

CS 2710 Foundations of AI
Lecture 14

Planning

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Administration

- **Midterm exams**
 - **Mean: 77.75**
 - **Median: 78.5**
 - FOL, translation of English to FOL and proof of theorems by resolution refutation (Problem 6) the main problem
- **The results of the tic-tac-toe competition**

Tic-tac-toe player competition

- 1 Swapna Somasundaran
- 2 Amruta Parundare
- 3 Chang Liu

Planning

Planning problem:

- find a sequence of actions that achieves some goal
- An instance of a search problem

Methods for modeling and solving a planning problem:

- **Classic State space search**
- **Situation calculus based on FOL**
 - Search by proving the theorem
 - Inference rules or Resolution refutation approaches
- **STRIPS – a restricted FOL language**
 - More efficient (goal progression and goal regression)
 - Partial order planners (plan space search)

Planning problems

Properties of many (real-world) planning problems:

- The description of the state of the world is very complex
- Many possible actions to apply in any step
- Actions are typically local
 - - they affect only a small portion of a state description
- Goals are defined as conditions referring only to a small portion of state
- Plans consists of a large number of actions

The state space search and situation calculus frameworks may be too cumbersome and inefficient to represent and solve the planning problems

Solutions

- **Complex state description and local action effects:**
 - avoid the enumeration and inference of every state component, focus on changes only
- **Many possible actions:**
 - Apply actions that make progress towards the goal
 - Understand what the effect of actions is and reason with the consequences
- **Sequences of actions in the plan can be too long:**
 - Many goals consists of independent or nearly independent sub-goals
 - Allow goal decomposition & divide and conquer strategies