

Character Input Method and Character Input Apparatus

The present invention relates to a character input method and a character input apparatus, especially suitable for a relatively small-sized electronic apparatus such as a mobile phone terminal.

A small-sized electronic apparatus, such as a mobile phone terminal or a pager, includes a display composed of an LCD etc. for displaying various information such as numbers, characters, or pictures. For example, in the case of a mobile phone terminal, there has been a type which has the function of so-called electronic phone directory and can store about several hundred phone numbers. Meanwhile, for each of the stored phone numbers, a personal name or company name is stored so as to indicate whose phone number it is, and the stored phone numbers and names etc. can be displayed. Also, in the case of a mobile phone terminal having the function of character message transfer, a character message input to the mobile phone terminal can be sent to another phone, or the mobile phone can receive a character message sent from another phone and display it on the display unit.

Here, in the case of displaying Chinese characters on the display unit of such an electronic apparatus, since there are 6000~7000 frequently used Chinese characters, a method for inputting the characters is desirable. That is to say, in the case of a relatively large electronic apparatus having a keyboard capable of inputting letters of an alphabet, the keyboard can be used to input the pronunciation of a desired Chinese character by letters, and candidate characters having the pronunciation are displayed successively on the display unit and a desired character is found 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 letters is not suitable for a small-sized electronic apparatus such as a mobile phone terminal. Some

types assign three letters to each dial key of a mobile phone terminal, and the letters can be input by different numbers of key presses. However, it is very troublesome to input Chinese characters by such letters.

One of the conventional Chinese character input processes for a mobile phone terminal assigns each basic stroke (笔划) composing Chinese characters to each dial key, and the input is performed by specifying the strokes successively in order observed in calligraphy and finding the desired character by the strokes combined in fixed order. For example, when the Chinese character “王” is specified, since the Chinese character is composed of strokes “一” and “丨”, the strokes “一”, “一”, “丨”, and “一” are input successively in fixed order. The Chinese character “王” is thus specified by the above operations. Chinese characters containing “王” is successively displayed as “王, 琼, 现, 理, 表...”, and a desired character is found from the displayed characters and is specified.

However, the input process by strokes combined in fixed order requires that the stroke order of each Chinese character be remembered correctly. Meanwhile, in the case of Chinese characters having many strokes, the number of key presses is so great that a desired character cannot be quickly found and input.

Here, the description is made with regard to the case of inputting Chinese characters in a mobile phone terminal, but the same problem exists in the case of inputting Chinese characters in various relatively small-sized electronic apparatuses.

The purpose of the present invention is for conveniently inputting characters such as Chinese characters in an electronic apparatus with limited space to arrange the operation keys.

This purpose can be achieved by the present invention comprising:

a memory means for classifying and storing candidate characters, each of which is expressed by the combination of a first pronunciation element and a second pronunciation element, as each combination of each first pronunciation element and the second pronunciation elements;

an operation means for indicating a first direction, indicating a second direction opposite to the first direction, or indicating a

determination;

a display means for displaying said candidate characters; and

a control means for successively controlling the display on said display means, by a first, second direction indication or a determination indication on said operation means, into display states of selecting a first pronunciation element, selecting a second pronunciation element capable of combining with the selected first pronunciation element, and selecting a candidate character expressed by the combination of the selected first, second pronunciations.

According to the present invention, any character can be selected as an input character by selecting a first pronunciation element, selecting a second pronunciation element capable of combining with the selected first pronunciation element, and selecting from candidate characters with the pronunciation determined by the selected first pronunciation element and the second pronunciation element, by means of indicating the first direction, the second direction and determination on the operation unit.

The above and other objects, features, and advantages of the present invention will become more apparent from the following detailed description when taken in conjunction with the accompanying figures in which:

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

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

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

Fig. 4 is an illustrative diagram of an exemplary display of one embodiment according to the present invention;

Fig. 5 is a perspective diagram of an exemplary mobile phone terminal according to another embodiment of the present invention;

Fig. 6 is a perspective diagram of an exemplary mobile phone terminal according to another embodiment of the present invention.

