THE DESIGN AND EVALUATION OF MARKING MENUS

by

Gordon Paul Kurtenbach

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Graduate Department of Computer Science
University of Toronto

Abstract

This research focuses on the use of hand drawn marks as a human-computer input technique. Drawing a mark is an efficient command input technique in many situations. However, marks are not intrinsically self-explanatory as are other interactive techniques such as buttons and menus. This research develops and evaluates an interaction technique called marking menus which integrates menus and marks such that both self-explanation and efficient interaction can be provided.

A marking menu allows a user to perform a menu selection by either popping up a radial menu and then selecting an item, or by drawing a straight mark in the direction of the desired menu item. Drawing a mark avoids popping up the menu. Marking menus can also be hierarchic. In this case, hierarchic radial menus and "zig-zag" marks are used. Marking menus are based on three design principles: self-revelation, guidance and rehearsal. Self-revelation means a marking menu reveals to a user what functions or items are available. Guidance means a marking menu guides a user in selecting an item. Rehearsal means that the guidance provided by the marking menu is a rehearsal of making the mark needed to select an item. Self-revelation helps a novice determine what functions are available, while guidance and rehearsal train a novice to use the marks like an expert. The intention is to allow a user to make a smooth and efficient transition from novice to expert behavior.

This research evaluates marking menus through empirical experiments, a case study, and a design study. Results shows that (1) 4, 8 and 12 item menus are advantageous when selecting using marks, (2) marks can be used to reliably select from four-item menus that are up to four levels deep or from eight-item menus that are up to two levels deep, (3) marks can be performed more accurately with a pen than a mouse, but the difference is not large, (4) in a practical application, users tended towards using the marks 100% of the time, (5) using a mark, in this application, was 3.5 times faster than selection using the menu, (6) the design principles of marking menus can be generalized to other types of marks.

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