ACT-R Software Updates 2018

Dan Bothell
Carnegie Mellon University
July 21, 2018
Current Software

• Last year’s workshop
  – 7.5-<2244:2017-07-11>

• Now
  – 7.5-<2244:2017-07-11>

• Two minor bug fixes
  – Production compilation
  – -location buffer unstuffing
New Software

- Address the complaint that ACT-R is “in” Lisp
  - Lisp is the interface for working with ACT-R
New Software

• Create a new interface through which things can communicate
New Software

- For practical reasons some internals still best communicating directly
Dispatcher

• A simple RPC server
  – ACT-R TCP/IP server connection
  – Subset of JSON RPC 1.0 for communication

• Small set of actions to coordinate operations
  – Add, remove, call (either direction), monitor

• Details in the docs/remote file
Current Status

• ACT-R 7.11.1-<2629:2018-07-17>

• Usable
  – Used in cognitive modeling class and summer school

• Enough external access
  – Tutorial tasks
  – Implement goal module
  – All Environment functionality

• Includes a Python client and interface library
  – All tutorial tasks have been reimplemented completely in Python
  – Example replacement goal module in Python

• Still needs some work
  – Reference documentation
  – Extras and examples
Important Differences

- Asynchronous models
- Performance
- PM modules’ interface
Asynchronous Models

• Multiple clocks & schedulers (meta-process)
• No longer available internally
• Can be implemented externally
  – Connect multiple ACT-R instances
Performance

• General updates
  – Better concurrency safety
  – Safety checks on input
  – Error handling

• Dispatcher overhead

• External connection costs
  – ~.3ms round trip for RPC call
Rough Performance Measures from Tutorial tasks (new/old)

- **Best case** .35
  - Unit 1 models from Python vs ACL w/IDE
- **Worst case** 16
  - Unit 5 1hit-blackjack from Python without caching similarity values (8 if cached)
- **Average Lisp based tasks** 1.75
- **Average Python based tasks** 3
PM modules’ interface

• Complete overhaul of the *device* construct
  – Monolithic Lisp object with specific methods called by the modules

• Separate interfaces for each module
• Devices decouple the modules from the world
Action modules

• Perform the action (peck, ply, speak, etc)

• Installed device (keyboard, mouse, joystick, microphone) converts that to an action

• Provided devices make the action available through the dispatcher for monitoring
Attention modules

• Audio already only had specific sound commands

• Vision had both device and direct commands
  – Only use the direct commands now
  – Don’t need proc-display
  – Some functionality not yet implemented (sub-letter features and scale phrase)
AGI still available

• Create simple tasks with an experiment window device

• Built specifically on the virtual windows
  – Provides an interface for mapping to real windows
  – Visible-virtuals through Environment included
AGI differences

• Multiple experiment windows can be installed
  – All provide model with visual features
  – Feature locations in global coordinates
    • Consistent with the mouse device

• Specific Lisp GUIs no longer part of the system
Near Future

• End of this year
  – 7.5 Moves to old software
  – 7.11⁺ Becomes the current version