Next, an embodiment of the present invention will be described with

reference to the accompanying figures.

This embodiment is suitable for 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 transfer, and various data communications.

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

As the structure for performing wireless communications, a voice signal picked up by a microphone 11 is baseband-processed by an amplifier 12 etc. The baseband-processed voice signal is converted into digital voice data in a prescribed format by an A/D (analog/digital) 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 transmission data structure. At this time, control data etc. supplied from the CPU 31 is appended to the transmission data. The transmission data processed by the data processor 14 is supplied to a modulator 15 to be modulated. The data signal modulated by the modulator 15 is supplied to a transmission HF (high frequency) circuit 16 to be frequency-converted for transmission. The transmission signal frequency-converted by the HF circuit 16 is supplied to an antenna 18 via an antenna switch 17 and is wireless-transmitted from the antenna 18.

On the other hand, the signal received by the antenna 18 is supplied to a reception HF circuit 19 via the antenna switch 17 to be frequency-converted, thus the received HF signal is converted into an IF (intermediate frequency) signal (or a baseband signal). The IF signal converted by the HF circuit 19 is supplied to a demodulator 20 to be demodulated. The signal demodulated by the demodulator 20 is supplied to the data processor 14. In the data processor 14, 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 amplified by an amplifier 22 etc. and then is played from a speaker 23. Also, the control data extracted by the data processor 14 is supplied to the CPU 31.

To the CPU 31 is connected a memory 32 which stores in advance the operation program necessary for a wireless phone. Also, under the control of the CPU 31, data set by user operation, such as electronic phone directory data or text message information etc., which will be described later is stored into the memory 32. Here, in the case of the mobile phone terminal of this example, as the electronic phone directory data or the character message information, Chinese characters such as those in Chinese can also be stored as prescribed codes, in addition to the characters such as letters. Also, information necessary for search process when inputting the Chinese characters, which will be described later, is also stored in the memory 32.

Also, the mobile phone terminal includes an operation keyboard 33 provided 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, and includes a rotary operation unit 34 capable of input operation by rotary operation and pressing operation. The rotary operation unit 34 is a device called "jogdial". When the operation keyboard 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 numerals, characters or pictures of prescribed digits can be displayed in several lines (for example about 4 lines) on the display unit 40, under the control of the CPU 31. Backlight is provided on the display unit 40, thus the display can be confirmed even in a dark place.

The appearance of the mobile phone terminal of this example is shown in Fig. 2. On the surface of the casing composing the mobile phone terminal 10, a microphone 11 is provided at the lower part, and a

speaker 23 is provided on the upper part, and the operation keyboard 33 and the display unit 40 are provided on between. Also, the rotary operation unit 34 is provided on the left side where the operation keyboard 33 and the display unit 40 are provided. The rotary operation unit 34 is a rotary switch called "jogdial" with only part of a round plate portion protruding from the body of the terminal. The portion can be rotated in the upward direction indicated by the arrow "a", be rotated in the downward direction indicated by the arrow "b", or be pressed to the body side indicated by the arrow "c". When performing each operation, the corresponding operation information is supplied to the CPU 31. When the mobile phone terminal is hold in for example the left hand, the rotary operation unit 34 can be rotated upward or downward or pressed only by the thumb of the left hand. In this example, characters are input by using the rotary operation unit 34.

Also, as shown in Fig. 2, the display unit 40 provided on the mobile phone terminal of this example prepares at least a first display line 41 and a second display line 42, as display lines for displaying numerals or characters. Also, a display line 43 is also prepared for displaying the reception level or the remaining energy of the battery by pictures etc.

