Innovative Interfaces, Week 1 Report

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1 The Model Human Processor

1.1 Context and Summary

The paper [2] argues for the construction of a model of the human as a collection of quantifiable mechanisms, including sensors, processing and interaction capabilities. The motivation for such a model is to be able to make predictions about how humans would behave in interactions with potential computer systems or machines.

Cognitive modelling was considered a topic of human-computer interaction and intelligence amplification (IA). These ideas were first pioneered in the 1950s and 1960 [7]. Some work was done in-between on psychological interaction and responses to computers [1]. This paper from 1986 was coinciding at the time with emerging commodity GUI desktop systems.

In the paper, a rough model of a human is given by various parameters relating to reaction time to vision and audio, ones memory of these, times to process ones impressions, and times to produce feedback back to the system one is interacting with. It is argued that more refined models should be produced in the future to create better results, and for more complex situations. A few basic examples try to verify the justification for the approach.

1.2 Evaluation

While investigating the interface between man and machine, most work previously had focused on the computer, or the interface. Considering human-computers as a complete system, this paper draws attention to modelling and making calculations on the human sides of the equation. This is an important insight into engineering-oriented usability studies. The model presented in the paper are too basic for practical application. But later research has evolved towards additional and more complex models that have utility [10][12][11], for example GOMS (Goals, Operators, Methods, and Selection rules) and Keystroke-Level Modelling.

2 Star Graphics: An Object-Oriented Implementation

Star Graphics (hereby Star) was a text and graphics editor developed by Xerox Corporation that ran on the XEROX Star system [5]. It was a major application (over 250 thousand lines of codes) that featured text and graphic capability for producing rich word processed documents.

The Star system pioneered, as a commercial product, the window based desktop metaphor and mouse-driven graphical user interface (GUI) [6] (this metaphor became ubiquitous on Macintosh and Windows systems that appeared only a couple of years later). There existed some graphical-based precursors, Sketchpad and On-Line System lead to graphical R&D efforts at PARC [9]. PARC developed prototypes through the 70s featuring windows, menus and icons representing files and folders.

The graphical based interaction on the completed system supported adding any number of primitive objects including points, lines, rectangles, triangles and text frames. Object could be modified, either directly such as selection, translation, moving a vertex, resizing or deletion, or through a properties sheet window with additional options. The Star implementation used an early type of OO multiple-inheritance that considers object types to be assembled by more primitive abstractions, known as traits. [3] The internal representation of the objects used a hierarchy of document objects; a system of inheritance that resembles the DOM used in browsers, and application frameworks today (for example Java).

The Star system was a commercial failure, mainly attributed to its high price [5]. It was however the precursor to numerous innovations present in most personal computer systems today.

3 The X Window System

3.1 Context and Summary

An important motivation for the development of the X-Windows manager was the high level interface to make application code more portable from one machine to another, and to enable network transparency, allowing both local and remote client programs to access a user's display [8]. This allows a number of applications displaying concurrently on one machine with an X-server, to be arbitrarily separated between local and remote machines.

Other specifications of the X-System included device independency, window management functions (such as overlapping and resizable windows) and support for high quality graphics and text. It distinguished itself at the time by deliberately not containing specification for application user interface design, such as buttons or window styles.

The essential task of the X-Server (the part that runs the display) is to listen and de-multiplex input events from the user to the X-Clients, and to multiplex graphical requests from clients (using the X-Window API protocol) to the display

3.2 Evaluation

X-Windows employed a modular approach to GUI design. Network transparency meant easier time-sharing and utilisation of distributed computer resources. The flexibility on the user interface design lent the system to a broader range of applications. Until recently X-Windows was used to run most of the Linux based window managers, but considered by some to be too feature rich and unnecessarily abstracted, it has lost some traction to other graphical protocols that communicate more directly with applications [4].

References

[1] S.K. Card, T.P. Moran, and A. Newell. *The Psychology of Human-Computer Interaction*. Erlbaum, Hillsdale, NJ, 1984.

[2] S.K. Card, T.P. Moran, and A. Newell. *The model human processor*, chapter 45. John Wiley and Sons, 1986.

[3] G. Curry and et al. Traits - an approach to multiple-inheritance subclassing. *Proc ACM Conf. on Office Automation Systems (SIGOA)*, 1982.

[4] H. Gajewska. Why x11 is not our ideal window system. *Software: Practice and Experience*, pages 137–171, Oct. 1990.

[5] E. Harslem and L.E. Nelson. A retrospective on the development of star. *International Conference on Software Engineering*, Sept. 1982.

[6] J. Johnson, R. Roberts, W. Verplank, D. Smith, C. Irby, M. Beard, and K. Mackey. The xerox star: A retrospective. *IEEE Computing*, 22, Sept. 1989.

[7] J.C.R. Licklider. Man-computer symbioses. *Human Factors in Electronics, IRE Transactions on*, pages 4–11, Mar 1960.

[8] B.A. Myers. A taxonomy of window manager user interfaces. *Computer Graphics and Applications, IEEE*, 1988.

[9] T.S. Perry and J. Voelcker. Of mice and menus: Designing the user-friendly inter-face. *IEEE Spectrum*, 46-5 I., Sept. 1989.

[10] J Preece and et al. *Interaction Design*. John Wiley & Sons, 2002.

[11] P.M. Sanderson. Towards the model human scheduler. *International Journal of Human Factors in Manufacturing*, pages 195–219, July 1991.

[12] B. Xie and G. Salvendy. *Review and reappraisal of modelling and predicting mental workload in single- and multi-task environments*. Taylor & Francis, 2000.