

METHOD FOR INPUTTING CHARACTERS IN A CHARACTER SET BY USING A KEY OR KEYS, KEYPAD OR KEYBOARD, AND INFORMATION PROCESSING APPARATUS

Field of the invention

The present invention relates to information processing field, and particularly to a method for inputting characters in a character set by using a key or keys, a keypad or keyboard, and an information processing apparatus.

Background of the invention

In the traditional information processing field, with respect to techniques for inputting characters by using a key or keys, universally, a key corresponds to a character inputted. For example, in a personal computer, there are keys for English alphabets A-Z and keys for digits 0-9. When any of the keys is activated, an English alphabet or a digit corresponding to the key appears on a display screen. If a Chinese character is to be inputted (for example, using input methods such as ZiGuang Chinese Character Input Method), when pinyin corresponding to the Chinese character is inputted, there appears on the screen a display bar, in which Chinese characters having the pinyin are displayed, and the user may choose a correct Chinese character from them. If a Japanese character is to be inputted, the user inputs a Roman phonetic alphabet of a hiragana by using English alphabet keys A-Z, in a state that the language option is set as Japanese, and a corresponding hiragana appears on the screen. Again for example, a calculator comprises keys for digits 0-9 and keys for symbols “+”, “-“, “x”, “÷”, “=”. The user inputs an operation expression by using the keys for digits 0-9 and the keys for symbols “+”, “-“, “x”, “÷”, “=”. When the user inputs “=”, a final operation result appears on the LCD display screen. The above traditional methods are characterized in that a key corresponds to a character. A character in a character set, to be inputted by the user uniquely corresponds to a key, so

many keys are needed. If the number of the keys is less than the number of characters in the character set, the traditional methods are inoperable. Therefore, the traditional techniques for inputting characters by using a key or keys require a large number of keys and an unreducible volume of keyboard.

With the development of information processing techniques, the volume of the keyboard is required to be smaller and smaller, and the number of the keys is required to be fewer and fewer. The traditional keyboards and traditional methods for inputting characters by using a key or keys become inadapttable.

Summary of the invention

An object of the invention is to decrease the number of keys required for character input and reduce the volume of the keyboard, in order to be adapted to the needs of modern information processing techniques.

A solution of the invention is to let some characters in the character set collectively use a key, such that characters in a character set having more characters than the keys, can be inputted by using limited keys.

The present invention provides a method for inputting characters in a character set by using a key or keys, the number of the characters in the character set being larger than the number of the key or keys, said method comprising: assigning all the characters in the character set to said key or keys, at least one key within said key or keys being assigned a plurality of characters in the character set; and distinguishing the characters assigned to said at least one key, wherein selecting a combination of the distinguished characters in the character set generates a desired complete character.

The present invention provides a keypad or keyboard, comprising keys for inputting characters in a character set, the number of the characters in the character set being larger than the number of the key or keys, wherein all the characters in the character set are assigned to said key or keys, at least one key within said key or keys being assigned a plurality of characters in the character set, the characters represented by said at least one key being distinguishable.

The present invention provides an information processing apparatus, comprising: a keypad or keyboard, comprising keys for inputting characters in a character set, the number of the characters in the character set being larger than the number of the key or keys, wherein all the characters in the character set are assigned to said key or keys, at least one key within said key or keys are assigned a plurality of characters in the character set, the characters represented by said at least one key being distinguishable; and a display screen for displaying the result of inputting characters by means of the keypad or keyboard.

Since in the invention, some characters in the character set collectively use a key, the number of keys required for character input is saved and the volume of the keyboard is reduced.

Brief description of the drawings

Fig.1 is a flow chart showing a method according to the invention.

Fig.2 is a schematic diagram showing keys in a mode switching manner of a five-dimensional calculator according to a first embodiment of the invention.

Fig.3 is a schematic diagram showing keys in a long-short activating manner of a five-dimensional calculator according to the first embodiment of the invention.

Fig.4 is a schematic diagram showing keys in a vowel plus digit manner of a five-dimensional Japanese input according to a second embodiment of the invention.

Fig.5 is a schematic diagram showing keys in a vowel plus navigation key manner according to the second embodiment of the invention.

Fig.6 is a schematic diagram showing keys in a manner of vowel plus number of strokes according to the second embodiment of the invention.

