A User Input and Analysis Tool for Information Architecture

Jianming Dong
jdong@us.ibm.com
+1 512 838 0906

Shirley Martin
smartin2@us.ibm.com
+1 512 823 8106

Paul Waldo
pwaldo@us.ibm.com
+1 512 838 4059

IBM Austin Ease of Use, 11400 Burnet Road, MS 9446, Austin, TX 78758 USA

ABSTRACT

The EZSort tool helps interface designers organize information for Web sites based on users' expectations gathered from card sorting exercises. It includes two packages: Usort and EZCalc. Usort provides a simple user interface for the card sort study participants to group cards by direct manipulation within a Graphical User Interface. EZCalc analyzes the card sort data gathered from Usort using cluster analysis statistical tool and generates tree diagrams that present clearly the page groupings suggested by the data. The output diagrams from EZCalc feature directly adjustable criteria bars and dynamic feedback on the resulting groupings. This tool is available for download from the IBM Ease of Use Web site.

Keywords

Card sort, cluster analysis, information architecture, interface design, EZSort, Usort, EZCalc, Web, Usability, World Wide Web

INTRODUCTION

The organizational structure of a Web site is an essential element of its ease of use. Site visitors must be able to navigate freely and confidently through a site in order to make efficient use of its contents. Unfortunately, many corporate Web sites are not organized to match their user's expectation. Such designs are often inscrutable to the users of these sites.

One user-oriented approach to acquire user input to site structure design is card sorting. In a typical card sorting exercise, members of a site's target audience take randomly ordered cards representing pages of a Web site, and group the cards as they see fit.

Some researchers (e.g., Nielsen and Sano, 1994) have "eyeballed" the sets of cards to divine an overall organizational structure. Cluster analysis quantifies card sorting data by calculating similarity scores, which represent the strength of the perceived relationships between pairs of cards, based on how often the members of each possible pair appear in a common group. By revealing the perceived relatedness of the main pages, tree diagrams can be generated to help guide the navigational design of the site to meet users' expectations, resulting in a more usable site.

Cluster analysis has been underused due to the tedious procedures required for getting the user data into, and interpreting the output of, currently available statistical packages such as SAS^{TM} or Statistica^{TM}. These packages require the user to convert raw user data (card groups) into matrices of either distance scores or similarity scores. This conversion can require several hours for each participant's data if performed by hand. The packages' output is also difficult to manage. Their tree diagrams illustrate the relationships between the cards, but provide no assistance in visualizing the consequences of choosing various criteria for grouping the pages.

EZSort is a software tool that simplifies both the card sorting exercise procedure and the interpretation of the resulting trees. This tool includes two packages -- USort and EZCalc. Card sort participants can use the USort package to sort virtual cards with a simple Graphical user interface, instead of packs of physical cards. Test administrators can use the EZCalc package to manage card sort data generated by USort, and perform cluster analyses. EZCalc generates tree diagrams that allow direct adjustment of the cluster thresholds. This tool is available for downloaded from the IBM Ease of Use Web site at http://www-3.ibm.com/ibm/easy/ eou_ext.nsf/Publish/649.

CARD SORTING PROCEDURE WITH USORT

Card sorting is a data collection method that is useful in understanding users' perceptions of relationships between items. A typical procedure follows:

- Recruit participants from target audience and test each participant in an individual session.
- Create a card list file using any text editor. Each line in the text file contains a card name and its description.
- Start Usort program and specify the card list file to be used.

- Participant enters ID number.
- The program displays all cards in the "SOURCE" field with random order. Participant is asked to arrange cards into logical groups in the "TARGET" field by drag and drop operation. An example user interface is shown in the following Figure.
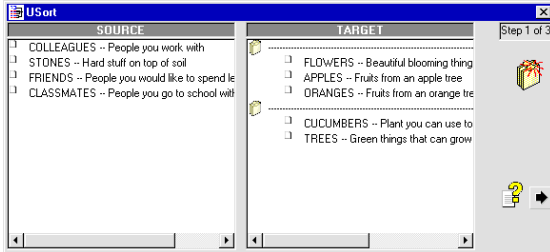

