Topics in KR: Automated Planning & RAC

- Sensing: active vs. passive, continuous vs. discrete
- ND plan: conformant - always reaches goal regardless, non-NMOT some projects
  - conditional - depends (full obs.);
  - conditional - depends (partial obs.)

△ Tradeoff in modeling: Newdet can be converted partially into UTS graphs;
△ Tradeoff between representability & tractability

△ ADL
  - Deser. language used in KR research
  - more compact
  - PDDL (Planning Domain Descr. Language)
  - DPSSL (Davis Putnam Logemann Loveland)
  - CDCL (conflict driven clause learning)

△ Classical rep
  - STRIPS (no forces, actions are real)
  - set temmatical rep
  - SAT-solvers (DPLL) (combinatorial explosion)
  - State variable representaion; (finite Domain Rep)
  - fluent - a function

△ Modern temmatical planners = SAS + FD + LAHA...
The Sussman Anomaly
- Backward Search in STRIPS cannot find optimal sol. (no redundant/useless moves)

Questions for Sheila
- parallel (lifed) search
- subsymbolic planner optimization for {
domain-specificity

include: SAT solvers
- DPLL alg arbitrary (CNF) (sat, unsat)
backtracking + unit propagation + pure literal elim

Horn clauses
Clause w/ at most 1 literal (i.e., \( \overline{w} v \overline{v} w v v \))

Horn fact: unit clause: \( \overline{w} v \) => \( w v v \)

Horn goal: \( w v v \) => \( \overline{w} v \)

Answer set programming

Enforced Hill Climbing
Broad classes for generating heuristics
- relaxation heuristics (e.g., Manhattan / Euclidian Relaxa)
- abstraction heuristics (e.g., Pattern DB)
- subgoal path heuristics
- landmark heuristics

Linear Temporal Logic
- eventually
- always

$LTL \leftrightarrow$ Book: automata (UFSA)

Hierarchical Task Network
- no state based
- tasks = activities (rather than state goals)
- methods = decompose tasks to subtasks

HTN planning in situca calculus

Situational Calculus
- Actions
- Sits - history of actions
- fluents - predicates on sits

Theory $D$ in sitcalc is ($\mathbb{Z}, \Omega, \varnothing$, Days, Ds)
PROBE planner

- probes - incrementally built as the fly
- avoid searching! with C3 - backtracking-freeness

VAISHAK TALK

- Prego paper "and what with" "not so much" "very good generalized"
- Logic + Prob = ultimate expressiveness

pb width: mean to characterise hardness/interconnectivity of plan pb

- graphical models

exact notion of width that connec. planning pb:

Width of pb/6: size of smallest chain - 2 of slides

It pays off to reason your way into a plan.

(plan search methodically throwing (it))

Temporal extension S(E) "read "precedes"

1. learnable
PDDL v1
1990s
2. preprocess
3. search

2009-2011
FD (LAMA)

2008
2002
2000s

Graph, Plan, Blackbox
FF
SAT

2014
KNAPTOK (laplak)
SOKOBAN

1/2