Detailed description of the drawings

Fig.1 is a flow chart showing a method according to the invention. The present invention provides a method for inputting characters in a character set

by using a key or keys, the number of the characters in the character set being larger than the number of the key or keys, said method comprising: assigning (S1) all the characters in the character set to said key or keys, at least one key within said key or keys being assigned a plurality of characters in the character set; and distinguishing (S2) the characters represented by said at least one key for said at least one key assigned the plurality of characters in the character set.

For example, the character set comprises 15 characters in all, i.e., digits 0-9, "+", "-", "x", "÷", "=", but they are only two keys, i.e., a digit key and an operation symbol key, that is, the digit key is assigned 10 characters, i.e. digits 0-9, and the operation symbol key is assigned 5 characters, i.e. "+", "-", "x", "÷", "=". In this way, for the digit key, it is needed to distinguish which character in digits 0-9 it represents; for the operation symbol key, it is needed to distinguish which character in "+", "-", "x", "÷", "=" it represents. The following is a discussion about how a key assigned a plurality of characters in the character set distinguishes the characters it represents. The distinguishing mainly comprises the following two manners:

(1) The characters represented by said at least one key are distinguished by an activating manner of said at least one key.

1) The characters represented by said at least one key are distinguished by a time interval between two activations of said at least one key. For example, the characters represented by said at least one key are switched over once if the time interval between two activations of said at least one key is less than a preset period T. For example, the preset period T is 0.2 seconds. If either said at least one key are not activated again within the preset period T after they are initially activated, or other keys are activated after said at least one key is activated, the characters are input successfully.

Take the above example as an example again. For example, an equation "9x5=" is to be inputted. First the digit key that represents the digits 0-9 is activated continuously for nine times, wherein the time interval between each of two continuous activations is less than T. Since the digit key initially represents 0,

after it is activated once, the key is switched over to represent 1; after the digit key is activated twice, the key is switched over to represent 2..., after the key is activated for nine times, the key is switched over to represent 9. Then the operation symbol key representing “+”, “-“, “x”, “÷”, “=” is activated, and at this time it is deemed that “9” is inputted successfully. Then the operation symbol key is continuously activated twice, and the time interval between the two continuous activations is less than T. The operation symbol key initially represents “+”, after it is activated once, it is switched over to represent “-“, and after it is activated twice, it is switched over to represent “x”. Then the digit key is activated again, and at this time “9x” are inputted successfully. Then the digit key is continuously activated for five times, and the time interval between each of two continuous activations is less than T. Then the operation symbol key is activated, and at this time “9x5” are inputted successfully. Then, the operation symbol key is continuously activated for four times. After the preset period T, “9x5=” are inputted successfully and the result 45 is displayed on the display screen.

2) There is one mode key in addition to said at least one key, activating the one mode key causing said at least one key to represent specific characters.

Fig.2 is a schematic diagram showing keys in a mode switching manner of a five-dimensional calculator according to a first embodiment of the invention. In order not to blur the inventive point of the invention, the display screen of the calculator is not shown and only the keypad thereof is shown. The keypad has 7 keys comprising 5 input keys and 2 functional keys. Among the 5 input keys, the up key is used for inputting digits 0, 1/operation symbol “+”; the right key is used for inputting digits 2, 3/operation symbol “-”; the down key is used for inputting digits 4, 5/operation symbol “x”; the left key is used for inputting digits 6, 7/operation symbol “÷”; the middle key is used for inputting digits 8, 9, decimal point (·)/operation symbol “=”. The two functional keys respectively are a mode key and a delete key.

After the mode key is activated, an operation symbol input mode is entered to input an operation symbol, that is, the above-mentioned 5 input keys at this

time respectively represent “+”, “-“, “x”, “÷”, “=”. After the mode key is activated and then an input key is activated, an operation symbol is inputted, and at this time the mode is automatically converted into a digit input mode. In the digit input mode, if the time interval between two adjacent activations of a key is within T, the input content is switched over, for example, if the up key is activated, the first input is 0; if the time interval between the second activation and the first activation is less than T, the input is changed to 1; if the time interval between the third activation and the second activation is less than T, since the key can only input digit 0 or 1, the input is re-changed to 0, and so on. If either a key for inputting a digit is not activated again within the period T, or other keys (except the delete key) are activated after said digit is inputted, the digit is input successfully. Short-activating the delete key deletes the one character inputted and long-activating the delete key deletes all the characters. Short-activating the delete key means that the duration for activating the delete key once is less than or equal to a preset period M, and long-activating the delete key means that the duration for activating the delete key once is larger than the preset period M.

