

(Dis)Advantages of Logic-Based Agents

- + Modular, declarative pieces
 - (Facilitates input, debugging, modification)
 - (Many uses, Introspective)
- + Well-defined semantics
 - (So its use is well-defined)
- + Very Expressive
 - Especially Partial Knowledge: \neg , \forall , \exists , ...
- ? Intuitive
- Terrible when data is noisy/errorful
 - Inconsistency
- Can be inefficient

Remaining Issues

- Efficiency [Meta-Level]
 - Control of Reasoning
 - Which clauses to resolve?
 - When/How to use Meta-Level Reasoning?
 - When to cache?
 - $A, A \Rightarrow B$; cache B ?
 - $A \Rightarrow B, B \Rightarrow C$; cache $A \Rightarrow C$?
- Unsound reasoning
 - Theory Formation, Abduction, “Guessing”, ...
 - Theory Revision, Diagnosis, ...
- How to encode World?

Encoding (Vocabulary)

- What to represent?

Color, Location, Ownership, ...

“Epistemological Adequacy”

- What are relevant features?

What should be reified? ... and how?

“Marriage between A and B is going poorly.”

“A and B were married last May.”

? `Hu(A B poorly from-May ...)`

vs `MarriageEvent(A B AB-M1), Began(AB-M1 May)`

Epistemology + Perspicuity

- How to represent it?

`Man(John)` vs `IsA(John Man)`

Polar vs Rectangular coordinates

Efficiency (+ Perspicuity)

When to Use Logic-Based System

- Logic is useful if(f)
 - Need to encode and use Partial Knowledge
 \forall, \neg, \exists
 - Need to explain answer
 - System itself will Change
(Especially when *modifying* existing info.)
 - Dealing w/ deterministic, discrete situation
(World is known, state perhaps inaccessible)
- Otherwise...
 - If (only) answering simple “boolean” questions
Use DataBase System!
 - If dealing with Algorithm
eg Sort, D-o-G, Numeric Integration, ...
Use ALGORITHM!
 - If continuous \Rightarrow probabilistic structure
 - If unknown \Rightarrow learning approaches

[Perhaps incorporate these as
COMPONENTS of Logic System...]

Big Points

- Idea of SOUNDness
 - ... ie, process is NOT arbitrary!
- Can be used... effectively
 - ... To handle partial info
 - Eg: Wumpus world, Simulation, Diagnosis, ...
 - ... planning (over time)
- Tradeoffs
 - Sound vs Complete vs Expressive (vs Efficient)
 - ... + discussion of implementations

Summary of Logical-Based Agents

Context: Agent must reach decision, given
prior knowledge
current percepts

As world is *inaccessible*

⇒ Must deal with partial information

As world is Known, Deterministic, Discrete:

⇒ Reason using Logic

- Semantics: What should be concluded?
Proof: What can be computed?
Syntax: What it looks like?
- Resolution: Sound & Complete
- Implemented Systems
... embodying various tradeoffs
- Planning
... + dealing w/ Changing World