In the first, second display lines 41, 42 of the display unit 40, for example when performing transmission operations by the terminal, or when performing reception by the terminal, phone number of the addressee or phone number of the addresser is displayed with numerals in the second display line 42, under the control of the CPU 31. Also, when the phone number of the addressee is registered by the function of electronic phone directory, the two display lines 41, 42 are used to display the registered phone number with numerals, and to display the personal or company name etc. related to the phone number with characters, under the control of the CPU 31. Here, in the case of this example, characters such as Chinese characters or letters etc. can be used as the name related to the phone number.

When in the mode of displaying the registered phone number on the display unit 40, under the control of the CPU 31 based on the upward or

downward rotary operation of the above rotary operation unit 34, the displayed phone numbers and names are changed successively in the prescribed order or its reverse order. When the desired addressee phone number is displayed on the display unit 40 by such an operation, the CPU 31 calls to the phone number when the rotary operation unit 34 is pressed.

And when the phone number of the addresser is displayed to the addressee, 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. is also displayed in addition to the phone number.

Also, the mobile phone terminal of this example can transmit or receive a text message under the control of the CPU 31. In the case of receiving a text message, the received text message is stored into the memory 32 while the stored text message is displayed on the display unit 40. Also, the text message input by the user operation and displayed on the display unit 40 can be transmitted to a party with any phone number, under the control of the CPU 31. Similar to the above case of electronic phone directory, the text message can be displayed by using 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, for registering names etc. by the above function of electronic phone directory, or for preparing the text message to be transmitted, the case of inputting Chinese characters is described as an example of inputting characters.

First, the codes of the Chinese characters are classified according to the pronunciations of the respective characters, and stored in the memory 32 of the mobile phone terminal of this example. Here, it is noticed that the pronunciation of each Chinese character is composed of a pronunciation element called *shengmu* (声母), and a pronunciation element called *yunmu* (韵母), therefore is classified and stored according to the elements of *shengmu* and *yunmu*.

That is to say, the *shengmu* composing the pronunciation of a Chinese character is basically classified into one of the 21 pronunciations, as shown by the alphabetized symbols (*pinyin*) in the *shengmu* column of

the following [Table 1]. Also, the *yunmu* can be classified into one of the 35 pronunciations, as shown by the alphabetized symbols in the *yunmu* column of [Table 1].

[Table 1]

Content of *Shengmu* and *Yunmu*

<i>shengmu</i>	basic	b p m f d t n l g k h j q x zh ch sh r z c s
	applied	basic <i>shengmu</i> + a o e + w y
<i>yunmu</i>	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 üe üan ün	

Here, in the case of this example, for each of the 21 *shengmus*, information on *yunmus* capable of combining with the *shengmu* is stored in the memory 32. The following [Table 2] shows an example.

[Table 2]

<i>shengmu</i>	<i>yunmu</i>
f	a an ang ei en eng o ou u
j	i ia ian iang iao ie in ing iong iu u uan ue un
r	an ang ao e en eng i ong ou u uan ui un uo
w	a ai an ang ei en eng o u
y	a an ang ao e i in ing o ong ou u uan ue un

For example, there are nine *yunmus* capable of combining with the *shengmu* [f], and there are fourteen *yunmus* capable of combining with the *shengmu* [j], as shown by [Table 2]. Also, when a pronunciation is determined by the combination of such *shengmu* and *yunmu*, there are about several to ten odd Chinese characters corresponding to the determined pronunciation. Here, the information on Chinese characters determined by the combination of each *shengmu* and *yunmu* is stored in the memory 32.

Thus, the CPU 31 performs the character input process according to

the flowchart shown in Fig. 3, by using the information stored in the memory 32. When performing the character input process, the CPU 31 uses the second display line 42 of the display unit 40 as the display position for input process. The user performs the input operation by inputting characters while looking at the display in the display line 42. Also, the first display line 41 of the display unit 40 is used as a display position for inputting a determined character string. In the following process, the input characters are displayed one by one on the display line 41, forming a name or a text message etc. Fig. 4 shows an example of how the display changes in the display lines 41, 42.