Again takes the input of the equation “9x5=” as an example. Firstly, the middle key (representing the input 8 at this time) is activated, then the middle key (representing the input 9 at this time) is activated once again within the present period T. Then the mode key is activated and then the down key (representing the input of the operation symbol “x” at this time) is activated. At this time, the mode is automatically converted into the digit input mode. Then, the down key (representing the input 4 at this time) is activated and the down key (representing the input 5 at this time) is activated once again within the preset period T. Then, the mode key is activated again, and the middle key (representing the input of the operation symbol “=” at this time) is activated. The result 45 is displayed on the display screen.

3) If the duration for activating said at least one key is larger than a preset period M (i.e. long activation), said at least one key represents specific

characters.

Fig.3 is a schematic diagram showing keys in a long-short activating manner of the five-dimensional calculator according to the first embodiment of the invention. The display screen of the calculator is not shown and only the keypad is shown. The keypad has 7 keys comprising 5 input keys and 2 functional keys. Among the 5 input keys, the up key is used for inputting digits 0, 1/operation symbol "+"; the right key is used for inputting digits 2, 3/operation symbol "-"; the down key is used for inputting digits 4, 5/operation symbol "x"; the left key is used for inputting digits 6, 7/operation symbol "÷"; the middle key is used for inputting digits 8, 9/decimal point (.). The two functional keys respectively are a confirmation key and a delete key.

For the above-mentioned 5 input keys, long activation (i.e. the duration for activating the key is larger than the preset period M) inputs the operation symbols and decimal point, and short activation (i.e., the duration for activating the key is less than or equal to the preset period M) inputs the digits. By activating the confirmation key, a final calculation result is obtained. If the time interval between two adjacent short activations of an input key is within T, the inputted content is switched over, for example, if the up key is short-activated, then the first input is 0; if the time interval between the second short activation and the first short activation is less than T, the input is changed to 1; if the time interval between the third short activation and the second short activation is less than T, since the key can only input digit 0 or 1, the input is re-changed to 0, and so on. If either a key for inputting a digit is not activated again within the period T, or the key for inputting a digit is short-activated and then long-activated, or other keys (except the delete key) are activated after said digit is inputted, the digit is input successfully. Short-activating the delete key deletes the one character inputted and long-activating the delete key deletes all the characters.

Again take the input of the equation "9x5=" as an example. Firstly, the middle key (representing the input 8 at this time) is short-activated, then the middle key (representing the input 9 at this time) is short-activated once again

within the present period T. Then, the down key (representing the input of the operation symbol “x” at this time) is long-activated. Then the down key (representing the input 4 at this time) is short-activated and then the down key (representing the input 5 at this time) is short-activated once again within the preset period T. Then, the confirmation key is activated. The result 45 is displayed on the display screen.

(2) The characters represented by said at least one key are distinguished by means of re-choosing using the keys.

1) In response to said at least one key assigned the plurality of characters in the character set being activated, an association of the plurality of characters with the at the one key is displayed using a display screen, and the characters represented by said at least one key are determined by means of re-choosing by using keys.

Fig.4 is a schematic diagram showing keys in a vowel plus digit manner of a five dimensional Japanese input according to a second embodiment of the invention. In order not to blur the inventive point of the invention, the display screen of the five dimensional Japanese input is not shown and only the keypad thereof is shown. The keypad comprises 5 input keys and 2 functional keys. Among the 5 input keys, the up key is used for inputting あ a か ka さ sa た ta な na は ha ま ma や ya ら ra わ wa /digit 1; the right key is used for inputting い i き ki し si ち ci に ni ひ hi み mi り ri /digit 2; the down key is used for inputting う u く ku す su つ cu ぬ nu ふ hu む mu ゆ yu る ru /digit 3; the left key is used for inputting え e け ke せ se て te ね ne へ he め me え e れ re /digit 4; and the middle key is used for inputting お o こ ko そ so と to の no ほ ho も mo よ yo ろ ro を o /digit 5. The two functional keys are a confirmation key and a delete key respectively.

