SegMan

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This presentation will focus on integrating ACT-R models with external environments, mainly through the application of appropriate AI techniques. The work has been carried out by computer science researchers at North Carolina State University, in collaboration with Frank Ritter in the Applied Cognitive Science Lab at Pennsylvania State University. NCSU's efforts have been supported by funding from the National Science Foundation and from SPAWAR.

Our longest-running project has produced a software system called SegMan, which loads as an add-on to ACT-R in Allegro CL for Windows, and allows an ACT-R model to interact with off-the-shelf Windows applications [Zettlemoyer & St. Amant, 1999, St. Amant & Riedl, 2001]. SegMan processes the screen image, extracts information about buttons, text boxes, and so forth, to generate a representation that is fed as input into ACT-R/PM. On the output side, model actions are mapped to keyboard and mouse actions. Our work suggests that it may eventually be feasible to build a "cognitive model in a box" for the evaluation of interactive, off-the-shelf systems in situ.

Over the past year we have begun to address dynamic environments with SegMan. Frank Ritter's group has developed an ACT-R model that can interact with a simple off-the-shelf driving simulation. Our current work is moving toward more complex, realistic environments, even including video input from a robot, toward the goal of producing evaluation methods for human-robot interaction [Shah et al., 2003].

Our work on image processing for cognitive models is part of a larger vision involving development environments that incorporate cognitive modeling into the process of uilding and evaluating interactive systems [Ritter et al., 2002]. We have recently developed a system that supports the design and evaluation of cell phone menu hierarchies, automatically analyzing the efficiency of menu traversal without the need for the designer to build models explicitly. We hope to extend this approach to automatically build models for cell phone applications.

[Ritter et al., 2002] Frank E. Ritter, Dirk Van Rooy, and Robert St. Amant. A user modeling design tool for comparing interfaces. Proceedings of the Fourth International Conference on Computer-Aided Design of User Interfaces (CADUI). 2002. Pp. 111-118.

[St. Amant & Riedl, 2001] Robert St. Amant and Mark O. Riedl. A perception/action substrate for cognitive modeling in HCI. International Journal of Human-Computer Studies 55(1): 15-39. 2001.

[Shah et al., 2003] Kunal Shah, Sameer Rajyaguru, Robert St. Amant, and Frank E. Ritter. Connecting a cognitive model to dynamic gaming environments: Architectural and image processing issues Proceedings of the Fifth International Conference on Cognitive Modeling (ICCM). 2003. Pp. 189-194.

[Zettlemoyer & St. Amant, 1999] Luke S. Zettlemoyer and Robert St. Amant. A visual medium for programmatic control of interactive applications. Proceedings of CHI. 1999. Pp. 199-206.