

Research Paper Summary

Ring, G. (1998): The Role Of Graphics In User Interfaces

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Introduction

This paper presents a broad general summary of the state of the research in graphical user interfaces in the late 1990's. The author presents a brief history of the evolution of GUI and presents evidence supporting the use of GUI as well as outlining the challenges presented by GUIs.

History

Ring points out that the evolution of GUIs followed the great increase in computing power that occurred during the late 1980's and early 1990's. Earlier systems simply did not have the memory or processing power to support this type of interface.

XEROX Corporation performed the ground breaking work by developing an interface that included these fundamental elements: direct manipulation of graphical elements using a mouse, and a graphical metaphor of the familiar world. These fundamental elements are based on psychological underpinnings drawn from the work of Jerome Bruner (1966). Bruner described three fundamental cognitive skills—enactive (physical manipulation), iconic, and symbolic.

Metaphor

Metaphor is the key to the success of GUI. While a command-line interface requires the user to either memorize commands for every operation as well as memorizing the directory hierarchy, a good metaphor makes it possible for the user to intuit—or nearly intuit—most operations. The metaphors used allow the graphics to encode meanings. The encoding may be from the use of icons that visually explain their functions to the use of size of an icon to indicate how much memory a file uses.

Research areas

Ring describes two areas of study important for continued development of GUI. One is the field of "Visual Language," which is an area in which researchers attempt to develop an understanding of how visual elements communicate specific ideas to viewers. It is under this general area of study that questions regarding use of layout, 2-D and 3-D organization, typography, color and texture might be examined.

Another area of research that may generate findings important for interface design is the neurology of perception. An example of why this field is important

is that there is no way to be sure what part of a visual field as large and complex as a computer display a user will attend to at any moment. Improved understanding of perception may make it possible to design interfaces that more reliably communicate what is intended.

Interactive Multimedia Interfaces

Interactive Multimedia (IMM) products provide environments with the potential for a rich assortment of stimuli, including audio, video, graphics, animation, and text. Ring observes that the use of many communication channels can easily lead to overload. Disorientation is especially problematic in hypermedia environments—those in which the network of nodes is joined by associative links and there is little organization. Ring states that intuitive mappings between the graphical representations of interface elements and their functions is vital (although this reader notes that six years later there are many GUI products with fairly non-intuitive mappings!). Ring also claims that the use of visual cues may be helpful, but he gives no examples. Perhaps this is an area in which further research is needed.

Ring summarizes his review by pointing out that both Apple and Microsoft have established guidelines for GUI development, and shares a list of “key components” of well-designed interfaces, according to Marcus (1992).

Conclusion

This article seems to be a good starting point for understanding some of the important issues involved in the design and use of graphical user interfaces. It describes why GUIs are useful, some of the pitfalls involved in their use, a few areas for future research, and it gives some resources for application of GUI design.