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Arbitrary precision user settings

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ABSTRACT

A user of a mobile device often adjusts various user settings, e.g., speaker volume, screen brightness, etc., to reach a comfortable level. Sometimes, the user reaches, e.g., a volume level, that is a bit too high, and so hits the volume-down button. This results in a level that is too low, and so the user adjusts the volume back up, which is again unsatisfactorily high. The user repeats this loop for some time without truly finding a happy medium.

This disclosure provides techniques that enable a user to reach a precise level for an electronic control setting. Upon detecting that a user is repeatedly adjusting a setting about a certain level, the techniques adjust a control step-size downwards. The user tunes into their desired level in finer steps. If the user is again found repeating an up-down sequence at the finer resolution, the step-size is again adjusted downwards. This process of adjusting downward the step-size continues until the user reaches a comfortable level. If the user stays at that level for a certain period of time, then the step-size is re-adjusted upwards to its original value.

KEYWORDS

Precise control; audio volume; step-size; slider; control knob; continuous control; discrete control; fine control; coarse control; optimization; adaptive step-size; arbitrary precision

BACKGROUND

Many control settings for consumer devices, e.g., smartphones, laptops, televisions, etc., have a simple user interface, e.g., a slider that enables a user to move down or up a parameter such as speaker volume, screen brightness, etc. While a slider (or control knob) gives the feeling of continuous control, in most cases, the settings are discretized into a few, e.g., ten or so, buckets. In addition, some controls are often used in an up/down manner, which simply jumps to the next bucket.

Sometimes, the user reaches, e.g., a volume level, that is a bit too loud (low), and so moves the volume up/down button by one step. This results in a level that is too low (loud), and so the user adjusts the volume in the opposite direction, which is again unsatisfactorily loud (low). The user repeats this loop for some time without truly finding a happy medium.

DESCRIPTION

Per the techniques of this disclosure, a repeated movement of a setting in one direction followed by a movement in the other direction is an indication that the user is not happy with the level as reachable by the controller. The repeated back-and-forth change of setting can be detected using, e.g., a heuristic or a simple machine learning model.

For example, when the user increases volume, then reduces it, then increases it again, the second increase signals a user intention to set the volume to a value between the last two available discrete points.

Upon detection of user intent to set volume to a value between two available discrete points, the step-size for volume control is decreased, e.g., halved. This enables the user to seek a comfortable level at a finer resolution. If the user still repeats an up-down movement of the setting at the finer resolution, then the step-size is again decreased, e.g., halved. This enables the user to seek a comfortable level at a still finer resolution. The process of step-size reduction and seeking of optimal level at increasingly finer resolution is repeated until the user finds a comfortable level.