When a Japanese hiragana is to be inputted, a vowel key corresponding to the hiragana is selected first, and then five options respectively corresponding to the up, right, down, left, middle keys (or 1, 2, 3, 4, 5) will appear on the display screen. A key corresponding to the hiragana (or a digit corresponding to the

hiragana) is then selected. Since each of the above-mentioned keys corresponds to 10 hiragana, correspondence relations formed by the 5 options are not enough. It is required to let the up key and the down key become a page up key and a page down key, respectively. Short-activating the delete key deletes one character inputted and long-activating the delete key deletes all the characters. The meanings of the short-activation and long-activation are the same as those in the first embodiment. The selection of the confirmation key will enable some common characters including “ん” and “っ” to appear on the display screen. Specific ways of selecting the characters can make reference to the vowel plus navigation manner described below, and thus are omitted there.

Take the input of “ま” for example. Since the vowel corresponding to ま is あ, so the あ key is selected. At this time the following associations appear on the display screen:

Up key/digit 1—あ

Right key/digit 2—か

Down key/digit 3—さ

Left key/digit 4—た

Middle key/digit 5—な.

At this time, the desired ま does not appear. Long-activate the down key to page down. At this time, the following associations appear on the display screen.

Up key/digit 1—は

Right key/digit 2—ま

Down key/digit 3—や

Left key/digit 4—ら

Middle key/digit 5—わ.

At this time, the right key (or the digit 2) is selected and the input is successful.

A sonant can be inputted on the basis of the input of hiragana.

There are the following sonant in Japanese.

が ga ぎ gi ぐ gu げ ge ご go
 ざ za じ zi ず zu ぜ ze ぞ zo
 だ da ぢ zi づ zu で de ど do
 ば ba び bi ぶ bu べ be ぼ bo,

which correspond to:

か ka き ki く ku け ke こ ko
 さ sa し si す su せ se そ so
 た ta ち ci つ cu て te と to
 は ha ひ hi ふ hu へ he ほ ho

Take the input of “ば” as an example. Firstly the vowel あ key corresponding to は is selected. Then, the down key is long-activated to page down. Then, the up key (or digit 1) is activated to input は, then the up key (or digit 1) is activated once again, は is changed to ば.

Half-sonant is processed similarly to sonant. For example:

Half-sonant: ぱ pa ぴ pi ぷ pu ぺ pe ぽ po

which correspond to: は ha ひ hi ふ hu へ he ほ ho

Take the input of “ぱ” as an example. Firstly the vowel あ key corresponding to は is selected. Then, the down key is long-activated to page down. Then, the up key (or digit 1) is activated to input は, then the up key (or digit 1) is activated once again, は is changed to ぱ. Then the up key (or digit 1) is activated once again, and ぱ is changed to ぱ.

A diphthong (ようおん) can be inputted on the basis of the input of hiragana.

There are the following diphthongs (ようおん) in Japanese:

きや kya きゅ kyu きょ kyo
 しゃ sya しゅ syu しょ syo
 ちゃ tya ちゅ tyu ちょ tyo
 にゃ nya にゅ nyu によ nyo
 ひゃ hya ひゅ hyu ひょ hyo

みや mya	みゆ my	みよ myo
りや rya	りゆ ryu	りよ ryo
ぎや gya	ぎゆ gyu	ぎよ gyo
じや zya	じゆ zyu	じよ zyo
ぢや zya	ぢゆ zyu	ぢよ zyo
びや bya	びゆ byu	びよ byo
ぴや pya	ぴゆ pyu	ぴよ pyo

They can be processed by dividing them into two parts.

Take the input of “きや” as an example: き and や can be inputted respectively. き may be inputted first and then や. The vowel あ key corresponding to や is selected first while inputting や. Then, long-activate the down key to page down. Then, activate the down key (or digit 3) to input や, and then activate the down key (or digit 3) once again, や is changed to や (small font).

2) In response to said at least one key assigned the plurality of characters in the character set being activated, said plurality of characters are displayed using a display screen, specific keys are used as navigation keys to navigate between the plurality of characters, and a specific key is used as a confirmation key to confirm the result of the navigation as a character represented by said at least one key.

