Factors affecting performance of target acquisition task in touchpad

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Abstrak

The performance and usability of the input device play an important role in providing better experience for the user. The touchpad is commonly known as a pointing device and is a predominant pointing technology for notebook computers. However, comparative evaluations have established that touchpad performance is poor in comparison with a mouse. The best setting of touchpad is also remaining unknown. Furthermore, there is no research that study about the velocity pattern in touchpad.

To solve this drawback, this research attempts to implement Fitts' Law method, merely focused on touchpad. In the design of experiment, touchpad size and position filter are added as new independent variables, along with Control Display Gain, Distance, Width, and Angle, as the wellknown variables in Fitts' Law researches. Two sizes of touchpad are prepared which consist of large (100*60) and small (65*36) sizes. In addition, position filter is set at 2 different levels: 30 and 50, moreover gain setting is set at 3 different levels of fixed gain: 0.5, 1, and 2. For the Fitts' Law Program, 3 different levels of distance (100, 300, and 500 pixel), 3 different levels of target width (10, 40, and 70 pixel), and 8 directions (0, 45, 90, 135, 180, 225, 270, and 315) are applied. Moreover, the dependent variables that are being studied are movement time, error count, movement count, target re-entry count, and peak velocity.

In this experiment, 20 participants are recruited and ANOVA Split Plot is used as the method. In total, each participant performed 2592 trial movements (2 touchpad size $\times$ 3 position filter $\times$ 3 control display gain x 3 distance $\times$ 3 target size $\times$ 8 moving direction $\times$ 3 repetitions). As for the results, touchpad size significantly affects movement time, error count, movement count, and re-entry count. Position filter also significantly affects the re-entry count.

The best setting acquired from result shows that filter 50 and gain 2 are better implemented for primary movement, and filter 30 and gain 0.5 are better applied in secondary movement. The result also shows that there is difference in angle for touchpad performance and mouse. The different behavior for touchpad user also differs in touchpad performance indicator. Moreover, clutching behavior on touchpad user makes touchpad velocity graph to be modeled into several primary movement. Furthermore, strong interaction between distance and gain influences Fitts' Law equation to be modified.