ACT-R Workshop

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ACT-R (Anderson, Bothell, Byrne, Douglass, Lebiere, & Qin, 2004) is a cognitive architecture whose initial development was driven by modeling phenomena from the psychology laboratory. As can be seen by visiting the ACT-R web site (http://act-r.psy.cmu.edu/), successful models have been developed for a wide range of tasks involving attention, learning, memory, problem solving, decision making, and language processing. Under the pressure of accommodating this range of tasks the architecture has developed fairly detailed modules that represent perceptual attention, motor programming, long-term declarative memory, goal processing, and procedural competence. Recent years have seen a major effort to apply detailed modeling approach in ACT-R to the performance of significant real-world tasks. These applications have included driving (Salvucci, 2005), aircraft maneuvering (Byrne & Kirlik, 2005), and simulated agents for computer-generated forces (Best & Lebiere, 2006). We have also continued a long-standing tradition of applying ACT-R models to tutoring systems of academic skills, particularly high school mathematics (Anderson, 2007).

In response to these efforts, a new variant of the ACT-R architecture called ACT-R 6.0 has been created. While it continues the basic tenets of the earlier models, it cleanly breaks out components into separate modules, such as a declarative module, a procedural module, a visual module, and a manual module. The information processing in each of these modules is largely encapsulated from the information processing in others. These modules communicate with one another by putting information into buffers. A system of production rules coordinates the action of these modules. These production rules can recognize patterns in these buffers and make requests of modules. This modular design has enabled exploration of alternative implementation of modules and integration of new modules into ACT-R (e.g., Salvucci & Taatgen, 2008; Taatgen, van Rijn, & Anderson, 2007). It has also enabled importation into ACT-R of ideas from other architectures (e.g., Jilk et al., 2008; Lebiere et al., 2008). The modules appear to have mappings to brain regions, which has enabled us to use cognitive neuroscience data, particularly brain imaging, to guide the further development of models and the architecture (Anderson, 2007).

Topic and Format

The workshop will assume a basic knowledge of ACT-R. This workshop is being planned instead of the independent ACT-R workshop that is normally held the week before Cognitive Science in order to make it available to a larger audience. Rather than focusing on reporting modeling efforts within ACT-R it will focus on the architecture. It will consist of presentations on ACT-R developments from the community, an update on current developments in ACT-R 6.0 at CMU, and a panel discussion on the future of ACT-R. The schedule (which will be posted on the ACT-R web site) will be divided about evenly between presentations and discussion sessions. These sessions will involve currently active members of the ACT-R community.

Acknowledgments

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References

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ACT-R Workshop
Schedule

Opening: ACT-R from CMU's Perspective

9:00 - 9:45 Overview of ACT-R
John R. Anderson, Carnegie Mellon University

9:45 – 10:30 Details of ACT-R 6.0
Dan Bothell, Carnegie Mellon University

Break: 10:30 – 11:00

Presentations 1: Architecture

11:00 – 11:30 Functional constraints on architectural mechanisms
Christian Lebiere, Carnegie Mellon University

11:30 – 12:00 Retrieval by Accumulating Evidence in ACT-R
Leendert van Maanen, University of Groningen

12:00 – 12:30 A mechanism for decisions in the absence of prior reward
Vladislav D. Veksler, Rensselaer Polytechnic Institute

Lunch: 12:30 – 1:30

Presentations 2: Extensions

1:30 – 2:00 ACT-R forays into the semantic web
Lael J. Schooler, Max Planck Institute for Human Development

2:00 – 2:30 Making Models Tired: A Module for Fatigue
Glenn F. Gunzelmann, Air Force Research Laboratory

2:30 – 3:00 Acting outside the box: Truly embodied ACT-R
Anthony Harrison, Naval Research Laboratory

3:00 - 3:30 Interfacing ACT-R with different types of environments and with different techniques: Issues and Suggestions.
Michael J. Schoelles, Rensselaer Polytechnic Institute

Break: 3:30 – 4:00

Panel: 4:00 – 5:30

Future of ACT-R from a non-CMU Perspective

Danilo Fum, University of Trieste
Kevin A. Gluck, Air Force Research Laboratory
Wayne D. Gray, Rensselaer Polytechnic Institute
Niels A. Taatgen, University of Groningen
J. Gregory Trafton, Naval Research Laboratory
Richard M. Young, University College London