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FORMAL REASONING GROUP

Usable Concepts of Logical AI

- Contexts as objects
- Elaboration tolerance
- Reasoning about action
- Challenges

Contexts as objects

Glue together independently written knowledge bases, planning systems, etc.

- $ist(c, p), value(c, term)$

- $value(AFdb, price(GE771)) = \$6$ million

- $enter(AFdb)$ [later $leave(AFdb)$]

- $afdb: \qquad price(GE771) = \$6$ million

-

$$\begin{aligned} outer: \quad & value(AFdb, price(GE771)) \\ & = value(GEdb, price(GE771)) \\ & \quad + price(AF\text{-}warranty(GE771)) \end{aligned}$$

Elaboration tolerance—preliminary

- Some formalisms tolerate elaboration better.

- Some elaborations are easier.

- Split a concept, e.g. altitude of an airplane

- MYCIN—How to add time? More than one patient? Contexts.

- *Drosophila* is Missionaries and Cannibals.
  - an oar on each bank
  - small missionary and large cannibal
  - more missionaries and cannibals

– an island

– one missionary is Jesus Christ

Reasoning about action

Compound actions (preliminary)

- Conditional actions. Do X if p.
- Do X until p. Bomb the bridge until it is destroyed.
- Do X for all x in A. Wash all the dishes.
- Washing a dish is not a planned action for humans. We don't think fast enough for that.

What knowledge should an HPKB have about the effects of compound actions?

Challenges

Elaboration tolerance of knowledge formalisms

- Add new preconditions for actions.

- Remove preconditions for actions.

- Add effects of actions.

- Make effects conditional.

- Split a concept.

- Add parameters to a function or predicate, e.g. "It depends on how much they know about it."