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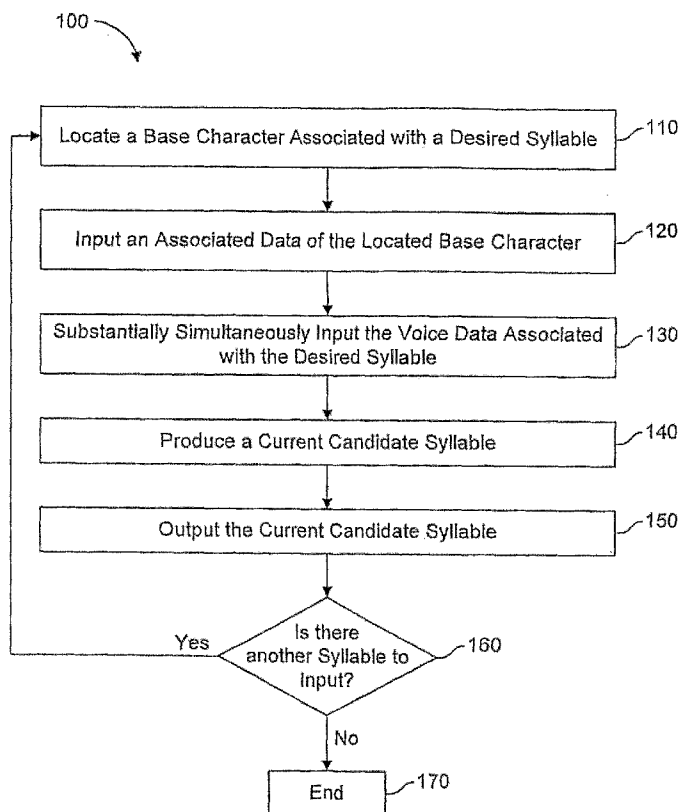
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(54) Title: SYSTEM AND METHOD FOR VOICE ASSISTED INPUTTING OF SYLLABIC CHARACTERS INTO A COMPUTER



(57) Abstract: A technique to input characters of syllabic scripts in a practical and natural way into a computer that includes substantially simultaneously inputting a base character along with voice data of a desired syllable associated with the base character via a voice producing device such as a microphone. In one example embodiment, this is achieved by locating a base character associated with a desired syllable from a set of characters disposed in a character input device. An associated data of the located base character is then inputted using the character input device into a voice-recognition engine. The voice data associated with the spoken desired syllable is then inputted substantially simultaneously into the voice-recognition engine. A current candidate syllable is then produced by the voice-recognition engine as a function of the inputted associated data and the substantially simultaneously inputted voice data.



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SYSTEM AND METHOD FOR VOICE ASSISTED INPUTTING OF SYLLABIC CHARACTERS INTO A COMPUTER

Technical Field of the Invention

The present invention relates generally to a user interface in a computer system, and more particularly relates to data entry into a computer.

Background of the Invention

Generally, data entry into computers is performed using keyboards. The complexity and size of the keyboard depends upon the number and type of characters present in a script. Typically, syllabic scripts, such as Indic, Sinhalese, Burmese, Thai and the like tend to have large and/or complex character sets with a structure including a consonant and vowel modifier. Such scripts can present great difficulties in the design as well as use of these keyboards. For example, Indic scripts have nearly 30 to 40 consonants, 12 to 15 vowels, and about 12 to 15 phonetic modifiers and half consonant modifiers. It can be envisioned that various combinations of these consonants, vowels, and modifiers can result in forming a significantly large character set. To accommodate such a large character set, the amount of keyboard area required can be very large and would be practically impossible to build or use such a keyboard.

As a result, the current techniques employ either a keyboard where several key strokes may be required to enter a desired character, or a handwritten character-recognition technique that recognizes entire characters. The keyboard approach provides incomplete visibility of the entire character map at any given point of time. In addition, these keyboards are non-intuitive and can require extensive practice period for proficiency. Further, character entries using such keyboards tend to be very slow. Furthermore, the increasing demand for smaller and smaller devices is driving keyboard designs toward a smaller one-handed keypad making it impractical to use keyboards accommodating such large character sets. This can pose a severe problem for handheld devices, such as PDAs, which currently use graffiti keypads or T9 keyboards.

The handwritten character-recognition approach requires entering characters using a pen to naturally write an entire character on a graphics tablet. In this approach,

the character-recognition technique attempts to find the character that most closely matches the strokes entered on the tablet. Most of the current handwritten character-recognition techniques recognize neatly printed characters. However, the recognition accuracy of handwritten characters in scripts having complex shapes, such as Indic and the like is significantly poor.

Currently, handwritten character-recognition techniques are not robust enough to handle the different writing styles of an arbitrary user of such characters in syllabic scripts and hence tend to have significantly lower recognition accuracy. In addition, the current handwritten character-recognition techniques are not capable of handling characters of scripts, such as Indic, which have complex shapes and require writing these shapes neatly by using strokes in a particular direction and order. Further, the characters in syllabic scripts are generally highly cursive in nature, which makes it even more difficult for the current handwritten character-recognition techniques to recognize such handwritten characters.

Furthermore, techniques are available using a digitizer along with a gesture recognition engine to enter characters of scripts, such as Indic. These techniques basically require locating a base character using the digitizer on a touch pad, which has all the base characters of the Indic script, followed by entering one or more gestures or modifiers to input a character. However, these techniques can be difficult to use for certain scripts. In addition, the recognition accuracy for certain scripts can still be poor. Furthermore, such gesture based inputs do not lend themselves to smaller keyboards.