Fig.5 is a schematic diagram showing keys in a manner of vowel plus navigation keys according to the second embodiment of the invention. The display screen of the five dimensional Japanese input is not shown and only the keypad thereof is shown. The keypad comprises 5 input keys and 2 functional keys. Among the 5 input keys, the up key is used for inputting あ a か ka さ sa た ta な na は ha ま ma や ya ら ra わ wa; the right key is used for inputting い i き ki し si ち ci に ni ひ hi み mi い i り ri い i; the down key is used for inputting う u く ku す su つ cu ぬ nu ふ hu む mu ゆ yu る ru う u; the left key is used for inputting え e け ke se se て te ね ne へ he め me え e れ

re え e; and the middle key is used for inputting お o こ ko そ so と to の no
ほ ho も mo よ yo ろ ro を o. The two functional keys are a confirmation key
and a delete key respectively.

When a Japanese hiragana is to be inputted, a vowel key corresponding to the hiragana is selected firstly. There are five options appear on the display screen. The up and down keys, as navigations keys, serve as page functional keys, and right and left keys, as navigation keys, serve as functional keys for movement left and right. Short-activating the delete key deletes one character inputted, and long-activating the delete key deletes all characters. Long-activating the middle key will enable some common characters including “ん” and “っ” to appear on the LCD. The confirmation key confirms the successful input. The input of sonant, half-sonant and diphthong (ようおん) is processed similarly to that in the vowel plus digit manner.

Take the input of “む” as an example. Since the vowel corresponding to む is う, the down key is short-activated, so there are 5 parallel options appear on the screen: う u く ku す su つ cu ぬ nu. Since the desired む does not appear on the screen, the down key as a navigation key is long-activated to page down. At this time 5 parallel options appear on the screen: ふ hu む mu ゆ yu る ru う u. At this time, the cursor is stopped on the middle ゆ yu by default. By activating the left key once, the cursor moves from the middle ゆ yu left to む mu. Then, the confirmation key is activated for confirmation.

3) In response to said at least one key assigned the plurality of characters in the character set being activated, said plurality of characters are classified, the characters under the classified class are displayed using a display screen in response to a key corresponding to the classified class being activated, and the characters represented by said at least one key are determined using specific keys as navigation keys and a confirmation key.

Fig.6 is a schematic diagram showing keys in a manner of vowel plus number of strokes according to the second embodiment of the invention. The display screen of the five dimensional Japanese input is not shown and only the

keypad thereof is shown. The keypad comprises 5 input keys and 2 functional keys. Among the 5 input keys, the up key is used for inputting あ a か ka さ sa た ta な na は ha ま ma や ya ら ra わ wa /digit 1; the right key is used for inputting い i き ki し si ち ci に ni ひ hi み mi り ri /digit 2; the down key is used for inputting う u く ku す su つ cu ぬ nu ふ fu む mu ゆ yu る ru う u /digit 3; the left key is used for inputting え e け ke せ se て te ね ne へ he め me え e れ re /digit 4; and the middle key is used for inputting お o こ ko そ so と to の no ほ ho も mo よ yo ろ ro を o /digit 5. The two functional keys are a confirmation key and a delete key respectively.

When a Japanese hiragana is to be inputted, a vowel key corresponding to the hiragana is selected firstly. After the vowel key is activated, the manner is automatically converted into a stroke input manner. Then, the number of strokes of the hiragana is inputted and corresponding options appear on the display screen for navigation. The left and right keys, as navigation keys, serve as functional keys for moving left and right. The confirmation key is activated for confirming input. Short-activating the delete key deletes one character inputted, and long-activating the delete key deletes all characters. The concepts of short-activating and long-activating are the same as the above. Long-activating the middle key will enable some common characters including “ん” and “っ” to appear on the display screen. The input of sonant, half-sonant and diphthong (ようおん) is processed similarly to that in the vowel plus digit manner.

Take the input of “ち” as an example. Since the vowel corresponding to ち is い, the right key shall be activated firstly. Since the number of strokes of ち is 2, the right key representing the digit 2 shall be then activated. At this time い、ち、み、い、り、い appear on the display screen. For example, the cursor is stopped on み. The left key is activated once to move left a step, and the cursor is stopped on ち. The confirmation key is activated for confirmation. At this time, the input of ち is completed.