Next, the process of the flowchart in Fig. 3 will be described. First, the CPU 31 judges whether it is in the mode of inputting characters (Step 101). Here, in the case of the mode of inputting characters, symbols representing the pronunciations of the *shengmus* are displayed successively on the display unit 40 (Step 102). Fig. 4A shows an example of the display at this time. For example, the *shengmus* are display in fixed order in the second display line 42. Then, one of the displayed *shengmus* is marked as one to be selected. For example, in the example of Fig. 4A, the *shengmu* displayed at the left end of the display line 42 is underlined, indicating the *shengmu* to be selected.

In the state of displaying the *shengmus*, the user performing character input operation rotates the rotary operation unit 34 so that the *shengmu* of a desired character is underlined. The CPU 31 judges whether there is a rotation operation of the rotary operation unit 34 (Step 103). In the case that there is a rotation operation, it judges the direction of the rotation (the upward direction "a" or the downward direction "b" as shown in Fig. 2) and the rotated amount, and changes the display state of the *shengmus* according to the state of rotation (Step 104). In particular, for example, when the rotary operation unit 34 is rotated in the upward direction, the *shengmu* display in the display line 42 is changed by scrolling to the left side, and when the rotary operation unit 34 is rotated in the downward direction, the *shengmu* display in the display line 42 is changed by scrolling to the right side. The position to be underlined is

fixed at the left side, while the *shengmu* to be selected is changed according to the rotation operation of the rotary operation unit 34.

Here, the user performing the character input operation looks at the display on the display unit 40. Once the *shengmu* of the desired character is underlined, the user presses the rotary operation unit 34. The CPU 31 judges whether there is a press operation (Step 105). In the case that there is a press operation, the *shengmu* underlined at this time is determined as the selected *shengmu*, and *yunmus* capable of combining with the determined *shengmu* are displayed (Step 106).

The display in the display line 42 of the display unit 40 at this time is shown in Fig. 4B. The determined *shengmu* is displayed at the left end of the display line 42, while the position to be underlined is shifted to the immediate right side of the determined *shengmu*. Then, *yunmus* capable of combining with the determined *shengmu* are successively displayed at the right side of the determined *shengmu*, as shown in Fig. 4C. Therefore, the state shown in Fig. 4B is not actually displayed. Instead, after the selection operation in the *shengmu* display state shown in Fig. 4A, the state shifts directly to that of the *yunmu* display shown in Fig. 4C.

In the state of displaying the *yunmus*, the user performing character input operation rotates the rotary operation unit 34 so that the *yunmu* of the desired character is underlined. The CPU 31 judges whether there is a rotation operation of the rotary operation unit 34 (Step 107). In the case that there is a rotation operation, it judges the direction of the rotation (the upward direction "a" or the downward direction "b" as shown in Fig. 2) and the rotated amount, and changes the display state of the *yunmus* according to the state of rotation (Step 108). In particular, for example, when the rotary operation unit 34 is rotated in the upward direction, the *yunmu* display in the display line 42 is changed by scrolling to the left side, and when the rotary operation unit 34 is rotated in the downward direction, the *yunmu* display in the display line 42 is changed by scrolling to the right side. But the display of the determined *shengmu* at the left end does not change. The *yunmu* displayed beside the *shengmu* at the left end is underlined, indicating that it is to be selected, and the *yunmu* to be

selected is changed according to the rotation operation of the rotary operation unit 34.

Here, the user performing the character input operation looks at the display on the display unit 40. Once the *yunmu* of the desired character is underlined, the user presses the rotary operation unit 34. The CPU 31 judges whether there is a press operation (Step 109). In the case that there is a press operation, the *yunmu* underlined at this time is determined as the selected *yunmu*. Then, the CPU 31 reads Chinese characters with the pronunciation determined by the *shengmu* determined in Step 105 and the *yunmu* determined here, from the stored information in the memory 32, and displays the read Chinese characters successively in predetermined order in the display line 42 of the display unit 40 (Step 110). For example, as shown in Fig. 4D, when the *yunmu* [ang] is selected in the state that the *shengmu* [zh] has been selected, Chinese characters with the pronunciation [zh ang] are displayed successively in the display line 42. At this time, the character at a particular position (here, the character at the left end) is underlined, indicating the underlined Chinese character to be selected.

