



Logical Inference 4 wrap up

Chapter 9

Some material adopted from notes by Andreas
Geyer-Schulz, Chuck Dyer, and Mary Getoor

Prolog: logic programming language based on Horn clauses

- Resolution refutation
- Control strategy: goal-directed and depth-first
 - always start from the goal clause
 - always use new resolvent as one of parent clauses for resolution
 - backtracking when the current thread fails
 - complete for Horn clause KB
- Supports answer extraction (can request single or all answers)
- Orders clauses & literals within a clause to resolve non-determinism
 - $Q(a)$ may match both $Q(x) \leftarrow P(x)$ and $Q(y) \leftarrow R(y)$
 - A (sub)goal clause may contain >1 literals, i.e., $\leftarrow P1(a), P2(a)$
- Use “closed world” assumption (negation as failure)
 - If it fails to derive $P(a)$, then assume $\sim P(a)$

Summary

- Logical agents apply inference to a KB to derive new information and make decisions
- Basic concepts of logic:
 - Syntax: formal structure of sentences
 - Semantics: truth of sentences wrt models
 - Entailment: necessary truth of one sentence given another
 - Inference: deriving sentences from other sentences
 - Soundness: derivations produce only entailed sentences
 - Completeness: derivations can produce all entailed sentences
- FC and BC are linear time, complete for Horn clauses
- Resolution is a sound and complete inference method for propositional and first-order logic