLAIMS

1. A character inputting method, comprising of the steps of:
classifying search object characters with a first classification method, i.e. classifying with the order of strokes constituting characters;
then classifying said search object characters with a second classification method based on character pronunciation elements;
specifying at least one classified item based on said first classification method, and displaying the candidate characters in said search object characters;
specifying the prescribed pronunciation elements classified according to the second classification method from the displayed candidate characters so as to reduce the scope of said displayed candidate characters;
selecting specific characters with prescribed operations from said scope-reduced candidate characters, and determining the selected characters as the input characters.
2. The character inputting method according to claim 1, wherein,
the candidate characters displayed through specifying the first classification items are candidate radicals of the characters; under the state of displaying the candidate radicals, by selecting a specific radical from the displayed content with prescribed operations, the candidate characters containing the selected radicals are displayed;
from the displayed candidate characters, the prescribed pronunciation elements classified according to the second classification method are designated.
3. The character inputting method according to claim 1 or 2, wherein,
said pronunciation elements classified by the second classification method are *shengmus*.

4. The character inputting method according to any one of claim 1 to 3, wherein,

the character string constituted by the characters inputted through the above operations is sent to a receiving party as character message information via a prescribed communication line.

5. The character inputting method according to any one of claim 1 to 3, wherein,

the character string constituted by the characters inputted through the above operations is registered as the information of the names or titles corresponding to telephone numbers, i.e. the information of telephone directory.

6. A character inputting apparatus, comprising:

a storage means for storing characters as search objects, and attaching the information concerning class 1 and class 2, wherein class 1 classifies with the order of the strokes constituting characters, and class 2 is based on pronunciation elements of characters.

an operation means, at least capable of inputting the items of said class 1 and class 2;

a display means for displaying characters specified by operations of said operation means; and

a control means, for performing the following controls: displaying the candidate characters from among the characters stored in said storage means on said display means when specifying at least one item of said class 1 by the prescribed operations of said operation means, and reducing the scope of the displayed candidate characters on said display means from said candidate characters to the characters corresponding to items of class 2 when said operation means has such an operation as

specifying pronunciation elements classified by said class 2 under the status of displaying the candidate characters.

7. The character inputting apparatus according to claim 6, wherein, the candidate characters displayed by specifying said items of said class 1 under the control of said control means are candidate radicals of the characters, and under the state of displaying the candidate radicals, specific radicals are selected by way of prescribed operations of said operation means so as to display the candidate characters containing the selected radicals;

from the displayed candidate characters, the prescribed pronunciation elements classified by said second classification method are specified by the prescribed operation of said operation means, said operation means reduces the scope of candidate characters.

8. The character inputting apparatus according to claim 6 or claim 7, wherein, said second classification is the one using shengmus to classify the pronunciation of characters.

9. The character inputting apparatus according to any one of claims 6 to 8, further comprising communication means for sending as character message information via a prescribed communication line to a receiving party the character string constituted by characters determined from the candidate characters displayed on said display means.

10. The character inputting apparatus according to any one of claims 6 to 8, comprising a telephone directory information holding means for registering the character string constituted by determined characters from the candidate characters displayed on said display unit as information of

the names or titles corresponding to telephone numbers, i.e. information of telephone directory.