In the state of displaying the candidate Chinese characters, the user performing character input operation rotates the rotary operation unit 34 so that the desired character is underlined. The CPU 31 judges whether there is a rotation operation of the rotary operation unit 34 (Step 111). In the case that there is a rotation operation, it judges the direction of the rotation (the upward direction "a" or the downward direction "b" as shown in Fig. 2) and the rotated amount, and changes the display state of the characters according to the state of rotation (Step 112). In particular, for example, when the rotary operation unit 34 is rotated in the upward direction, the character display in the display line 42 is changed by scrolling to the left side, and when the rotary operation unit 34 is rotated in the downward direction, the character display in the display line 42 is changed by scrolling to the right side. There are in average about 10 frequently used Chinese characters represented by a pronunciation determined by a *shengmu* and a *yunmu*.

Here, the user performing the character input operation looks at the display on the display unit 40. Once the desired character is underlined, he presses the rotary operation unit 34. The CPU 31 judges whether there is a press operation (Step 113). In the case that there is a press operation, the character underlined at this time is determined as the selected character. When the input character has been determined, the determined character is displayed in the first display line 41 as shown in Fig. 4F (Step 114). Here, the selection of the first character has been described, so the determined character has been displayed at the left end of the display line 41. But when the input operation of the second or the following character is performed, the determined character is displayed at the end of the determined character string displayed in the display line 41.

Next, the CPU 31 judges whether the operation of ending character input has been performed (Step 115). The operation of ending character input can be performed by the operation of a particular key on the operation keyboard 33 or the operation of the rotary operation unit 34 (for example pressing twice quickly) etc.

Here, in the case that the operation of ending character input has not been performed, the procedure returns to Step 102, and the input operation of the next character is performed with the same process. In the exemplary display of Fig. 4F, the first character is determined, and the determined character is displayed in the first display line 41. Meanwhile, the *shengmu* display of Step 102 is performed so that the next character can be selected from the second display line 42.

Then, when it is judged in Step 115 that the operation of ending character input has been performed, the CPU 31 treats the character string displayed in the first display line 41 by the input operation, as the information corresponding to the operation mode at this time (Step 116). For example, when in the mode of inputting the name registered together with the phone number as electronic phone directory, the input characters are stored into the memory 32 as the name. While in the mode of transmitting a text message to any party, the input characters are stored into the memory 32 as text message, and the text message information is

read from the memory 32 and wireless-transmitted to the opposite party when the transmission operation of the text message is performed.

By inputting Chinese characters in this way, the desired character can be selected from among a plurality of Chinese characters and be input by simple operation. That is to say, the pronunciation of each Chinese character is divided into a *shengmu* and a *yunmu*. The *shengmu* is selected, then the *yunmu* capable of combining with the *shengmu* is selected, and then Chinese characters with the pronunciation determined by the selected *shengmu* and *yunmu* are displayed, and the desired Chinese character can be selected and input efficiently by simple operation. In particular, there are basically 21 *shengmus*, and there are about several to ten odd *yunmus* capable of combining with each *shengmu*. The selection is made from among about ten candidates during each selection operation, and very efficient Chinese character input can be achieved.

Furthermore, the operation procedure necessary for the input operation includes only three steps: the operation of scrolling the display position in one direction, the operation of scrolling the display position in the opposite direction, and the operation of determining the display. This is very suitable for a small-sized electronic apparatus such as a mobile phone. Especially in the case of this example where the rotary operation unit 34 shown in Fig. 2 is used as an operation means, three operations are performed: the operations of rotating upward and downward of the rotary operation unit 34 and the operation of pressing in a different direction from those of the rotation. Only one operation unit is needed to input the desired Chinese characters quickly by the above three steps.