- When the participant is satisfied with the groupings, click the right arrow button to proceed.
- Participant arranges the initial groups into higher-level groups if any further logical groupings are apparent. This can be done re-ordering hierarchical groups and switching lower-level separation lines to higher-level separation lines.
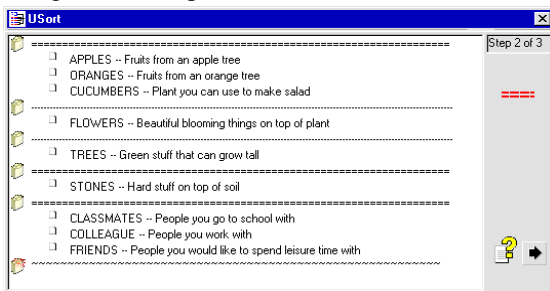
- When the participant is satisfied with the groupings, click the right arrow button to go to step 3, which allows participant to optionally suggest a name for each higher-level group.

EZSORT RESULT PRESENTATION WITH EZCALC

EZSort generates tree diagrams that indicate the strength of the perceived relationships between pairs of pages by the relative distance from the origin (0) of the nearest vertical line that connects the pages' associated horizontal lines.
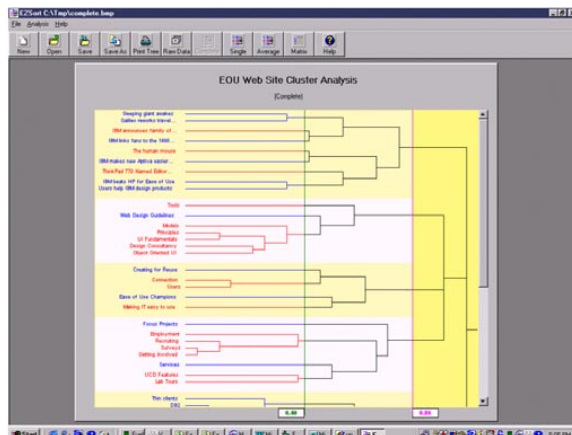
To find the strength of the perceived relationship between any two pages, trace a path from one of the page names to the other, following the branches of the diagram, and taking the shortest possible path.

In the EZSort output diagrams, the group membership of the cards is indicated by differentiated line colors, shading, and spatial separation. The alternating blue and red text and line colors indicate low-level groupings. The alternating pale yellow and white background colors in the area to the left of the red line indicate the high-level groupings. The vertical separation of item names at the far left also reflects the similarity levels defined by the high-level and low-level thresholds.

The criteria for group membership are defined by two thresholds, indicated by vertical bars. The low-level threshold is indicated by a green bar, and the high-level threshold is indicated by a red bar. The distance value is displayed in a "value flag" at the bottom of each bar. The user can adjust the position of the criteria bars directly by dragging them. The groupings change dynamically as the bars are moved, providing immediate visual feedback to assist users in finding the most appropriate groupings. The distance values in the "value flags" also change in real time as the criteria bars are adjusted. Distance thresholds are chosen by adjusting the bars until an acceptable number of high-level and low-level divisions result. These divisions can be translated into navigational units in the resulting Web site.

CONCLUSION

Card sorting tests and cluster analysis can help site designers understand their target audience's expectations for site content organization. The EZSort tool simplifies the process of conducting a card sort study, statistically analyzing data from card sort studies and visualizing the results. It allows the user to see the results of changing the grouping criteria, making it easier to find the best threshold values. It also provides far better accuracy than simply "eyeballing" the data. Web site designers can use the results to help determine a structure that their audiences will understand.

REFERENCES
1. Aldenderfer, M. S., and Blashfield, R. K. (1984). Cluster Analysis (Sage University Paper series on Quantitative Applications in the Social Sciences, No. 07-044). Beverly Hills, CA: Sage.
2. Nielsen, J., and Sano, D. (1994). SunWeb: User interface design for Sun Microsystem's internal web. Proceedings of the 2nd World Wide Web Conference '94: Mosaic and the Web (Chicago, IL, October 17-20), 547-557 (also available in hypertext form as http://www.ncsa.uiuc.edu/SDG/IT94/Proceedings/HCI/nielsen/sunweb.html).