DISSERTATION DEFENSE

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A Cognitive Architecture Realization of Event Cognition Capabilities

Tuesday, August 2, 2022
3:00 – 5:00pm
Virtual Event
[Zoom link](#)

ABSTRACT: Intelligent agents that interact with our world need knowledge for how things are arranged in time similar to human knowledge of events. Humans leverage knowledge of events when engaged in summarizing experience, learning action models, and performing prospective cognition. Research on human event cognition describes how humans represent and think about events.

In pursuit of artificial agents with human-level cognitive capabilities, this thesis theoretically unifies humanlike event cognition with general cognition. The theory characterizes human event cognition as data structures for representing event knowledge and processing for learning and using those data structures. The data structures that characterize human mental representations of events are event schemas, event models, and the working event model. These each represent different types of knowledge that humans maintain for events. Given these data structures, humanlike event cognition has the potential to be implemented as data structures and processing within many existing cognitive architectures' memory systems. Episodic memory stores previous experience and can potentially support knowledge of event models that represent specific previously experienced events. Semantic memory stores regularities or facts and can potentially support knowledge of event schemas that represent classes of events. Working memory represents the current situation and can include a working event model that guides action and describes how the current situation is expected to proceed. This suggests a general theoretical framework that uses cognitive architecture processing of event knowledge to account for event cognition capabilities.

To test this theory, I extend the Soar Cognitive Architecture's episodic memory mechanisms and develop an artificial agent that uses those mechanisms to implement the cognitive capability of summarization according to the theory. The new event cognition processing supports a task general form of instance-based action model creation that demonstrates the utility of retrieving event model knowledge. Action model creation is developed and evaluated in two domains, providing a successful initial test for the broader theory.

CHAIR: Prof. John Laird