When a Chinese character is input, *shengmus* and *yunmus* can be always displayed in predetermined order on the display unit. For example, the previously selected *shengmu* and the *yunmu* can be first displayed at the selection position. Also, when candidate Chinese characters are displayed after pronunciation has been determined by the *shengmu* and *yunmu*, the previously selected Chinese character can be first displayed at the selection position. Also, the display order can be changed according

to the operation mode of the terminal when Chinese characters are input. For example, when in mode of inputting the registered Chinese characters as electronic phone directory, the Chinese characters frequently used as names are first displayed on the display unit.

Also, operation units other than the above rotary operation unit can also be used to input Chinese characters similarly. For example, in the example shown in Fig. 2, the operation unit has a round plate component which can rotate freely within 360° angle. But a component capable of turning upward and downward only within a prescribed degree (for example tens degree) can also be provided. When turning the component upward or downward, the same operation as that of rotating the rotary operation unit 34 upward or downward can be performed. Also, instead of rotating an operation unit like the rotary operation unit 34 upward or downward, another operation unit capable of horizontal movements (i.e. the movement to left and the movement to right) can also be employed to indicate the same operations. Also, the position to arrange the operation unit performing such operations is not limited to the above examples, but it can be arranged at any position on the casing of the terminal.

Also, in the above example as shown in Fig. 4, as the display on the display unit when Chinese characters are input, the character to be selected is underlined. But, other ways of display may be employed to indicate the part to be selected. For example, blinking may be applied to the *shengmu*, *yunmu*, character etc. to be selected, or the display color can be reversed to indicate the selected part.

Also, A different operation unit may be used to indicate the operations of scrolling to one direction and another and the operation of determination. Fig. 5 shows an exemplary mobile phone terminal 10' in this case. Here, an operation key 35 indicating scrolling to one direction and an operation key 36 indicating scrolling to another direction can be provided up and down on the side of the casing of the terminal 10', and an operation key 37 performing operation of determination is provided between the two keys 35 and 36. Similarly, in the case of this structure, for example when the mobile phone terminal 10' is hold by the left hand,

the operations of scrolling to one direction and another and the operation of determination can be performed by a minor movement of the thumb of the left hand, thus Chinese characters can be input with good operability.

Also, instead of providing the special-purpose keys on the side of such terminal, function keys provided at the same surface as that of the dial keys can be used to perform input operation. For example, as shown in Fig. 6, three particular keys 33a, 33b, 33c on the keyboard 33 of the mobile phone terminal 10" can be defined respectively as the operation key indicating scrolling to one direction, the operation key indicating scrolling to another direction, and the operation key for operation of determination. When each of the keys 33a, 33b, 33c is operated, the same Chinese character input process can be performed.

Although the above embodiment is used in the mobile phone terminal for inputting Chinese characters, it can also be used in other various electronic apparatus to input Chinese characters. For example, it can be used in a reproduction apparatus for reproducing audio signal such as music from a prescribed medium when the title of the music is input by using Chinese characters.

Also, in the above embodiment, a Chinese character is divided into two pronunciation elements, i.e. a *shengmu* and a *yunmu* for searching a character. But, in the case of searching and inputting characters of other languages, the pronunciation of each character can also be divided into a first pronunciation element and a second pronunciation element and the input process can be similarly performed.

According to the character input method of the 1st aspect of the present invention, searching candidate characters, each of which is expressed by the combination of a first pronunciation element and a second pronunciation element, is performed by the following three steps of selections: selecting a first pronunciation element, selecting a second pronunciation element capable of combining with the first pronunciation element, and selecting a character with the pronunciation determined by the selected first and second pronunciation elements. Thus, any character can be searched from among a plurality of candidate characters and be

input by simple operation.

