Reading Summary

Course: CEN4721 Human-Computer Interaction

Author: Yiru Mu, Charles Richardson

Reading: A predictive model of menu performance

Menus serve as a primary control in user interfaces. Performances of these menus rely heavily on the outcome of user interactions. Authors in this paper proposed a model of menu performances that incorporated the time it takes for users to find items, to move items, and the users' transition from novice to expert. Using Hick-Hyman and Fitts' laws*, two laws of human behaviors, the proposed model attempts to provide theoretical predictions for the performance of different menu designs (Cockburn et al., 2007). Additionally, transition from linear visual search to logarithmic decision time is used to model users' transition from novice to expert.

To calibrate the formulae used in the model, the researchers did an initial study with a static menu using unfamiliar and familiar datasets respectively and a random menu, which represent two extremes in menu learnability. Then, the proposed model was evaluated by comparing predicted results with the empirical results using 4 different types of menus, which are "traditional menus, morphing menus, recency- and frequency- based split menus" under a realistic Zipfian distribution of selections (Cockburn et al., 2007). Regression analysis results of the study showing the proposed model has high prediction accuracy for different types of the menus used, adaptive and non-adaptives, confirming hypothesis of the study that "performance with spatially stable menus migrates from novice behaviour that degrades linearly with menu length due to visual search time, through to expert behaviour that degrades logarithmically with menu length" (Cockburn et al., 2007).

This paper was effective in taking two laws of human behavior and merging them into a cohesive model. Where the paper fell short was on its sample size of eighteen. The central limit theorem in statistics implies that a sample size of around thirty is necessary to perform any relevant statistics, with sample sizes below this threshold being extremely susceptible to high variance. With a sample size smaller than the central limit theorems' threshold, we cannot confidently conclude that the results are accurate. In fact, it is debatable that the actual results could appear more like the expected results if the sample size was increased to its minimum significant level.

* "The Hick-Hyman Law describes human decision time as a function of the information content conveyed by a visual stimulus. Fitts' Law describes the movement time taken to acquire, or point to, a visual target (Cockburn et al., 2007)."

However, overlooking the statistical flaws, this paper provides a strong development of research in the area of menu design which academia and industry could use to cater better experiences to their personnel and their customers. Combining two laws into one model simplifies a handful of research and development for menu design which in turn saves time and resources. Furthermore, it enables more efficient products and services, which leads to more satisfied and empowered users.

Reference:

Cockburn, A., Gutwin, C., & Greenberg, S. (2007). A predictive model of menu performance. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. https://doi.org/10.1145/1240624.1240723

Ganti, A. (2022). Central Limit Theorem. Investopedia https://www.investopedia.com/terms/c/central_limit_theorem.asp

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