

Enabling Dynamic Agent-Defined Learning Problems in Soar

Nate Derbinsky



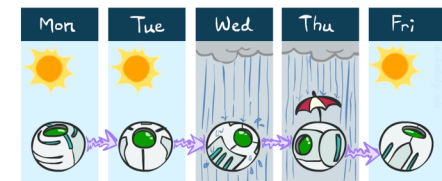
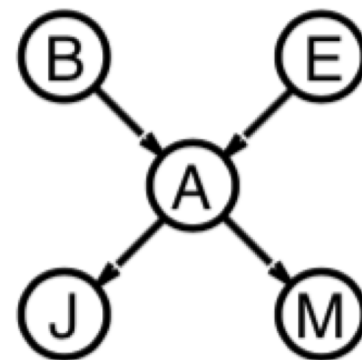
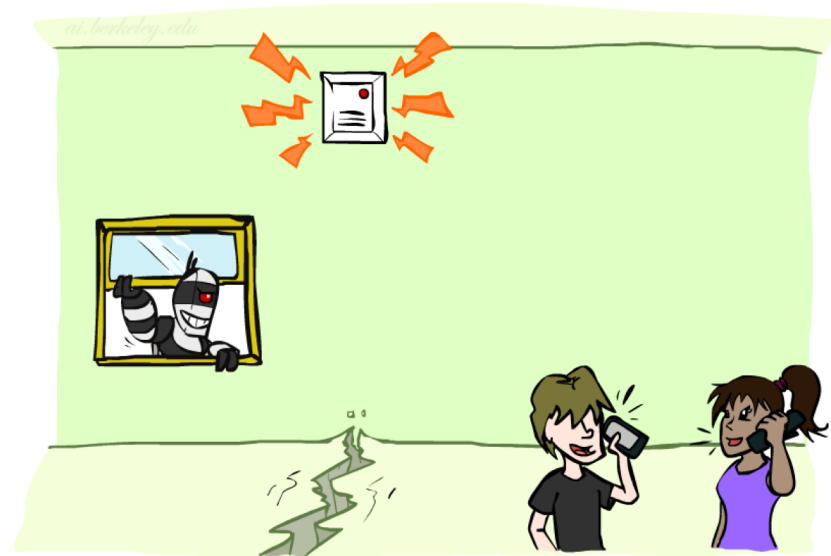
A Core Capability

- Dynamically “declare” a concept
- “Define” the concept flexibly via a combination of (hierarchical) symbolic knowledge/reasoning/learning and/or data-driven ML
- Immediately integrate it within task processes



Example (1)

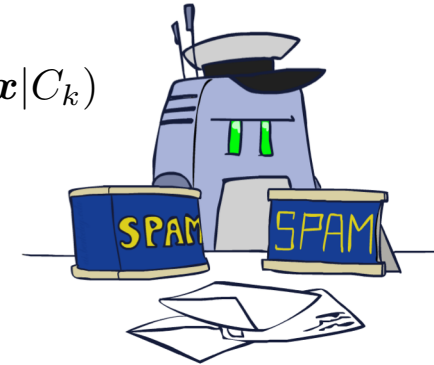
- Given knowledge about the world, construct a (graphical) model
- Parameterize via (episodic) experience and/or semantic facts
- Query for inferred consequences based upon a novel situation



Example (2)

- Given knowledge about the world, construct a (supervised) problem
- Supply training examples in real time or via episodic retrievals
- Query for likely output given novel inputs
 - And meta-data, such as confidence?!

$$\hat{y} = \arg \max_{k \in \{1 \dots K\}} P(C_k) P(\mathbf{x} | C_k)$$



Core Issues

- Representation of input/output knowledge
 - Dynamic features?
- Algorithm(s)
 - Ideally online/incremental; or asynchronous
 - Assumptions (particularly with dynamic fn's)
 - Degree of configurability/inspectability



Approach

- To start, SML I/O
 - Provides speed/flexibility during experimentation
- Agent creates/parameterizes problem(s) via symbolic structures
 - Train/supply evidence & query via subsequent commands
 - Possibly support for SVS metric via ids?



Evaluation



- Novel approach to tight-loop integration of Soar and ML
- Likely useful for research (e.g. Rosie) and applications



- No results to show yet
- No killer app to speak of

