

CSC384

Introduction to Artificial Intelligence: October 28th

October 28, 2014

Knowledge Representation and Classical Planning

Final comments

- Final comments on first order logic
- Introduction to classical planning, chapter 10 of the textbook

Knowledge Representation

First order logic: final comments

Methods of Reasoning:

- **Forward Chaining**

Direct resolution (often with heuristics) to resolve towards desired answer

- **Resolution Refutation**

Add negation of desired question to the knowledge base
Can use an answer predicate to extract the answer to a question

- **Backward Chaining**

Work backwards from the goal using depth first search

Knowledge Representation

First order logic: final comments

Prolog:

- Uses horn clauses (at most one positive predicate)
- Clauses written in the form of an implication (RHS implies LHS)
- Reasons using depth first backward chaining with extra components
- Need to avoid infinite loops in reasoning!

```
append([],Y,Y)
```

```
append([A|X],Y,[A|Z]) :- append(X,Y,Z)
```

```
path(X,Z) :- path(X,Y), link(Y,Z)
```

```
path(a,c)
```

Classical Planning

Introduction

We merge search and first order logic to allow for reasoning about action.
We will address the simplest case first:

- Actions will have deterministic effects
- No incomplete or uncertain knowledge

Though similar to search, this will allow for more reasoning about the actions themselves

Classical Planning

Introduction

State:

- Conjunction of fluents (predicates)
- Effect: result of performing the action

Classical Planning

Introduction

Actions:

- Precondition: necessary conditions for the action
- Effect: result of performing the action
- Add list: predicates that become true as a result of the action
- Delete list: predicates that become false as a result of the action