

CS540: Artificial Intelligence: Lecture 01a

BRUCE DRAPER

1/16/18



Organization

Instructor:

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GTA:

Dejan Markovikj
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Office Hours (in lab):
• Monday 8-10 AM
• Wednesday 7-8 PM
• Thursday 12-1 PM

Goals

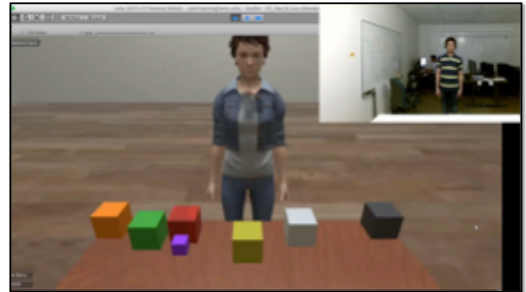
Theory and Practice of AI

- Excluding material in CS545 (Machine Learning)
- Excluding material in CS510 (Image Computation)
- Excluding material in CS440 (AI: background)

Research Skills

- Reading literature
- Formulating hypotheses
- Doing research in teams
- Writing papers
- Presenting papers (oral presentation)

Motivational Video: Blocks World



Explanation of Video

DARPA *Communicating with Computers* program

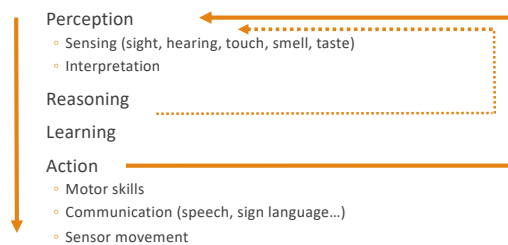
Goal: peer-to-peer communication

- Human / avatar or avatar / avatar
- Communication about goals, plans & actions
- Conversational lead switches
- Error repair

Our team's approach

- FL: Elicitation studies (define common gestures)
- FL: Avatar movements
- CSU: recognize gestures & words, promote dialog
- Brandeis: language & simulation-based semantics

Intelligent Behaviors



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 Project

Domain: Blocks World

- Secret goal: leverage CwC to get to "real" projects
- Secret goal: if successful, contribute to CwC

Simulated perception

- Simulated speech recognition (with noise)
- Simulated attentive vision (with noise)

Simulated action

- Simulated speech (text output)
- Simulated blocks world actions (with errors)

Projects concentrate on reasoning and learning

- No direct access to blocks worlds
- Perception gives input based on state of the world
- Actions change the state of the world
- Possible "warm-up" project: build discrete grid simulator

Course Project (II)

Goal:

- Build an agent that achieves and maintains a goal state
 - There may be multiple agents in one world
 - Agent goals may or may not be compatible
 - Multiple possible success metrics
- Analyze strengths & weaknesses of your agent
 - Write a paper on results, strengths & weaknesses
 - Literature review: compare to class reading assignments
 - Give brief (10 minute) oral presentation
 - Every participant separately describes their contributions
- Project grade is based on written & oral presentation, contributions, not code

Your resources

- All projects in teams of 4 (3 with permission)
- Every team must include one distance student, one on-campus student

Other Requirements

20% of grade: class participation

- Reading assignments
 - Discuss on Piazza
 - Strengths of paper
 - Weakness of paper
 - Relevance (if any) of paper
- Questions & discussions in class (on-campus)
 - Including but not limited to assigned reading

Note: Piazza board not set up yet (when Dejan gets here)

Course Topics

Reasoning & learning will involve

- Planning
- Advanced Search
- Scheduling
- Natural Language Processing
- Natural Language Generation
- Natural Language Dialogs
- Genetic algorithms & particle filters
- Ensemble learning
- Knowledge representation & uncertainty
- Data mining
- Game Theory
- Markov models
- Probabilistic reasoning
- Bayesian networks
- Symbolic/subsymbolic interfaces
- Other...

Whoa!
Way Too Much!

*So what are your
interests? (symbolic
representations only)*