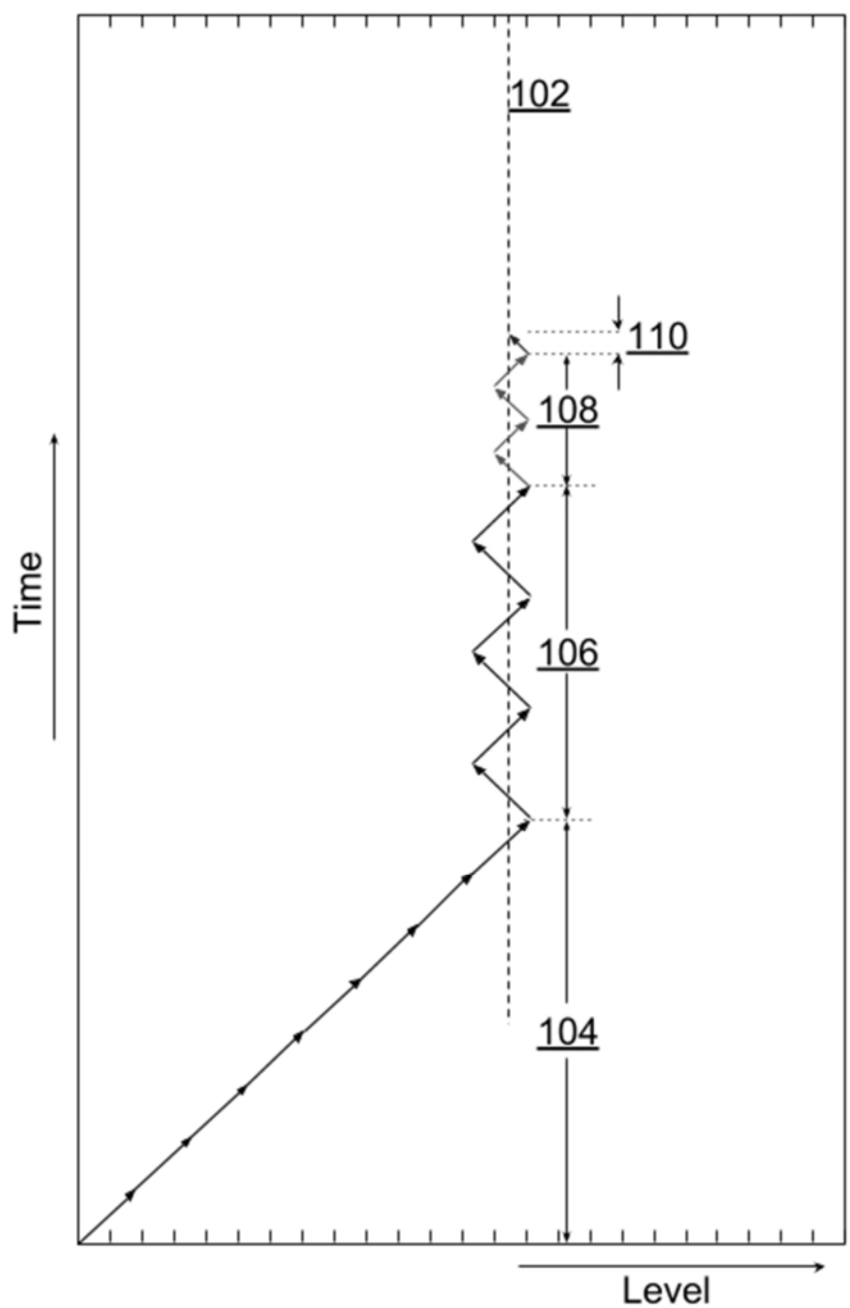

Fig. 1: Adjusting step-size to reach optimum level

Fig. 1 illustrates adjusting step-size to reach optimum level, per techniques of this disclosure. The X-axis represents the control setting, and the Y-axis represents time. The user attempts to reach a desired level (102). The user starts from zero, and at the end of an initial phase (104) reaches a level just above desired. The user reduces it by one step, this time under-shooting the desired level. This up-down movement continues (106), and is detected by the techniques of this disclosure. The step-size is reduced, enabling the user to search for the desired level at finer resolution (red arrows). Although now closer to the desired level, the setting still oscillates about the desired level (108). The step-size is reduced again (blue arrow), and the user finds a comfortable level (110).

After the user reaches a comfortable level and stays there for a predetermined duration, e.g., a few seconds, the step-size is reset to its original value. Thus, after the timeout of a few seconds, an up/down adjustment is executed at the original, coarser resolution.

Alternate to the adaptive step-size technique described above, the user setting may be provided at a fixed but very fine-grained quantization.

In this manner, the techniques of this disclosure provide fine grained control over simple, one-dimensional settings in an intuitive manner.

CONCLUSION

This disclosure provides techniques that enable a user to reach a precise level for an electronic control setting. Upon detecting that a user is repeatedly adjusting a setting about a certain level, the techniques adjust a control step-size downwards. The user tunes into their desired level in finer steps. If the user is again found repeating an up-down sequence at the finer resolution, the step-size is again adjusted downwards. This process of adjusting downward the step-size continues until the user reaches a comfortable level. If the user stays at that level for a certain period of time, then the step-size is re-adjusted upwards to its original value.

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