According to the character input method of the 2nd aspect of the present invention, in the method of the 1st aspect of the present invention, the first pronunciation element is *shengmu*; and the second pronunciation element is *yunmu*. Thus, Chinese characters can be input by simple operation.

According to the character input method of the 3rd aspect of the present invention, in the method of the 1st or 2nd aspect of the present invention, the operations indicating the first direction and second direction are the operations of moving a prescribed portion up and down or left and right. Thus, pronunciation elements and characters can be easily input by using the up and down or left and right operations.

According to the character input method of the 4th aspect of the present invention, in the method of the 3rd aspect of the present invention, the operation of determination is the operation of pressing the prescribed portion or its vicinity in a different direction from those of said operations of moving it up and down or left and right. Thus, after the operations of moving up and down or left and right, the operation of determination can be performed directly and quickly, and searching each pronunciation element can be more easily performed.

According to the character input method of the 5th aspect of the present invention, in the method of the 1st or 2nd aspect of the present invention, the character selected by said operation of determination is displayed at the end of the portion where a determined character string is displayed. Thus, words can be input one by one, and names and messages can be easily formed.

According to the character input method of the 6th aspect of the present invention, in the method of the 5th aspect of the present invention, the determined character string displayed by said operation is registered as phone directory information which is name information corresponding to a phone number. Thus, names registered as phone directory information can be easily input.

According to the character input method of the 7th aspect of the

present invention, in the method of the 5th aspect of the present invention, the determined character string displayed by said operation is transmitted to an opposite party via a prescribed communication line, as text message information. Thus, the characters to be transmitted as text messages can be easily input.

According to the character input apparatus of the 8th aspect of the present invention, searching candidate characters, each of which is expressed by the combination of a first pronunciation element and a second pronunciation element, is performed by the following three indication operations: indications of two directions and determination indication based on the information classified by each pronunciation element and stored in the memory unit. The operation unit is one of a simple structure without the keyboard, and any character can be searched from among a plurality of candidate characters and be input by simple operation.

According to the character input apparatus of the 9th aspect of the present invention, in the apparatus of the 8th aspect of the present invention, the first pronunciation element composing a candidate character stored in said memory means is *shengmu*; and the second pronunciation element is *yunmu*. Thus, Chinese characters can be input by a simple operation unit.

According to the character input apparatus of the 10th aspect of the present invention, in the apparatus of the 8th or 9th aspect of the present invention, the operation means is one which indicates said first direction when a component capable of rotating within at least a prescribed angle is rotated in a first direction, and indicates said second direction when it is rotated in a second direction opposite to the first direction, and indicates said determination when said component is pressed in a direction different from both of said rotating directions. Thus, characters such as Chinese characters can be easily input by an operation unit with simple structure.

According to the character input apparatus of the 11th aspect of the present invention, in the apparatus of the 8th or 9th aspect of the present

invention, the operation means is composed of at least three keys including a key indicating said first direction, a key indicating said second direction, and a key indicating said determination. Thus, Chinese characters can be input by a simple structure using only three keys.

According to the character input apparatus of the 12th aspect of the present invention, in the apparatus of the 8th or 9th aspect of the present invention the display means has a portion for displaying a determined character string, and said control means performs control so that the selected candidate character is displayed at the end of a character string displayed on the portion where the determined character string is displayed. Thus, names and messages can be easily formed by using the input characters.

According to the character input apparatus of the 13th aspect of the present invention, in the apparatus of the 12th aspect of the present invention, the control means registers the determined character string displayed on said display means, as phone directory information which is name information corresponding to a phone number. Thus, names registered as phone directory information can be easily input.

According to the character input apparatus of the 14th aspect of the present invention, in the apparatus of the 12th aspect of the invention, the control means transmits the determined character string displayed on said display means, to an opposite party via the prescribed communication line, as text message information. Thus, characters to be transmitted as text message can be easily input.



