example, processing that can be performed to determine an acceleration factor. In one embodiment, the acceleration amount processing **300** is, for example, suitable for use as the operation **104** illustrated in **FIG. 1**. In another embodiment, the acceleration amount processing **300** is, for example, suitable for use as a sub-operation for the operation **206** illustrated in **FIG. 2**.

[**0048**] The acceleration amount processing **300** initially determines **302** a speed of a rotational user input. As previously noted with respect to **FIG. 1**, the rotational user input is provided by a rotational input device that is interacted with by a user. In one embodiment, the speed of the rotational user input is determined **302** based on the number of rotational units identified by the rotational user input. More particularly, in another embodiment, the speed of the rotational user input is determined **302** based on the number of rotational units and an amount of time over which such rotational inputs were received. The speed of the rotational user input can, for example, be considered to be the speed of a user movement or the speed of rotation of a rotational input device.

[**0049**] After the speed of the rotational user input has been determined **302**, a decision **304** determines whether the speed of the rotational user input is slow. The speed of the rotational user input can be determined or estimated, directly or indirectly, in a variety of ways. In one embodiment, a threshold is used to distinguish between slow and fast speeds of the rotational user input. The precise rate of rotation that is deemed to be the threshold between slow and fast can vary with application. The threshold can be determined experimentally based upon the particular application for which the acceleration amount processing **300** is utilized.

[**0050**] Once the decision **304** determines that the speed of the rotational user input is slow, then the acceleration factor (AF) is set **306** to zero (0). On the other hand, when the decision **304** determines that the speed of the rotational user input is not slow (i.e., the speed is fast), then a decision **308** determines whether an amount of time ($\Delta t1$) since the last time the acceleration was altered exceeds a first threshold (TH1). When the decision **308** determines that the amount of time ($\Delta t1$) since the last acceleration update is longer than the first threshold amount (TH1), then the acceleration factor is modified **310**. In particular, in this embodiment, the modification **310** causes the acceleration factor to be doubled.

[**0051**] Following the operation **310**, as well as following the operation **306**, an acceleration change time is stored **312**. The acceleration change time reflects the time that the acceleration factor was last updated. The acceleration change time is stored such that the decision **308** understands the amount of time since the acceleration was last modified (i.e., $\Delta t1$). Following the operation **312**, as well as directly following the decision **308** when the amount of time since the last acceleration update was made is less than the first threshold (TH1), the acceleration amount processing **300** is complete and ends.

[**0052**] Hence, according to the acceleration amount processing **300**, when the speed of the rotational user input is deemed slow, the acceleration factor is reset to zero (0), which indicates that no acceleration effect is imposed. On the other hand, when the speed of the rotational user input indicates that the speed of such rotation is fast, then the acceleration effect being imposed is doubled. In effect, then, if the user interacts with the rotational input device such that the speed of rotation is slow, then no acceleration effect is provided. In such case, the user can scroll through a data set (e.g., list, audio file) with high resolution. On the other hand, when the user interacts with the rotational input device with a high speed of rotation, then the acceleration effect is step-wise increased (e.g., via doubling or other means). The acceleration effect provided by the invention enables a user to interact with a rotational input device in an efficient, user-friendly manner such that long or extensive data sets can be scrolled through in a rapid manner.

[**0053**] **FIG. 4** is a flow diagram of acceleration amount processing **400** according to another embodiment of the invention. The acceleration amount processing **400** is generally similar to the acceleration amount processing **300** illustrated in **FIG. 3**. However, the acceleration amount processing **400** includes additional operations that can be optionally provided. More specifically, the acceleration amount processing **400** can utilize a decision **402** to determine whether a duration of time ($\Delta t2$) since the last rotational user input is greater than a second threshold (TH2). When the decision **402** determines that the duration of time ($\Delta t2$) since the last rotational user input exceeds the second threshold (TH2), then the acceleration factor is reset **306** to zero (0). Here, when the user has not provided a subsequent rotational user input for more than the duration of the second threshold (TH2), then the acceleration amount processing **400** is reset to no acceleration because it assumes that the user is restarting a scrolling operation and thus would not want to continue with a previous accelerated rate of scrolling.

[**0054**] The rate at which the acceleration effect is doubled is restricted such that the doubling (i.e., operation **310**) can only occur at a rate below a maximum rate. The acceleration amount processing **400** also includes a decision **404** that determines whether the acceleration factor (AF) has reached a maximum acceleration factor (AF_{MAX}). The decision **404** can be utilized to limit the maximum acceleration that can be imposed by the acceleration amount processing **400**. For example, the acceleration factor (AF) could be limited to a factor of eight (8), representing that with maximum acceleration scrolling would occur at a rate eight (8) times faster than non-accelerated scrolling.

[**0055**] Still further, the acceleration amount processing **400** stores **406** a last input time. The last input time (t2) represents the time the last rotational user input was received (or processed). Note that the duration of time ($\Delta t2$) can be determined by the difference between a current time associated with an incoming rotational user input and the last input time (t2).

[**0056**] As previously noted, the acceleration amount processing **300, 400** is, for example, processing that can be performed to determine an acceleration factor. However, although not depicted in **FIG. 3** or **4**, when the length of the data set (e.g., list) is short, then the acceleration can be set to zero (i.e., no acceleration) and the acceleration amount processing **300, 400** can be bypassed. For example, in one embodiment, where the data set is a list, if the display screen can display only five (5) entries at a time, then the list can be deemed short if it does not include more than twenty (20) items. Consequently, according to another embodiment of