Summary of the Invention

According to an aspect of the subject matter, there is provided a method for inputting syllabic characters into a computer, the method including the steps of locating a base character associated with a desired syllable from a set of characters in a character input device, inputting an associated data of the located base character using the character input device into a voice-recognition engine, substantially simultaneously inputting voice data associated with the spoken desired syllable into the voice-recognition engine, producing a current candidate syllable by the voice-recognition engine as a function of the inputted associated data of the located base character and the substantially

simultaneously inputted voice data, and outputting the current candidate syllable by the voice-recognition engine.

Brief Description of the Drawings

Embodiments of the invention will now be described, by way of example only, with reference to the accompanying drawings in which:

FIG. 1 is a flowchart illustrating an example method of inputting a desired syllable into a computer according to an embodiment of the present invention.

FIG. 2 is a block diagram of a typical computer system used for performing selected functions related to entering syllables according to an embodiment of the present invention.

FIGS. 3 and 4 illustrate example keyboards that can be used for inputting a base character of an Indic script into a computer according to an embodiment of the present invention.

Detailed Description of the Invention

In the following detailed description of the various embodiments of the invention, reference is made to the accompanying drawings that form a part hereof, and in which are shown by way of illustration specific embodiments in which the invention may be practiced. These embodiments are described in sufficient detail to enable those skilled in the art to practice the invention, and it is to be understood that other embodiments may be utilized and that changes may be made without departing from the scope of the present invention. The following detailed description is, therefore, not to be taken in a limiting sense, and the scope of the present invention is defined only by the appended claims.

The term "voice-recognition engine" means an algorithm that classifies voice input patterns into one of a plurality of classes within a recognition vocabulary. The parameters and/or structure of such a voice recognizer are determined from the statistics of the input patterns. Some examples of algorithms used in the voice recognizer include Dynamic Time Warping, Hidden Markov Modeling, Neural Networks and the like. Other examples of voice recognizers are obvious to those skilled in the art of pattern recognition.

In the following technique the recognition vocabulary is determined by base character keyboard input. For each base character the recognition vocabulary is different e.g., for the base character /ka/, the recognition vocabulary is /kaa/, /ki/, /kii/, /ku/, /kuu/...., and for base character /ma/ the recognition vocabulary is /maa/, /mi/, /mii/, /mu/, /muu/, and so on. The recognition vocabulary here refers to base characters, modifiers, and conjunct modifiers. For example, a conjunct modifier /krii/ is obtained by combining the base character /ka/, with another base character /ra/, and a modifier /ii/. In one embodiment, a conjunct such as /krii/ is obtained by locating the base character /ka/, and speaking out the syllable /krii/ into a microphone.

The term "syllabic script" refers to scripts, such as Indic, where a written character has a relative one-to-one correspondence with a syllable in the spoken form of the language. In these scripts, the consonant character in its pure form represents the consonant sound plus an inherent vowel. Other vowels have to be attached to these base consonant characters to make the required syllables.

The term "character" refers to a member of alphabetic, logographic, and/or phonetic/syllabic character set, which includes syllables, alphabets, numerals, and punctuation marks. The term "syllable" refers to a unit of spoken language consisting of a single uninterrupted sound formed by a vowel, diphthong, or syllabic consonant alone, or by any of these sounds preceded, followed, or surrounded by one or more consonants.

The term "gestureboard" refers to a device that facilitates in inputting characters of a syllabic script into a computer. This is accomplished by locating a base character from a set of characters and then modifying the located base character with one or more natural handwritten modifying gestures using a digitizing tablet to form a desired syllable. An associated data of the formed current desired syllable is then inputted into the computer.

FIG. 1 illustrates an example method 100 of inputting syllables into a computer. At step 110, this example method 100 locates a base character associated with a desired syllable from a set of characters of a syllabic script included in a character input device. Exemplary character input devices include a digitizing tablet, a QWERTY keyboard, a non-QWERTY keyboard, a mobile device keypad, and a pen input device. Exemplary base character includes vowels and consonants.

At step 120, an associated data (e.g., active recognition vocabulary) of the located base character is inputted using the character input device into a voice-recognition engine. This can include locating the base character on a digitizing tablet or a keyboard and inputting the located base character by entering the located base character.

5 At step 130, voice data associated with the desired syllable is substantially simultaneously provided into the voice recognition engine. Exemplary voice data includes a modifier, data associated with a conjunct, and the data associated with the base character. For example, in Indic scripts, many unique characters are formed by attaching different vowel modifiers to the same base character. An exemplary modifier includes a
10 vowel modifier and a consonant modifier. For example, the base character /ka/ uses many modifiers yielding candidate characters such as: /kaa/, /kii/, /ku/, /kuu/, /ke/, /kE/, /kai/, /ko/, /kO/, /kou/, /kam/, /kah/. Further, Indic scripts also have conjuncts like /kra/, /ktu/, /pna/, etc., which also need multiple presses of keys in different layouts, making it difficult to use.

15 In some embodiments, the process of providing voice data first requires speaking the desired syllable. The produced voice data is then substantially simultaneously inputted into the voice-recognition engine. For example, the voice data can be produced using a speaker/microphone combination. Substantially simultaneously may include producing voice data before, during, and/or after inputting its associated character input
20 data.

At step 140, a current candidate syllable, which is the first syllable, is produced by the voice-recognition engine as a function of the inputted base character data and the substantially simultaneously produced voice data. At step 150, the current candidate syllable is then outputted by the voice recognition engine. Exemplary outputting of the
25 current candidate syllable includes transmitting, printing, and displaying of the current candidate syllable. In some embodiments, the current candidate syllable is displayed on a display device. Exemplary display device includes a computer monitor, a TV screen, a plasma display, an LCD, and a display on an electronic tablet.

