Click and Clack and Vampires

D. Michael Parrish

2021-05-23

```
Are you sure you want to delete "term_paper_final?"
Click "Y" for "yes" or "N" for "no:"

YN
```

—OS WTF [1]

Abstract

A method is described by which a tolerance controlling the computer interpretation of pointing device (such as a mouse) input may be investigated by individual users in an organic manner. The intended usage of the method is that each user may apply the knowledge gained from the investigation to the setting of one or more tolerances. Computer subroutines may apply these tolerances to the interpretation of each user's input. The goal is that user input is interpreted in a manner consistent with the user's intent.

Keywords

customization, Human-computer interface, mouse, personal computing

Article History

2021-05-23 First Complete Draft
2021-05-12 Partial Draft (description of method)

License

Prologue

Virginia was in a hurry. She furiously clicked the file icons to select which ones she wanted to attach to an urgent email response.

That's what she thought she was doing. What actually happend was that her computer interpreted the mouse input as an instruction to move a directory containing one million files into another directory.

Virgina felt personally betrayed by her personal computer.

Definition

vampire: a trap door on a stage [2, 3]

Introduction

Herein, we raise issue with a certain aspect of applications of human-computer interfaces—namely pointing devices—and present a method which could be part of a solution.

The issue and solution have to do with tolerances surrounding the user's precision in specifying points.

Below, we present background information, an organic method for estimating tolerance(s), and a particular application of the method.

Background

Several widely-used graphical user interfaces (GUI's) include a facility for specifying a point. Such a specification might be associated with the intent to select an object (e.g., a file, a "No" button, or a menu) or to create a new one (e.g., whatever is associated with a particular menu item).

Some of these GUI's have a user-controlled parameter—call it *tolerance*—that defines "close enough." In other words—suppose the user's pointing device is a mouse—between the button-down and button-up events, the mouse may move, and so there are at least two points associated with the *click* (botton-down followed by button-up events). If the two points are close enough, they are taken to represent a single point. If the two points are too far apart, the point might be ignored.

However, there may be something intolerable about the tolerance: the manner in which the user might gain knowledge sufficient to appropriately specify it. Typically, the tolerance is specified by a *number*. How is Virginia supposed to know which number corresponds to the steadyness of her hand? One method by which she might come to such knowledge is presented as follows.

Method

The user moves the mouse quickly, guiding the mouse cursor to an arbitrary location, then clicks. This process is repeated many times.

Each time the mouse-button state changes, the mouse position is logged. There are two positions for each click (one for button-down, one for button-up), as well as the *duration* of the click.

When enough repetitions have been performed, each of the logged pairs of positions are differenced. Each click k might be represented

$$(\Delta t, \Delta x, \Delta y)_k$$

Each of these differences represent the user's accuracy in picking a single point; $(\Delta t, 0, 0)$ would correspond to exactness.

The differences are organized into three collections: one for each direction x and y, and one for duration.

Post-processing and statistics are computed on the three collections. Post-processing steps might include taking the absolute value, then replacing all the zero differences with the next smallest value. Post-processing might also include casting out the more extreme absolute differences.

The statistics establish thresholds of tolerance in each direction for estimating the user's intent when clicking: if the differences in position between button-down and button-up fall within the tolerance, the corresponding action might be interpreted as the user specifying a single point. If the differences in position are greater, but the *duration* Δt is also large, the event might be interpreted as a click-and-drag operation. Finally, if the differences in position exceed the tolerance, and Δt is short (as when the user's elbow is bumped mid-click), the event might be interpreted as noise, and therefore to be ignored.

Post-processed results are presented to the user.

Anecdotes

As an example, the author conducted an experiment in which the subject (the author) entered several mouse clicks, moving the mouse quickly between clicks, and attempting to stop during each click.

The mouse position was captured at each button-down and button-up event. The difference between the mouse position at button-down and at button-up was computed for each click.

The resultant mouse movements were presented to the subject (see the accompanying Plate 1 [4]). The subject was free to use the information presented in order to select a tolerance for future clicks.

Software

The above experiment was conducted using software[6] running in R[7] version 4.0.3.

Discussion

Such a method might be offered to the user upon installation of new software. The method might also be made available in a “Customize” menu.

The anecdotes provided in the correspondingly-named section do not include consideration of the time dimension. We leave such consideration to future work, and perhaps the work of others.

Conclusion

In the author’s opinion, personal computer software is too often impersonal. That is, facilities for tailoring the user experience to to the user are lacking. The present paper has presented a small part of what might be a larger effort toward “making the computer ‘personal again’”[5].

References

[1] OS WTF (a fictitious operating system whose user-prompts may be all too familiar.)

[2] The Free Dictionary (2021-05-12) “vampire.” therein attributed to HarperCollins (2005) Collins Discovery Encyclopedia, 1 ed. https://encyclopedia2.thefreedictionary.com/vampire

[3] Wiki User (2013-12-13) “Why is a stage trap door called a vampire?” https://www.answers.com/Q/Why_is_a_stage_trap_door_called_a_vampire

[4] Parrish DM (2021-05-19) “Test Results” https://github.com/dmparrishphd/click/blob/master/Files/6/0/Vampire/Drafts/clickAndClackAndVampires_Plate1.pdf

[5] HP (2008-06-10) “HP Bridges Work, Play, Home and Entertainment with Global Personal Systems Product Launch.” https://www8.hp.com/us/en/hp-news/press-release.html?id=169893

[6] Parrish DM (2021) clickAndClackAndVampires.R https://github.com/dmparrishphd/click/blob/master/Files/6/0/Vampire/R/clickAndClackAndVampires.R

[7] The R Foundation for Statistical Computing (2020-10-10) R v4.0.3 https://www.r-project.org/