In a case, said keys are physical keys and said keypad or keyboard is a physical keypad or keyboard, and the activation is finger press. In another case,

said keys are soft keys on a touch screen, said keypad or keyboard is a soft keypad or keyboard on the touch screen, and said activation is finger touch.

Although the display screen is not shown in the figures, the information processing apparatus of the invention comprises a keyboard and a display screen. The reason why the display screen of the invention is not shown is for not blurring the inventive point of the invention.

The invention has been described in detail above in combination with the exemplary embodiments of the invention, but various variants and modifications may be made to the above embodiments by those skilled in the art, without departing from the scope of protection as defined by the claims of the invention.

Claims

1. A method for inputting characters in a character set by using a key or keys, the number of the characters in the character set being larger than the number of the key or keys, said method comprising:

assigning all the characters in the character set to said key or keys, at least one key within said key or keys are assigned a plurality of characters in the character set;

distinguishing the characters assigned to said at least one key;

wherein selecting a combination of the distinguished characters in the character set generates a desired complete character.

2. A method according to claim 1, characterized in that, the characters represented by said at least one key are distinguished by an activating manner of said at least one key or by means of re-choosing using the keys.

3. A method according to claim 2, characterized in that, the characters represented by said at least one key are distinguished by a time interval between two activations of said at least one key.

4. A method according to claim 3, characterized in that, the characters represented by said at least one key are varied if the time interval between two activations of said at least one key is less than a preset period T.

5. A method according to claim 4, characterized in that, there is at least one mode key in addition to said at least one key, activating the at least one mode key causing said at least one key to represent specific characters.

6. A method according to claim 4, characterized in that, if the duration for activating said at least one key is larger than a preset period M, said at least one key generates specific characters.

7. A method according to claim 3, characterized in that, if either said at least one key are not activated again within the preset period T after they are initially activated, or other keys are activated after said at least one key is activated, the characters are input successfully.

8. A method according to claim 4, characterized in that, if at least one key is activated for a duration less than or equal to a preset period M, and then activated for a duration larger than a preset period M, the characters are input successfully.

9. A method according to claim 2, characterized in that, in response to said at least one key assigned the plurality of characters in the character set being activated, the combination of the plurality of characters is displayed using a display screen, and the characters represented by said at least one key are determined by means of re-choosing by using the keys.

10. A method according to claim 2, characterized in that, in response to said at least one key assigned the plurality of characters in the character set being activated, said plurality of characters are displayed using a display screen, specific keys are used as navigation keys to navigate among the plurality of characters, and a specific key is used as a confirmation key to confirm the result of the navigation as a character represented by said at least one key.

11. A method according to claim 2, characterized in that, in response to said at least one key assigned the plurality of characters in the character set being activated, said plurality of characters are classified, the characters under the classified class are displayed using a display screen in response to a key corresponding to the classified class being activated, and the characters represented by said at least one key are determined using specific keys as

navigation keys and a confirmation key.

12. A method according to claim 1, characterized in that, said keys are physical keys or soft keys on a touch screen.

13. A method according to claim 1, characterized in that, there is at least one mode key in addition to said at least one keys, activating the at least one mode key causing said at least one key to represent specific characters.

14. A keypad or keyboard, comprising keys for inputting characters in a character set, the number of the characters in the character set being larger than the number of the key or keys, wherein all the characters in the character set are assigned to said key or keys, at least one key within said key or keys are assigned a plurality of characters in the character set; the characters represented by said at least one key being distinguishable.

15. A keypad or keyboard according to claim 14, characterized in that, said keypad or keyboard is a physical keyboard or a soft keypad on a touch screen.

16. An information processing apparatus, comprising:

a keypad or keyboard, comprising keys for inputting characters in a character set, the number of the characters in the character set being larger than the number of the key or keys, wherein all the characters in the character set are assigned to said key or keys, at least one key within said key or keys are assigned a plurality of characters in the character set, the characters represented by said at least one key being distinguishable;

a display screen for displaying the result of inputting characters by means of the keypad or keyboard.

17. The information processing apparatus according to claim 16,

characterized in that, in case of said at least one key assigned the plurality of characters in the character set being activated, the display screen further displays an association between said plurality of characters and the keys.

18. The information processing apparatus according to claim 16, characterized in that, in case of said at least one key assigned the plurality of characters in the character set being activated, the display screen further displays the plurality of characters for navigation.