At step 160, the method 100 determines whether there is another syllable to input.
30 Based on the determination at step 160, if there is no other desired syllable to input, then the method 100 goes to step 170 and stops the inputting of the syllables into the

computer. Based on the determination at step 160, if there is another syllable to input, then the method 100 goes to step 110 and repeats steps 110-160 to enter the next desirable syllable input and displays the next candidate syllable along with the displayed current candidate syllable such that the current candidate syllable is cursively connected to the next candidate syllable. In some embodiments, the next candidate syllable is displayed substantially adjacent to the current candidate syllable. In some embodiments, the above-described process is repeated until a current desired word is formed and displayed.

In some embodiments, the base character is selected from a set of characters associated with a syllabic script using the character input device to form a desired word. In these embodiments, a determination is made as to whether a modifier or a conjunct is needed to form the desired syllable. Based on the determination, an associated data of the located base character along with the voice data associated with a spoken desired syllable is inputted into the voice-recognition engine if the modifier or a conjunct is needed to form the desired syllable. The spoken desired syllable includes the base character and the modifier or a conjunct associated with the desired syllable. In these embodiments, the voice-recognition engine then produces a current candidate syllable as a function of the inputted associated data of the selected base character and the substantially simultaneously inputted voice data. The current candidate syllable is then outputted by the voice-recognition engine.

Based on the determination, an associated data of the selected base character is inputted into the voice-recognition engine if the modifier or the conjunct is not needed to form the desired syllable. In these embodiments, the voice-recognition engine produces a current candidate syllable. The produced candidate syllable is then displayed on a display device. Then a determination is made as to whether or not a next syllable is needed to form the desired word. Based on the determination the above-described steps are repeated to form the desired syllable if the next syllable is needed to form the desired word. Also based on the determination the technique stops inputting a next desired syllable if a next syllable is not needed to form the desired word. It can be envisioned that the above technique can also be used to input a sequence of syllables in a single input. For example, a user can speak a syllable sequence, such as "me raa bhaa ra th ma haa n" in a

single input, and substantially simultaneously input the base character sequence “ma, ra, bha, ra, tha, ma, ha, na” into the input device. The voice-recognition engine could use a variant of “forced alignment algorithm” along with the associated data sequence to output a candidate syllable sequence.

5 Although the flowchart 100 includes steps 110-170, respectively, that are arranged serially in the exemplary embodiments, other embodiments of the subject matter may execute two or more steps in parallel, using multiple processors or a single processor organized as two or more virtual machines or sub-processors. Moreover, still other
10 embodiments may implement the steps as two or more specific interconnected hardware modules with related control and data signals communicated between and through the modules, or as portions of an application-specific integrated circuit. Thus, the exemplary process flow diagrams are applicable to software, firmware, and/or hardware implementations.

 Various embodiments of the present invention can be implemented in software,
15 which may be run in the environment shown in FIG. 2 (to be described below) or in any other suitable computing environment. The embodiments of the present invention are operable in a number of general-purpose or special-purpose computing environments. Some computing environments include personal computers, general-purpose computers, server computers, hand-held devices (including, but not limited to, telephones and
20 personal digital assistants (PDAs) of all types), laptop devices, multi-processors, microprocessors, set-top boxes, programmable consumer electronics, network computers, minicomputers, mainframe computers, distributed computing environments and the like to execute code stored on a computer-readable medium. The embodiments of the present invention may be implemented in part or in whole as machine-executable instructions,
25 such as program modules that are executed by a computer. Generally, program modules include routines, programs, objects, components, data structures, and the like to perform particular tasks or to implement particular abstract data types. In a distributed computing environment, program modules may be located in local or remote storage devices.

 FIG. 2 shows an example block diagram 200 of a suitable computing system
30 environment for implementing embodiments of the present invention. FIG. 2 and the following discussion are intended to provide a brief, general description of a suitable

computing environment in which certain embodiments of the inventive concepts contained herein may be implemented.

A general computing device, in the form of a computer 210, may include a processing unit 202, memory 204, removable storage 201, and non-removable storage 214.

5 Computer 210 additionally includes a bus 205 and a network interface (NI) 212.

Computer 210 may include or have access to a computing environment that includes one or more user input devices 216, one or more output devices 218, and one or more communication connections 220 such as a network interface card or a USB connection. The user input devices may include a stylus and electronic tablet (digitizing
10 tablet), touchpad, mice, joystick, a QWERTY keyboard, non-QWERTY keyboard, and a mobile phone keypad. The output devices 218 may include a computer monitor, TV screen, plasma display, LCD, display on a gestureboard, display on keyboard, printer, and so on. The computer 210 may operate in a networked environment using the communication connection 220 to connect to one or more remote computers. A remote
15 computer may include a personal computer, server, router, network PC, a peer device or other network node, and/or the like. The communication connection may include a Local Area Network (LAN), a Wide Area Network (WAN), and/or other networks.

The memory 204 may include volatile memory 206 and non-volatile memory 208. A variety of computer-readable media may be stored in and accessed from the memory
20 elements of computer 210, such as volatile memory 206 and non-volatile memory 208, removable storage 201 and non-removable storage 214. Computer memory elements can include any suitable memory device(s) for storing data and machine-readable instructions, such as read only memory (ROM), random access memory (RAM), erasable
programmable read only memory (EPROM), electrically erasable programmable read only
25 memory (EEPROM), hard drive, removable media drive for handling compact disks (CDs), digital video disks (DVDs), diskettes, magnetic tape cartridges, memory cards, Memory Sticks™, and the like; chemical storage; biological storage; and other types of data storage.

