

**APPARATUS, METHOD AND COMPUTER  
PROGRAM PRODUCT FOR PROVIDING AN  
INPUT GESTURE INDICATOR**

FIELD

**[0001]** Embodiments of the invention relate, generally, to multi-touch user interfaces and, in particular, to techniques for improving the usability of these interfaces.

BACKGROUND

**[0002]** It is becoming more and more common for mobile devices (e.g., cellular telephones, personal digital assistants (PDAs), laptops, etc.) to provide touch sensitive input devices or touch user interfaces (UIs) as a compliment to or replacement of the standard keypad. Some of these touch UIs are traditional, single-touch input devices, wherein a user may perform operations on the device via a single tactile input using a stylus, pen, pencil, or other selection device. In addition, many devices now provide a finger-based multi-touch UI, which may provide a more natural and convenient interaction solution for the user.

**[0003]** Multi-touch solutions dramatically increase the number of patterns, or combinations of finger gestures, that can be used to perform various operations on the device. On the one hand, this may be beneficial to the user, since, as indicated above, it may make the user's interaction with the device more natural and convenient. On the other hand, however, the cost of effective recognition of the multi-touch patterns is often not trivial. In addition, it may be difficult for the user to remember all of the different patterns, or combinations of finger gestures, that can be used with his or her device for each of the different applications being operated on the device.

**[0004]** A need, therefore, exists for a way to take advantage of the multiple patterns available in connection with the enhanced finger-based multi-touch UIs, while alleviating the costs associated with recognizing those patterns and assisting the user in his or her use of them.

BRIEF SUMMARY

**[0005]** In general, embodiments of the present invention provide an improvement by, among other things, providing an interactive selection technique, wherein a prediction may be made as to the operation or command a user is likely to request based on a number of factors, and an indicator may be displayed that illustrates to the user the finger gesture associated with that operation or command. In particular, according to one embodiment, at some point during operation of his or her electronic device (e.g., cellular telephone, personal digital assistant (PDA), laptop, etc.), a user may touch the electronic device touchscreen using one or more of his or her fingers, or other selection devices. In response, the electronic device may first determine one or more characteristics associated with the resulting tactile input detected. These characteristics may include, for example, the number of tactile inputs detected (e.g., with how many fingers, or other selection devices, did the user touch the touchscreen), the amount of force applied in connection with each of the tactile inputs, the user's hand pose (e.g., was the user's hand open, were the user's fingers curving to form a circle, etc.), and/or the identity of the finger(s) used to touch the touchscreen (e.g., thumb, index, middle, ring and/or pinky). In addition, the electronic device may receive contextual information associated with

the current state of the electronic device. For example, the electronic device may receive information regarding the current application being operated on the electronic device, the previous one or more operations performed by the electronic device while operating that application, and/or the like.

**[0006]** Using the characteristic(s) determined and the contextual information received, the electronic device may predict which operations the user is likely to request, or commands the user is likely to perform, by way of a finger gesture. In one embodiment, this prediction may involve accessing a look up table (LUT) of certain characteristics and/or states mapped to likely operations or commands. Alternatively, or in addition, various algorithms may be used that may be based, for example, on past operations and sequences of operations performed by the user in different contexts. Once a prediction has been made as to the likely operation(s) to be requested by the user, the electronic device may display an indicator that illustrates the gesture associated with the predicted operation (s). The user may use the indicator as a reference to perform the finger gesture necessary to perform the corresponding command. Based on the foregoing, embodiments of the present invention may assist the user by predicting his or her needs and reducing the number of patterns, or combinations of finger gestures, he or she is required to memorize in order to manipulate his or her electronic device to its fullest extent. Embodiments may further reduce the computational complexity, and, therefore cost, associated with gesture recognition by reducing the pool of gestures to those likely to be performed.

**[0007]** In accordance with one aspect, an apparatus is provided for providing an input gesture indicator. In one embodiment, the apparatus may include a processor configured to: (1) determine a characteristic associated with one or more tactile inputs detected; (2) receive contextual information associated with a current state of the apparatus; (3) identify one or more operations likely to be requested based at least in part on the determined characteristic and the received contextual information; and (4) cause an indicator associated with at least one of the identified operations to be displayed, wherein the indicator illustrates a gesture associated with the identified operation.

**[0008]** In accordance with another aspect, a method is provided for providing an input gesture indicator. In one embodiment, the method may include: (1) determining a characteristic associated with one or more tactile inputs detected; (2) receiving contextual information associated with a current state of the apparatus; (3) identifying one or more operations likely to be requested based at least in part on the determined characteristic and the received contextual information; and (4) causing an indicator associated with at least one of the identified operations to be displayed, wherein the indicator illustrates a gesture associated with the identified operation.

**[0009]** According to yet another aspect, a computer program product is provided for providing an input gesture indicator. The computer program product may contain at least one computer-readable storage medium having computer-readable program code portions stored therein. The computer-readable program code portions of one embodiment may include: (1) a first executable portion for determining a characteristic associated with one or more tactile inputs detected; (2) a second executable portion for receiving contextual information associated with a current state of the apparatus; (3) a third executable portion for identifying one or more operations likely to be requested based at least in part on the