

below. Each node in the usage frequency tree **146**, other than the root node, corresponds to a distinct character sequence that is a complete or partial word. A node representing a completed word is distinct from a node representing a partial word made from the same sequence of characters, and the former is a child of the latter in the tree. In some embodiments, a completed word is represented by appending a particular character, such as a space character, to the end of its parent sequence. This representation has the property that a first node is a child of a second node only if the character sequence corresponding to the first node is the concatenation of the character sequence corresponding to the second node and one additional character. In some embodiments, the memory **102** stores, for a node, the last character of the character sequence corresponding to that node, as opposed to the entire sequence for that node. The full character sequence corresponding to a node may be identified by backtracking through the ancestor nodes to the root node and prepending the characters stored for the ancestor nodes. It should be appreciated that the character set used for the usage frequency tree need not be limited to English letters or to the characters shown in FIG. 4. For example, it may include any or all of the following: characters from other languages and writing systems, accented characters, ligatures, punctuation, mathematical symbols, and other kinds of symbols.

[0049] In some embodiments, the usage frequency tree includes leaves that are complete words. In some embodiments the usage frequency tree includes leaves that are phrases or sentences. Additionally, in some embodiments, in order to limit the size of the usage frequency tree, the usage frequency tree may have a predefined maximum depth. In this situation, the length of a character sequence in the usage frequency tree is at most the maximum depth of the usage frequency tree. In some embodiments, other criteria may be used to prune the full theoretical usage frequency tree in advance of storing it. For example, using the notion of node weight discussed below, any node whose weight is below a predefined minimum may be removed from the usage frequency tree in advance of storing the tree, along with all of its descendants. Alternatively, any node whose weight, when divided by the weight of its parent, is below a predefined minimum, may be removed from the usage frequency tree in advance, along with all of its descendants.

[0050] A node in the usage frequency tree **146** is also associated with a usage frequency weight of the corresponding character sequence. In some embodiments, the usage frequency weight is equal or proportional to the number of occurrences of the character sequence in a representative sample of text. In that case, the weight of a node divided by the weight of its parent is an estimate of the probability that, given the parent sequence, its continuation will be the child sequence. Thus, if the tree includes all partial and complete words occurring in the representative sample of text, the weight of any node will be equal to the sum of the weights of its child nodes. Alternatively, if the usage frequency tree has been pruned in advance, then the weight of any node will be greater than or equal to the sum of the weights of its child nodes. In some embodiments, the usage frequency weight is equal or proportional to the number of occurrences of the character sequence in a representative sample of text divided by the number of characters in the character sequence or by a nondecreasing function of the number of characters in the sequence. This division has the effect of reducing the weight of longer sequences. In some embodiments, the usage fre-

quency weight of a node is a nonincreasing function of the usage frequency ranking of the corresponding character sequence. In some embodiments, the representative sample of text used to determine usage frequencies includes all or part of a broad range of published texts in a given language. In other embodiments, the representative sample of text is customized for locale, domain of application (including domain-specific terminology), software application, or other criteria. In some embodiments, the user can select and/or customize the representative sample of text. In some embodiments, the user can select and/or customize the set of weights. In some embodiments, the weights are automatically (i.e., without user intervention) updated based on the text that the user enters. For example, after each text entry session, the weights can be updated to be a weighted average of the prior usage frequency weights and the usage frequency weights derived from the text entered in that session. In some embodiments, the usage frequency tree includes nodes representing full or partial sequences of words in addition to full or partial words, and the representative sample of text includes a variety of instances of grammar usage, or the weights are otherwise determined in a manner that takes into account grammar rules.

[0051] In some embodiments, the portable device **100** is a device where operation of a predefined set of functions on the device is performed exclusively through a touch screen in the display system **112** and/or a touchpad. By using a touch screen and/or a touchpad as the primary input/control device for operation of the device **100**, the number of physical input/control devices (such as push buttons, dials, and the like) on the device **100** may be reduced. In one embodiment, the device **100** includes a touch screen, a touchpad, a push button for powering the device on/off and locking the device, a volume adjustment rocker button and a slider switch for selecting ringer profiles. The push button may be used to turn the power on/off on the device by depressing the button and holding the button in the depressed state for a predefined time interval, or may be used to lock the device by depressing the button and releasing the button before the predefined time interval has elapsed. In an alternative embodiment, the device **100** also may accept verbal input for activation or deactivation of some functions through the microphone **113**.

[0052] The predefined set of functions that may be performed exclusively through a touch screen and/or a touchpad include navigation between user interfaces. In some embodiments, the touchpad, when touched by the user, navigates the device **100** to a main, home, or root menu from any user interface that may be displayed on the device **100**. In such embodiments, the touchpad may be referred to as a "menu button." In some other embodiments, the menu button may be a physical push button or other physical input/control device instead of a touchpad.

[0053] In some embodiments, the device **100** is a device where operation of a predefined set of functions on the device is performed exclusively or primarily through the click wheel **114**. By using the click wheel **114** as the primary input/control device for operation of the device **100**, the number of other input/control devices (such as push buttons, dials, and the like) on the device **100** may be reduced.

[0054] Attention is now directed towards embodiments of user interfaces and associated processes that may be implemented on a portable electronic device **200**. FIG. 2A illustrates a portable communications device having a physical click wheel input device in accordance with some embodi-