

0.5 or 1 s. In some embodiments, two or more consecutive taps may correspond to a second symbol if a time interval between the two or more consecutive taps is less than a fifth pre-determined value, such as 0.1, 0.5 or 1 s.

[0157] In some embodiments, the first symbol is in a first subset of the symbols in the character set displayed in the keyboard 1210 and the second symbol is in a second subset of the symbols in the character set displayed in the keyboard 1210. The first subset may have a probability of occurrence that is greater than a sixth pre-determined value and the second subset may have a probability of occurrence that is less than the sixth pre-determined value. Thus, the first subset may include symbols that are more likely to occur, for example, in a language (using a lexicography model) and/or based on a user history. The gesture used to select the first symbol may, therefore, be easier or quicker for the user to make. For example, the first gesture may be a tap gesture and the second gesture may be a swipe gesture. This is illustrated in FIG. 12A. The gestures needed to select corresponding symbols for a respective icon may be indicated on the icon. For example, a dot on the icon may correspond to a tap and a horizontal line on the icon may correspond to a dash. This 'tap-dash' embodiment is an example of a two-gesture keyboard. Additional examples are discussed below.

[0158] In some embodiments, the first symbol may have a probability of occurrence immediately after the second symbol that is less than a seventh pre-determined value. In some embodiments, the second symbol may have a probability of occurrence immediately after the first symbol that is less than a seventh pre-determined value. This arrangement or grouping of the symbols displayed on the icons may reduce errors when using the keyboard 1210 because the user will be less likely to make a first gesture for the first symbol corresponding to a respective icon and then make the second gesture for the second symbol corresponding to the respective icon (or vice versa). Gestures for different symbols on the respective icon may, therefore, be separated by a time interval that is large enough to reduce a likelihood of inadvertently selecting a respective symbol using consecutive gestures for symbols corresponding to the respective icon.

[0159] FIGS. 12B-12G illustrate additional multi-gesture keyboards. For the icons in keyboards 1212, 1214, 1216, 1218, 1220 and 1222, a first symbol for a respective icon in these keyboards may be selected with a first gesture (for example, a single tap) and a second symbol for the respective icon may be selected using a second gesture (for example, two consecutive taps). The keyboard 1222 in FIG. 12G includes some icons that correspond to more than two symbols. These symbols may be selected by making additional gestures, such as three consecutive taps. In some embodiments, a second or third symbol for the respective icon may be selected by the user by first contacting a meta key, such as a shift key, and then contacting and/or breaking contact with the respective icon.

[0160] While the device 1200 has been illustrated with certain components and a particular arrangement of these components, it should be understood that there may be fewer or more components, two or more components may be combined, and positions of one or more components may be changed. For example, the keyboards 1210, 1212, 1214, 1216, 1218, 1220 and/or 1222 may include fewer or additional icons. In some embodiments, a different character set and/or different groups of symbols may be used on the icons in the keyboard 1210, 1212, 1214, 1216, 1218, 1220 and/or 1222.

[0161] In some embodiments, the user selects symbols by breaking a contact with one or more icons on the display 208. In other embodiments, however, the user may select one or more symbols without breaking contact with the display 208. For example, the user may pause or maintain contact over the respective icon for a time interval longer than an eighth pre-determined value (such as 0.1, 0.5 or 1 s) before moving on to the next icon and corresponding symbol. In the process, the user may maintain contact with the display. In other embodiments, selection of the respective icon and corresponding symbol may occur by increasing a contact pressure with the display 208 while maintaining the contact with the display.

[0162] A flow chart for a symbol entry process 1300 corresponding to embodiments where contact is not broken is shown in FIG. 13. While the symbol entry process 1300 described below includes a number of operations that appear to occur in a specific order, it should be apparent that the process 1300 can include more or fewer operations, which can be executed serially or in parallel (e.g., using parallel processors or a multi-threading environment), an order of two or more operations may be changed and/or two or more operations may be combined into a single operation.

[0163] A plurality of icons may be displayed on a touch-sensitive display (1310). A respective icon may correspond to at least one symbol. A contact by a user with the display may be detected (1312). Positions of the contact corresponding to a sequence of icons may be determined (1314). The at least one symbol may be selected when a respective position of the contact corresponds to the respective icon for a time interval exceeding a pre-determined value (1316).

[0164] As discussed previously, the user may make errors when using a touch screen in the display system 112 (FIG. 1). The device 100 (FIG. 1) may, therefore, adapt an offset between an estimated contact and an actual contact in accordance with such errors. Feedback may be provided by the user activating an icon corresponding to a delete key. The offset may be applied to one or more icons. In some embodiments, there may be more than one offset and a respective offset may be applied to a respective subset that includes one or more icons in a plurality of the icons in a keyboard or other user interface. The adaptation may occur continuously, after a pre-determined time interval and/or if an excessive number of user errors occur (e.g., as evidenced by a frequency of use of the delete icon). The adaptation may occur during a normal mode of operation of the device 100 (FIG. 1), rather than requiring the user to implement a separate keyboard training/adaptation mode.

[0165] A flow chart for a symbol entry process 1400 corresponding to such embodiments is shown in FIG. 14. While the symbol entry process 1400 described below includes a number of operations that appear to occur in a specific order, it should be apparent that the process 1400 can include more or fewer operations, which can be executed serially or in parallel (e.g., using parallel processors or a multi-threading environment), an order of two or more operations may be changed and/or two or more operations may be combined into a single operation.

[0166] A plurality of icons may be displayed on a touch-sensitive display (1410). A respective icon may correspond to at least one symbol. A contact by a user with the display may be detected (1412). An estimated contact that corresponds to the respective icon and the at least one symbol may be determined in accordance with the actual contact and pre-determined offset (1414). One or more corrections for