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BRIMS Tutorial Proposal

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Cognitive Crash Dummies: Here today, look toward tomorrow

06jan09

DETAILED DESCRIPTION OF TUTORIAL

Twenty-five years ago, Card, Moran and Newell introduced the concept of engineering models that could make a priori, quantitative predictions of human behavior with computer interfaces (Card, Moran & Newell, 1983a, b). In principle, these models could help design by quickly evaluating many alternative ideas before empirical data could be collected on running systems or prototypes. Research in this area has continued and over one hundred research papers have been published about GOMS and the Keystroke-Level Model (KLM) (see the GOMS bibliography, http://www.gomsmodel.org/gomsbib.html). Applications in the real world have been reported, but adoption into industrial practice has been slower than the success of the research might warrant. One hypothesis has been that there were no reliable, freely available, easy to use tools that made modeling easy for practitioners with little psychology training. In the past few years, several groups have been building user-centered tools for modeling (sponsored by the Office of Naval Research and other organizations) and it is now possible to accelerate adoption of modeling in industry through short courses.

Interest in this area is evident from the number of papers at CHI2007 that included modeling as one of the techniques that brought value to a project (e.g., see papers by Google, NASA, the Carlsbad Police, Drexel, Fraunhofer IASI, the UK's Transport Research Laboratory, among others) and by the attendance of practitioners from many companies at tutorials at BRIMS 2007 and HFES 2008. No one suggests that modeling is the only tool necessary, but it is a tool that is ready for more HCI professionals to feel comfortable using, and the BRIMS Conference is an appropriate place for them to attain these skills.

The day will begin with a short lecture on the history and state of the art of predictive human performance modeling, leading directly into a hands-on modeling session before the first break. The example interface will be a previously published interface (Nielsen & Phillips, 1993), which includes comparing two different interfaces for looking up a telephone number and two tasks on those interfaces. The first interface (Design A) involves using standard hierarchical menus to bring up a dialog box into which the telephone numbers are entered. The second interface (Design B) involves using a context menu brought up on the telephone numbers themselves to invoke the look-up. The tasks are to look up one and two telephone numbers. These interfaces and tasks have been used as a test of modeling in several publications (Nielsen & Phillips, 1993; John, 1994; John et. al. 2004; Salvucci, D. D., and Lee, F. J. (2003)), have empirical data against which to compare the models, and are easily understood by the participants in a tutorial.

There are two ways to use the tool that will be taught. The first way is to use screenshots from an existing system to baseline skilled performance on that system. This will be the topic of the first hands-on exercise. However, if the tool could only baseline existing systems, it would not be any more useful in design than conducting empirical tests! The second way to use the tool is to rapidly build new designs and predict skilled performance on many design ideas. This will be the focus of the second hands-on exercise. The participants will redo the storyboards and models of the Nielsen and Phillips task in this more powerful way. We will reuse the same task so they participants already have an understanding of it and how a baseline model is built. Given this basis, they will be able to appreciate the different modeling approaches provided by the tool. This activity will finish before lunch.

After getting comfortable with using the tool on these simple examples, the participants will spend most of the rest of the day using the tool to model their own projects from their own work, or, if they do not have a work project to use, the instructor will provide several more complex projects. They will get one-on-one assistance from the instructor or a graduate student skilled in using the tool.

The tutorial will end with a short lecture on a variety of applications of this modeling technique and current research that will be available in the tool in the future. This will include being able to predict exploratory behavior, emergent strategies, and learning time as well as skilled execution time.

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Time allotted	Topic or Event
10 min	Instructor introduction & course objectives; Survey of the audience background and interests
20 min	State of the art of predictive human performance modeling
15 min	Introduction to the software, set-up & begin first hands-on exercise
45 min	Hands-on exercise continues, with instructor and graduate student aids helping the participants. When questions or issues of general interest arise, the instructor will discuss them with the class as a whole. Participants who finish early will move on to a second exercise, which can either be supplied by the instructor or can be of their own systems.
30 min	Break
30 min	Q&A about the first hands-on exercise session. Peer discussion of modeling options and trade-offs discovered during the first session.
1 hour	Second hands-on session where the participants re-do the model from the first exercise in a more powerful way.
1 hour	LUNCH
30 min	Q&A about the second hands-on exercise session. Peer discussion of modeling options, trade-offs, and approaches to design exploration discovered during the second session.
1 hour	Third hands-on session where the participants model a more difficult interface, either from the instructor's materials or their own system.
30 min	Break
1 hour	Presentation of designs and models of volunteer participants from the third hands-on session. Peer discussion of modeling options, trade-offs, and approaches to design exploration.
30 min	Wrap up of what has been explored today and the future of predictive human performance modeling and tools to support it.

WHO WOULD BENEFIT FROM THIS TUTORIAL

The target audience includes human factors professionals and system developers who want to evaluate alternative designs before building running prototypes. No prior knowledge of perceptual, cognitive, or motor psychology, or predictive human performance modeling is required.

Participants in the BRIMS 2007 and HFES 2008 tutorials were from industry and government, (with a few from academia interested in learning to teach human performance modeling) from organizations such as Boeing, BAE, Lockheed-Martin, Toyota, Nissan, Department Of Veterans Affairs (Health Data And Informatics), and all branches of the US armed forces. Comments on the feedback forms from the Sept 2008 HFES tutorial (which HFES calls a "workshop") included:

"This tool will be very useful to me as an HF practitioner. Often we are asked how "much" better one design is compared to another and it is difficult to obtain our target users to participate in a test like this. Modeling is a much easier effort to get the answers we need."

"The workshop has excellent application to product design in industry! This was something I can take back and use immediately in HCI."

"Well taught, organized, with examples that are applied and therefore very interesting to HSI [Human System Integration] practitioners."

"Groundbreaking theories being applied to real-world designs to accurately and easily predict user performance."

"Wonderful. I can clearly see how, as a practitioner in industry, I can apply this to the numerous projects I work on."