“Processor” or “processing unit,” as used herein, means any type of computational
30 circuit, such as, but not limited to, a microprocessor, a microcontroller, a complex instruction set computing (CISC) microprocessor, a reduced instruction set computing

(RISC) microprocessor, a very long instruction word (VLIW) microprocessor, explicitly parallel instruction computing (EPIC) microprocessor, a graphics processor, a digital signal processor, or any other type of processor or processing circuit. The term also includes embedded controllers, such as generic or programmable logic devices or arrays, application specific integrated circuits, single-chip computers, smart cards, and the like.

Embodiments of the present invention may be implemented in conjunction with program modules, including functions, procedures, data structures, application programs, etc., for performing tasks, or defining abstract data types or low-level hardware contexts.

Machine-readable instructions stored on any of the above-mentioned storage media are executable by the processing unit 202 of the computer 210. For example, a computer program 225 may comprise machine-readable instructions capable of inputting shapes and/or syllables from a script according to the teachings and herein described embodiments of the present invention. In one embodiment, the computer program 225 may be included on a CD-ROM and loaded from the CD-ROM to a hard drive in non-volatile memory 208. The machine-readable instructions cause the computer 210 to input into the computer 200 and display candidate shapes and/or syllables according to the various embodiments of the present invention. As shown in FIG. 2, the program 225 includes a voice-recognition engine 230 that receives associated data (voice recognition vocabulary) of basic characters and/or syllables and produces candidate characters and/or syllables. The voice-recognition engine 230 receives a desired syllable and produces a candidate character, which includes a base character and a modifier and/or a conjunct associated with the desired syllable.

In operation, a base character associated with a desired syllable is located from a set of characters associated with a syllabic script using the user input device 216. An associated data (recognition vocabulary) of the located base character is then inputted into the voice-recognition engine 230 using the user input device 216. Exemplary user input device 216 includes a keyboard. Referring now to FIGS. 3 and 4, there is illustrated example keyboards 300 and 400 in which keys 310 and 410, respectively, are based on characters from an Indic script. The keyboards 300 and 400 shown in the FIGS. 3 and 4, respectively, can be used to select and input a base character into the voice-recognition engine 230. As shown in FIG. 4, some of the keys 410 located on the keyboard 400 have

multiple characters, which require using a Shift key 420 when selecting a desired character.

A voice data associated with the desired syllable is then substantially simultaneously inputted via, any voice producing devices, such as a microphone 222 into the voice-recognition engine 230. A current candidate syllable is then produced by the voice-recognition engine 230 as a function of the inputted associated data of the located base character and upon receiving the substantially simultaneously inputted voice data. The produced current candidate syllable is then outputted by the voice-recognition engine 230 via the output device 218.

In these embodiments, the voice-recognition engine 230, which is coupled to the user input device 216 via the network interface 212, produces the current candidate syllables upon receiving the substantially simultaneously inputted voice data. The produced current candidate syllable is then displayed on the output device 218. The technique of inputting syllables from a syllabic script into a computer according to the various embodiments of the present invention is described in more detail with reference to FIG. 1.

In some embodiments, the computer program 225 further includes an active recognition vocabulary pointer 235 which is an input to the voice-recognition engine 230. The active recognition vocabulary pointer 235 is capable of receiving data inputs from the user input device 216. Further, the active recognition vocabulary pointer 235 may have an associated program and a database and outputs associated data that can be used by the voice-recognition engine 230 to produce a candidate character. The active recognition vocabulary pointer 235 points to a right location in the database containing active voice reference templates and/or models of the active vocabulary based on the base character input.

In some embodiments, the active recognition vocabulary pointer 235 upon receiving an input from the user input device 216, such as a keyboard, outputs an associated data that is used by the voice-recognition engine 230 to produce a candidate character. The voice-recognition engine 230 processes the voice input information from an input device, such as a microphone 222, to classify the voice data.

For example, if an input data 'ka' is entered using the keyboard 216, then the voice-recognition engine 230 that is responsive to the inputted data classifies the inputted data into a recognition vocabulary group of 'kaa', 'ki', 'kii', 'ku', etc.. Such a recognition vocabulary group may consist of modifiers, consonants, conjuncts, and the like as described earlier in the specification. The database (models/templates) corresponding to these active classes will then be used by the voice-recognition engine 230 while classifying the voice. The database is a collection of statistical models of active vocabulary sounds, when using Hidden Markov Models for voice recognition. The database is a collection of templates of active vocabulary sounds when using Dynamic Time Warping method of voice recognition.

In some embodiments, a user can input a character, such as /ka/ by pressing the associated key on the keyboard 216, followed by speaking out the modifier, such as /eee/ into the microphone 222, for obtaining the candidate character /kee/. In another embodiment, a user can input the character /ka/ by pressing the associated key on the keyboard 216, and speak out the modifier /kee/ into the microphone 222 for getting the same output /kee/. It can be seen that the second method is preferred for phonemic scripts like Indic, where the written and spoken form of the word are the same.

The syllable input technique of the present invention is modular and flexible in terms of usage in the form of a "Distributed Configurable Architecture". As a result, parts of the apparatus may be placed at different points of a network, depending on the model chosen. For example, the voice-recognition engine can be deployed in a server and the input and output devices streamed over from a client to the server and back, respectively. The voice-recognition engine can also be placed on each client, with the database management centralized. Such flexibility allows faster deployment to provide a cost effective solution to changing business needs.

The above description is intended to be illustrative, and not restrictive. Many other embodiments will be apparent to those skilled in the art. The scope of the invention should therefore be determined by the appended claims, along with the full scope of equivalents to which such claims are entitled.

