number of key locations for each virtual key may be limited such that, for example, the key locations corresponding to the touch locations earliest in time may be discarded.

[0039] Furthermore, some key locations may be "backed out" based on conditions that occur later in time than when the key locations was first considered to be a key location. One such later-occurring condition is that a later touch condition is determined to correspond to a "backspace" virtual key that, when activated, would nullify the activation of the virtual key to which the to-be backed out key locations corresponds.

[0040] In addition, the weights associated with particular virtual keys (see step **202** in **FIG. 2** and step **606** in **FIG. 6**) may be adjusted dynamically. In one example, the weights are adjusted based on the sequence of virtual keys already activated. For example, the weight associated with the most likely next virtual key to be activated, based on the sequence of virtual keys already activated, may be set to be higher (or lower) than the weights associated with other virtual keys. What virtual key is most like to be activated may be determined, for example, using a dictionary (word-based), statistical probability for individual letters (for example, based on statistical frequency of occurrence), or a combination of both. In some examples, virtual keys deemed to be "dangerous" (e.g., whose the result of whose activation may be difficult to reverse) are given a smaller weight. Potential examples of such "dangerous" keys may include, for example, a "delete" key or "cancel" key (for example, the "delete" GUI item **906** in **FIG. 9**.) Furthermore, in some examples, the slower virtual keys are activated (corresponding, nominally, to more deliberate activation), the less any particular virtual key would be weighted.

[0041] The described examples may be particularly useful where the virtual keyboards are small relative to the touch area with which a user may activate a virtual key. With a conventional keyboard (with which, for example, it is determined that a particular virtual key is activated by determining if the touch area is within a boundary corresponding to that virtual key), the touch area may correspond to more than one virtual key.

[0042] For example, **FIG. 8** illustrates an example of an arc-shaped keyboard that may be particularly suited for thumb activation of the relatively small and close- together virtual keys. The visual display **802** associated with the **FIG. 8** keyboard, as well as (nominally) the layout of the key locations used to determine which virtual key is activated) is arc-shaped. An output area **804** is also shown, which provides an indication of the activated virtual keys.

[0043] The thumb, for example, is relatively large and difficult to control. The arc-shaped keyboard may be initiated by a particular gesture such as "swiping" the thumb across a corner of the touch screen. The arc-shaped keyboard may be, for example, located in a corner of the touch screen easily reachable for activation of the virtual keys by a thumb of a hand holding the touch screen computer.

[0044] While this invention has been described in terms of several preferred embodiments, there are alterations, permutations, and equivalents, which fall within the scope of this invention. It should also be noted that there are many alternative ways of implementing the methods and apparatuses of the present invention. It is therefore intended that the following appended claims be interpreted as including all such alterations, permutations, and equivalents as fall within the true spirit and scope of the present invention.

What is claimed is:

1. A method of operating a touch screen to activate one of a plurality of virtual GUI items, comprising:

determining a touch location based on location data pertaining to touch input on the touch screen, wherein the touch input is intended to activate one of the plurality of virtual GUI items;

for each of the plurality of virtual GUI items, each virtual GUI items having a set of at least one GUI item location corresponding to it, determining a parameter for that virtual GUI item that relates the touch location and the set of at least one item location corresponding to that virtual GUI item;

processing the determined parameters to determine one of the virtual GUI items; and

generating a signal indicating activation of the determined one of the virtual GUI items.

2. The method of claim 1, wherein:

the plurality of virtual GUI items are virtual keys of a virtual keyboard, and the set of at least one items locations is a set of at least one key location;

the determined parameter for each virtual key indicates, when considered relative to the determined parameters for the other virtual keys, a likelihood that virtual key is the one the touch input is intended to activate; and

processing the determined parameters for the virtual keys includes determining from the determined parameters the virtual key for which the determined parameter indicates the highest likelihood.

3. The method of claim 2, wherein:

determining the parameter for each virtual key includes

for each key location of the set of at least one key location corresponding to that virtual key, determining a parameter relating the touch location and that key location; and

processing the determined parameters for each of the set of at least one key location corresponding to that virtual key to determine the parameter for that virtual key.

4. The method of claim 3, wherein:

the determined parameter for each virtual key includes an indication of a relationship between a touch location and a distribution of key locations corresponding to that virtual key.

5. The method of claim 4, wherein:

the distribution of key locations corresponding to that virtual key is represented by at least one statistical parameter characterizing the distribution.

6. The method of claim 5, wherein:

the at least one statistical parameter includes standard deviation.