What is claimed is

1. A character input method, comprising the following steps:

classifying candidate characters, each of which is expressed by the combination of a first pronunciation element and a second pronunciation element, as each combination of each first pronunciation element and the second pronunciation elements;

displaying the symbols representing said first pronunciation elements while changing them in forward order or reverse order, by an operation indicating a first direction or a second direction opposite to the first direction;

in the stage of displaying the prescribed symbols representing said first pronunciation elements, when a prescribed operation of determination is performed, determining a first pronunciation element represented by a prescribed symbol, and displaying in prescribed order the symbols representing the second pronunciation elements capable of combining with the determined first pronunciation element;

displaying the symbols representing the second pronunciation elements while changing them in forward order or reverse order, by an operation indicating the first direction or the second direction opposite to the first direction;

in the stage of displaying the prescribed symbols representing said second pronunciation elements, when a prescribed operation of determination is performed, displaying in prescribed order the candidate characters, each of which is expressed by the combination of said first pronunciation element and the second pronunciation elements represented by the prescribed symbols; and

selecting a desired character from among the candidate characters displayed in order, by an operation indicating said first direction or second direction and by a prescribed operation of determination.

2. The character input method according to Claim 1, wherein said first pronunciation element is *shengmu*; and said second pronunciation element is *yunmu*.

3. The character input method according to Claim 1 or 2, wherein



the operations indicating said first direction and second direction are the operations of moving a prescribed portion up and down or left and right.

4. The character input method according to Claim 3, wherein

said operation of determination is the operation of pressing said prescribed portion or its vicinity in a different direction from those of said operations of moving it up and down or left and right.

5. The character input method according to Claim 1 or 2, wherein

displaying the character selected by said operation of determination, at the end of the portion where a determined character string is displayed.

6. The character input method according to Claim 5, wherein

registering the determined character string displayed by said operation, as phone directory information which is name information corresponding to a phone number.

7. The character input method according to Claim 5, wherein

transmitting the determined character string displayed by said operation, to an opposite party via a prescribed communication line, as text message information.

8. A character input apparatus, comprising:

a memory means for classifying and storing candidate characters, each of which is expressed by the combination of a first pronunciation element and a second pronunciation element, as each combination of each first pronunciation element and the second pronunciation elements;

an operation means for indicating a first direction, indicating a second direction opposite to the first direction, or indicating a determination;

a display means for displaying said candidate characters; and

a control means for successively controlling the display on said display means, by a first, second direction indication or a determination indication on said operation means, into display states of selecting a first pronunciation element, selecting a second pronunciation element capable of combining with the selected first pronunciation element, and selecting a candidate character expressed by the combination of the selected first,



second pronunciations.

9. The character input apparatus according to Claim 8, wherein the first pronunciation element composing a candidate character stored in said memory means is *shengmu*; and the second pronunciation element is *yunmu*.

10. The character input apparatus according to Claim 8 or 9, wherein said operation means indicates said first direction when a component capable of rotating within at least a prescribed angle is rotated in a first direction, and indicates said second direction when it is rotated in a second direction opposite to the first direction, and indicates said determination when said component is pressed in a direction different from both of said rotating directions.

11. The character input apparatus according to Claim 8 or 9, wherein said operation means is composed of at least three keys including a key indicating said first direction, a key indicating said second direction, and a key indicating said determination.

12. The character input apparatus according to Claim 8 or 9, wherein said display means has a portion for displaying a determined character string, and said control means performs control so that the selected candidate character is displayed at the end of a character string displayed on the portion where the determined character string is displayed.

13. The character input apparatus according to Claim 12, wherein the control means registers the determined character string displayed on said display means, as phone directory information which is name information corresponding to a phone number.

14. The character input apparatus according to Claim 12, wherein said control means transmits the determined character string displayed on said display means, to an opposite party via the prescribed communication line, as text message information.