CS540: Artificial Intelligence: Lecture 01a

BRUCE DRAPER
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Organization

Instructor: Bruce Draper
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Office Hours TBD

All students (on campus and off) should send an email to cs540@cs.colostate.edu from the account they want to access Piazza through. Dejan will reply.

Goals

Theory and Practice of AI
- Assuming the material in CS440 as background
- Excluding material in CS530 (Image Computation)
- Excluding material in CS545 (Machine Learning)
- Excluding material in CS548 (Bioinformatics)

Research Skills
- Reading literature
- Formulating hypotheses
- Working in teams
  - Including distance teams
- Writing papers
- Presenting papers (oral presentation)

Motivational Video: Blocks World

Explanation of Video

DARPA Communicating with Computers program

Goal: peer-to-peer communication
- Human / avatar or avatar / avatar
- Communication about goals, plans & actions
- Conversational lead switches
- Error repair

Our team's approach (CSU, Brandeis, U of FL)
- Elicit common gestures from users
- Recognize gestures & words
- Understand the role of gestures within dialog
- Generate gestures & words via avatar
- Language understanding & simulation-based semantics

Intelligent Behaviors

Perception
- Sensing (sight, hearing, touch, smell, taste, proprioception)
- Interpretation

Reasoning
- Inference
- Learning

Action
- Motor skills
- Communication (speech, sign language...)
- Sensor movement
Artificial Agents

Implement perception/reasoning/action cycle
May also learn
Run continuously & independently

Example: travel "agent"
- Client sets goals (places/times/priorities)
  1. Agent perceives schedules & prices (from airline tables)
  2. Calculates whether to buy ticket now.
  3. If yes, buys ticket (action), else returns to step 1

This course is organized around agents

Course Organization

First Half: Basic AI Techniques
- Individual programming projects (3 or 4)
- Heuristic Search (review)
- Local search
- Genetic Algorithms
- Bayesian Networks
- Ends with a Midterm Exam
- Natural language (implemented as part of team projects)

Second Half: 2 Team Research Projects
- Assignment is a set of parameters, not instructions
  - Each team:
    - Defines their problem (within my parameters)
    - Performs an experiment (requires an hypothesis)
    - Writes a paper
    - Gives an oral presentation
  - Teams will combine on-campus and off-campus students
  - Size TBD
  - Teams chosen by me