The above-described methods, apparatus, and system facilitates easier input of syllabic scripts, such as Indic into a computer by entering a base character key followed

by speaking out the desired syllable, which includes the base character and a modifier. As Indic script is phonemic, the entry of the script becomes easier and natural by entering the base character using a keyboard substantially followed by speaking the desired syllable which includes the base character. The above-described process uses the voice

5 recognition as a function of the entered base character.

This technique facilitates easier input of syllables associated with the Indic scripts into a mobile computing device. This process provides a more natural way of entering syllables associated with Indic scripts into computers and mobile computing devices. Also, this technique provides entering syllables associated with Indic scripts with high

10 reliability, usability, and speed. Further, the above-described technique can facilitate in transmitting messages composed in syllabic scripts using short message service (SMS) via mobile device.

The above-described methods and apparatus provide various embodiments for syllable input into a computer. It is to be understood that the above-description is intended

15 to be illustrative, and not restrictive. Many other embodiments will be apparent to those of skill in the art upon reviewing the above-description. The system and method of the present invention is adaptable to a variety of applications and many other types of devices. Thus, mobile phones, PDAs, handheld PCs, laptop computers, and many other small devices can take advantage of character input according to the various embodiments of the

20 present invention. The scope of the subject matter should, therefore, be determined with reference to the following claims, along with full scope of equivalents to which such claims are entitled.

As shown herein, the present invention can be implemented in a number of different embodiments, including various methods, a circuit, an I/O device, a system, and

25 an article comprising a machine-accessible medium having associated instructions.

Other embodiments will be readily apparent to those of ordinary skill in the art. The elements, algorithms, and sequence of operations can all be varied to suit particular requirements. The operations described above with respect to the method illustrated in FIG.1 can be performed in a different order from those shown and described herein.

30 FIGS.1 - 2 are merely representational and are not drawn to scale. Certain proportions thereof may be exaggerated, while others may be minimized. FIGS. 1 - 2

illustrate various embodiments of the invention that can be understood and appropriately carried out by those of ordinary skill in the art.

In the foregoing detailed description of the embodiments of the invention, various features are grouped together in a single embodiment for the purpose of streamlining the disclosure. This method of disclosure is not to be interpreted as reflecting an intention that the claimed embodiments of the invention require more features than are expressly recited in each claim. Rather, as the following claims reflect, inventive subject matter lies in less than all features of a single disclosed embodiment. Thus, the following claims are hereby incorporated into the detailed description of the embodiments of the invention, with each claim standing on its own as a separate preferred embodiment.

CLAIMS

1. A method comprising:
locating a base character associated with a desired syllable from a set of characters in a character input device;
inputting an associated data of the located base character using the character input device into a voice-recognition engine;
substantially simultaneously providing voice data associated with the desired syllable into the voice-recognition engine; and
producing a current candidate syllable by the voice-recognition engine as a function of the inputted associated data and the voice data.
2. The method of claim 1, wherein the voice data is selected from a recognition vocabulary group consisting of data associated with a modifier, data associated with a conjunct, and the data associated with the base character.
3. The method of claim 1, wherein substantially simultaneously providing the voice data comprises:
speaking the desired syllable; and
inputting a voice signal associated with the desired syllable into a voice-recognition engine.
4. The method of claim 1, further comprising:
outputting the current candidate syllable by the voice recognition engine, and
wherein, in outputting the current candidate syllable, the output is selected from the group consisting of transmitting, printing, and displaying.
5. The method of claim 1, further comprising:
repeating the above steps to produce a next desired syllable; and

displaying the next candidate syllable along with the current candidate syllable such that the current candidate syllable is cursively connected to the next candidate syllable.

6. The method of claim 1, wherein the base character is selected from the group consisting of a vowel and a consonant.
7. The method of claim 2, wherein the modifier is selected from the group consisting of a vowel modifier and a consonant modifier.
8. A method for inputting characters into a computer comprising:
 - selecting a base character associated with a desired syllable from a set of characters associated with the script using a character input device to form a word;
 - determining whether a modifier or a conjunct is needed for the selected base character to form the desired syllable;
 - if so, inputting an associated data of the base character along with providing voice data associated with the desired syllable into the voice-recognition engine, wherein the voice data includes the base character and the modifier or the conjunct associated with the desired syllable;
 - producing a current candidate syllable by the voice-recognition engine as a function of the inputted associated data and the voice data;
 - outputting the current candidate syllable by the voice-recognition engine;
 - determining whether a next syllable is needed to form the desired word;
 - if so, repeating the above steps; and
 - if not, entering a blank space and proceeding to form a new word by repeating the above steps.
9. The method of claim 8, further comprising:
 - if the modifier or the conjunct is not needed, then inputting an associated data of the selected base character into the voice-recognition engine, wherein the voice-recognition engine produces a current candidate syllable;

displaying the produced current candidate syllable on a display device;
determining whether a next syllable is needed to form the word;
if so, repeating the above steps to form a next desired syllable; and
if not, stopping inputting of the next desired syllable.

10. The method of claim 9, further comprising:

displaying the next candidate syllable along with the current candidate syllable
such that current candidate syllable is cursively connected to the next candidate syllable.

11. An article comprising:

a storage medium having instructions that, when executed by a computing
platform, result in execution of a method comprising:

locating a base character associated with a desired syllable from a set of
characters in a character input device;

inputting an associated data of the located base character using the
character input device into a voice-recognition engine;

substantially simultaneously providing voice data associated with the
desired syllable into the voice-recognition engine; and

producing a current candidate syllable by the voice-recognition engine as a
function of the inputted associated data and the voice data.

