Large-Scale Cognitive Modeling using Model Integrated Computing

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Research in cognitive modeling is increasingly addressing large-scale models that interact with complex synthetic task environments. These efforts bring with them a number of new challenges, including the need to manage the complexity of large models, to integrate the models into complex software simulations, and to understand and debug models that are specified at high levels of abstraction. These challenges are difficult in isolation; together they constitute an enormous obstacle combining the significant challenges of large-scale software engineering with the complexity of knowledge-based systems.

This workshop will describe and debate the potential of a bold new solution to these challenges based on Model Integrated Computing (MIC). MIC is a modeling and systems integration paradigm, maturing at the vanguard of systems/software engineering (Sztipanovits & Karsai, 1997; Karsai, Agarwal, & Ledeczi, 2003). MIC is a promising foundation for large-scale cognitive modeling (LSCM) because it: (a) allows modelers to specify models in domain-specific, high-level languages; (b) efficiently combines models expressed in these languages; and (c) automates the integration of models into larger systems and task environments (Balasubramanian, Schmidt, Molnár, & Lédeczi, 2008).

Workshop presenters with backgrounds in cognitive psychology, systems/software engineering, multi-formalism modeling, artificial intelligence, high-level behavior representation, computational cognitive modeling, and end-user programming will:

- Outline some of the challenges associated with LSCM
- Describe MIC
- Illustrate how MIC can facilitate LSCM
- Show how work in information requirements grammars (Howes, Lewis, Vera, & Richardson, 2005) and cognitively bounded rational analysis (Howes, Vera, Lewis, & McCurdy, 2004) could contribute both generativity and rigor to a LSCM/MIC framework
- Show how work in cognitive substrates and specialized representation/process modules (Cassimatis, 2006) could contribute both flexibility and extensibility to a LSCM/MIC framework
- Suggest ways research in end-user programming can contribute to the usability of a LSCM/MIC framework by showing its designers how to support domain experts rather than programmers

Format and Topic

Presentations and discussions will explore the potential of MIC with members of the cognitive science community interested in LSCM. The diverse group of presenters will illustrate how multi-disciplinary research efforts interleaving software engineering, artificial intelligence, and cognitive modeling can lead to new and powerful approaches to LSCM. Additional information about the topic, content and schedule of the workshop is available at www.mindmodeling.org/LSCM.

References

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