12. The article of claim 11 wherein voice data is selected from a recognition
vocabulary group consisting of data associated with a modifier, data associated with a
conjunct, and the data associated with the base character.

13. The article of claim 11, wherein substantially simultaneously providing the voice
data comprises:

speaking the desired syllable; and

inputting a voice signal associated with the desired syllable into a voice-
recognition engine.

14. The article of claim 11, further comprising:
outputting the current candidate syllable by the voice recognition engine, and
wherein, in outputting the current candidate syllable, the output is selected from the group consisting of transmitting, printing, and displaying.
15. The article of claim 14, further comprising:
repeating the above steps to produce a next desired syllable; and
displaying the next candidate syllable along with the current candidate syllable
such that the current candidate syllable is cursively connected to the next candidate syllable.
16. An apparatus comprising:
a character input device having a set of base characters of a syllabic script to select a base character from the set of base characters that is associated with a desired syllable, and to output an associated data;
a voice-recognition engine coupled to the character input device that receives substantially simultaneously voice data associated with the desired syllable along with the associated data, wherein the voice recognition engine produces a current candidate syllable as a function of the received inputted associated data and the voice data; and
a display device coupled to the voice-recognition engine that displays the produced current candidate syllable.
17. The apparatus of claim 16, wherein the character input device comprises input devices selected from the group consisting of a digitizing tablet, a QWERTY keyboard, non-QWERTY keyboard, and a mobile phone keypad.
18. The apparatus of claim 16, wherein the voice data is selected from a recognition vocabulary group consisting of data associated with a modifier, data associated with a conjunct, and the data associated with the base character.

19. The apparatus of claim 18, wherein the base character is selected from the group consisting of vowels and consonants.

20. The apparatus of claim 19, wherein the modifier is selected from the group consisting of vowel modifiers and consonant modifiers.

21. The apparatus of claim 16, wherein the display device is a device selected from the group consisting of a computer monitor, a TV screen, a plasma display, an LCD, and a display on a gestureboard.

22. A computer system for inputting characters of a syllabic script comprising:
a processing unit;
a memory coupled to the processing unit;
a remote computer;
a network interface, wherein the processing unit and the remote computer are operatively connectible via the network interface;
a character input device having a set of base characters of a syllabic script to select a base character from the set of base characters that is associated with a desired syllable and to output an associated data, wherein the base character is selected from the group consisting of vowels and consonants;
a voice-recognition engine coupled to the character input device that receives substantially simultaneously voice data associated with the desired syllable along with the associated data, wherein the voice data is selected from a recognition vocabulary group consisting of data associated with a modifier, data associated with a conjunct, and the data associated with the base character, and wherein the voice recognition engine produces a current candidate syllable as a function of the received inputted associated data and the voice data; and
a display device coupled to the voice-recognition engine that displays the produced current candidate syllable.

23. The system of claim 22, wherein the character input device comprises input devices selected from the group consisting of a digitizing tablet, a QWERTY keyboard, non-QWERTY keyboard, a mobile phone keypad, and a pen input device.
24. The system of claim 22, wherein the display device is a device selected from the group consisting of computer monitor, TV screen, plasma display, LCD, and display on a gestureboard.
25. The system of claim 22, wherein the modifier is selected from the group consisting of vowel modifiers and consonant modifiers.

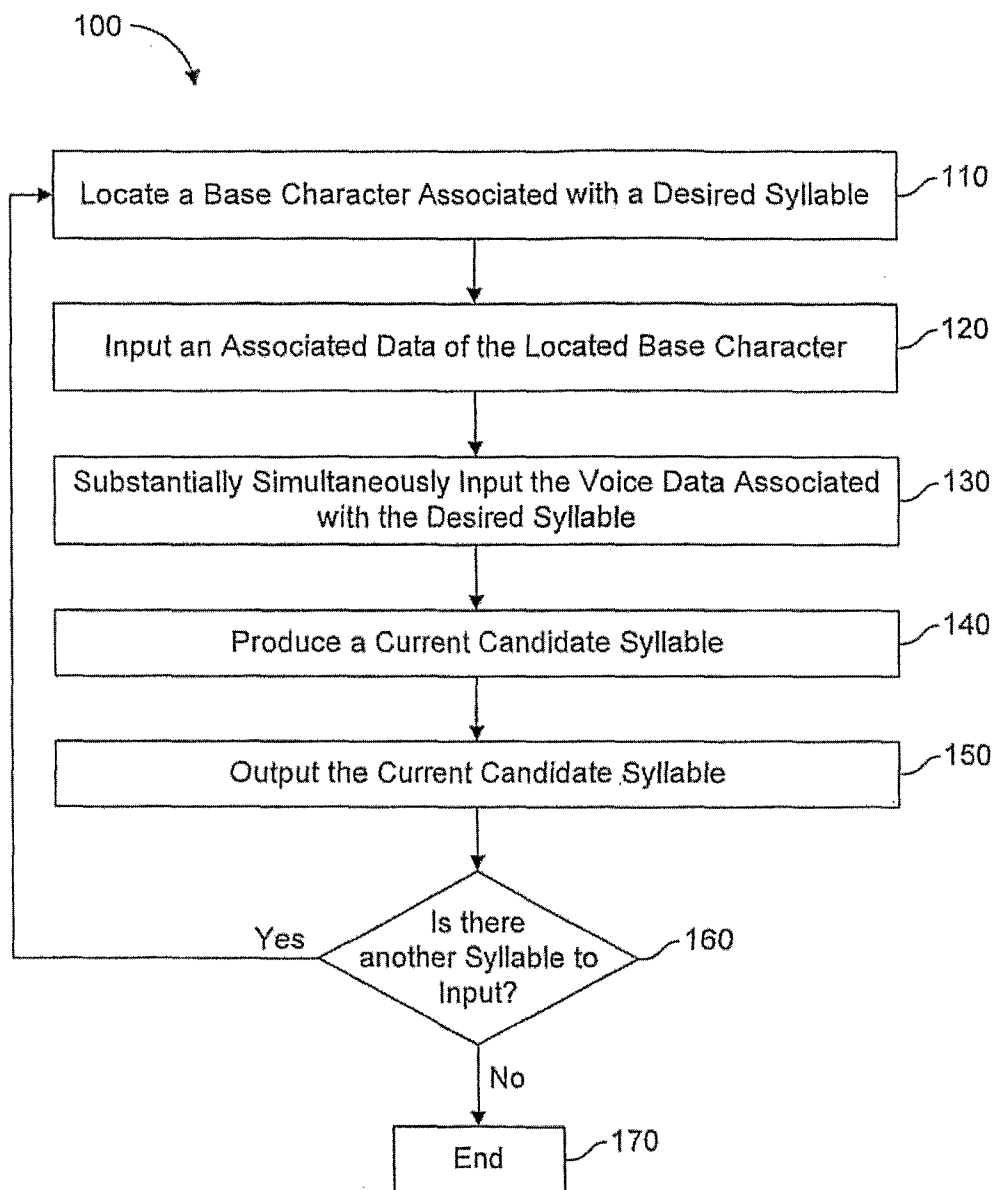
1/3

FIG. 1

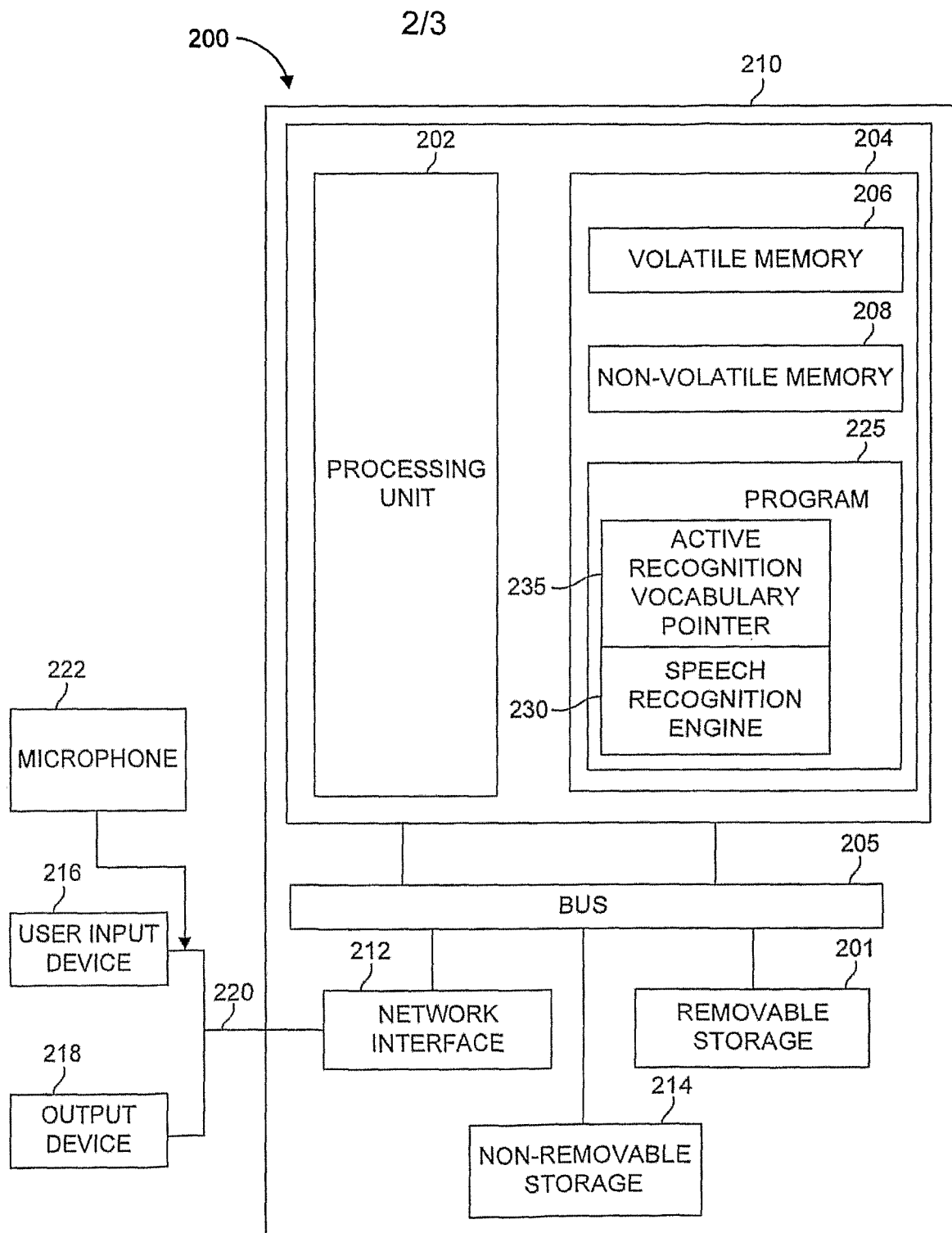


FIG. 2

3/3

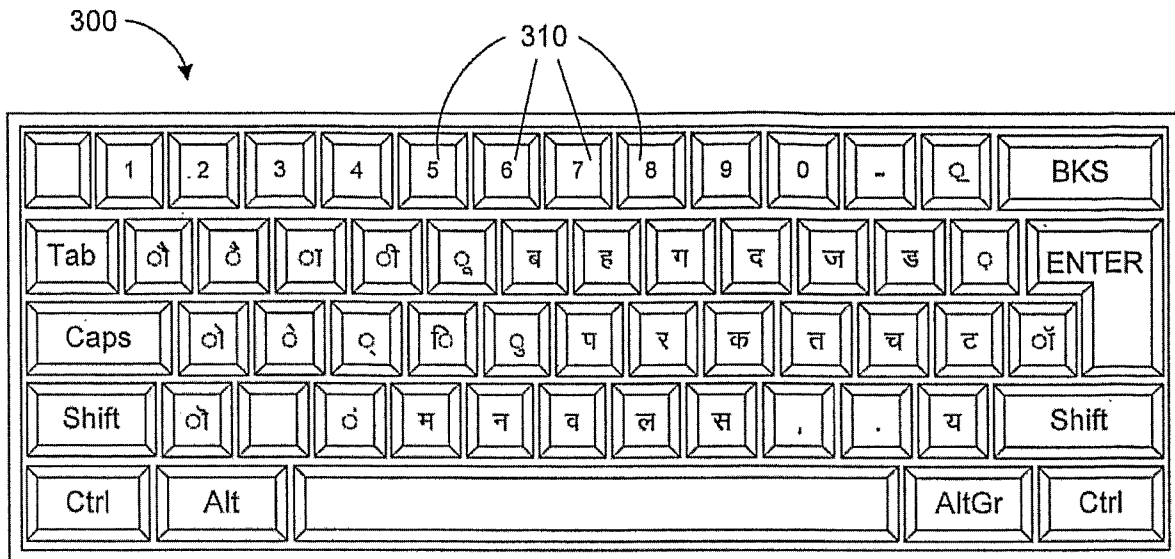


FIG. 3

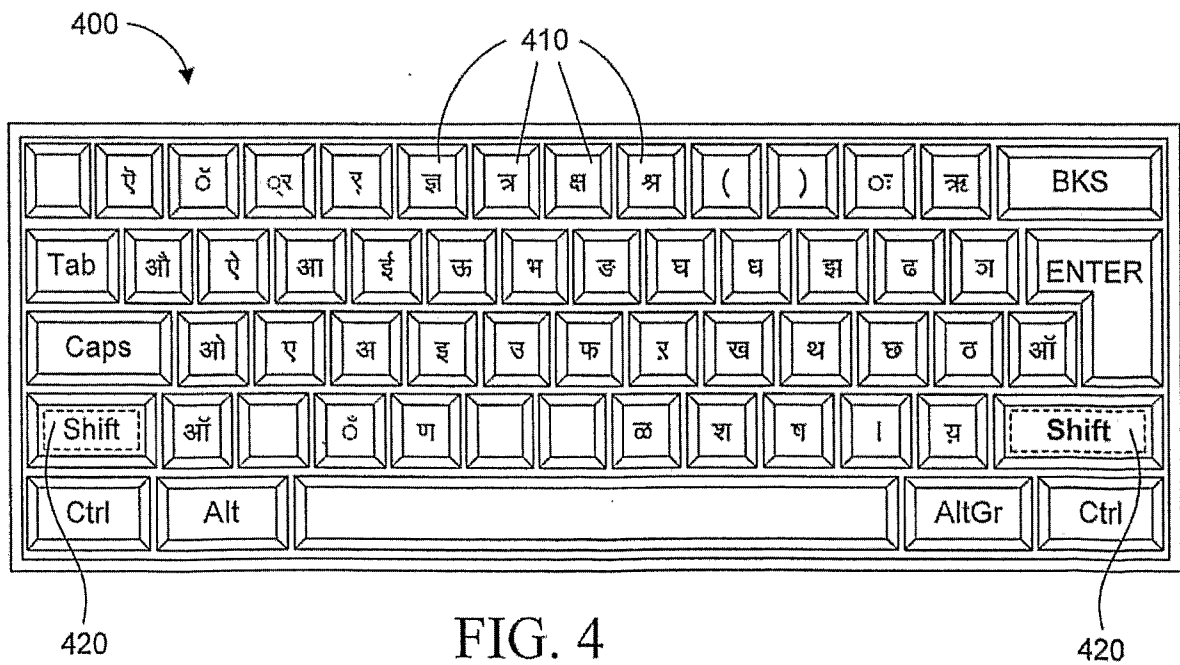


FIG. 4

INTERNATIONAL SEARCH REPORT

International application No
PCT/IN2005/000258

A. CLASSIFICATION OF SUBJECT MATTER

INV. G06F3/023 G06F3/00

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

G06F G10L

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

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

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 01/82043 A (OPENWAVE SYSTEMS, INC) 1 November 2001 (2001-11-01) page 6, line 3 - line 23 page 7, line 8 - page 8, line 4 page 8, line 20, paragraph 29	1-25
Y	US 2003/119551 A1 (LAUKKANEN PETRI ET AL) 26 June 2003 (2003-06-26) figure 6 paragraph [0009] paragraph [0043] paragraphs [0054], [0059] figure 6	1-25
A	WO 99/00790 A (M.H. SEGAN LIMITED PARTNERSHIP) 7 January 1999 (1999-01-07) abstract ----- -/-	1,8,11, 16,22



Further documents are listed in the continuation of Box C.



See patent family annex.

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- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- * & * document member of the same patent family

Date of the actual completion of the international search

10 April 2006

Date of mailing of the international search report

26/04/2006

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Krembel, L

INTERNATIONAL SEARCH REPORT

International application No

PCT/IN2005/000258

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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