343H: Honors AI

Lecture 27:
Course wrap-up
5/1/2014

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Final exam

- Monday May 12, 2-5 pm in CPE 2.218
- Comprehensive
  - Some more emphasis on material since midterm
- Bring two 8.5 x 11” sheets of notes
- No phones, tablets, iPads, etc.
- Practice exam with solutions
Classification mini-contest!

- **3rd Place: Andy Wickham and Tony Wickham**
  - 888 correct out of 1000 (88.8%)

- **2nd Place: Adam Faulkner**
  - 904 correct out of 1000 (90.4%)

- **1st Place: David Yu and Qi Guo**
  - 915 correct out of 1000 (91.5%)
1. Making decisions
   - Search, planning
   - Adversarial and uncertain search
2. Reasoning under uncertainty
   - Bayes’ nets
   - Decision theory
   - Machine learning
Search

[Diagram of a search tree with nodes labeled as a, b, c, d, e, h, and r.]

Start State:

Goal State:

Straight-line distance to Bucharest:
- Arad: 366
- Bucharest: 0
- Craiova: 460
- Dobrogea: 242
- Eforie: 161
- Fagaras: 178
- Giurgiu: 77
- Harghita: 151
- Iasi: 226
- Lugoj: 244
- Miercurea: 241
- Neamt: 234
- Oradea: 380
- Pitesti: 98
- Râmnicu Vâlcea: 193
- Sibiu: 253
- Timișoara: 329
- Urziceni: 90
- Vaslui: 199
- Zerind: 374
Adversarial search
Utilities

- 20 points
- 10 points
- 5 points
Markov Decision Processes
Reinforcement learning
Decision networks & VPI

Umbrella

Weather

Forecast
Probabilistic reasoning over time
Learning (Classifiers, Clustering)
Intelligent agents

- Sense, decide, act
- Maximize expected utility
Things we didn’t cover

- Constraint satisfaction
- Knowledge representation and reasoning
- Game theory and auctions
- Aspects of learning
- Natural language
- Vision
- Robotics
- ...
Strategy in AI

- **A goal of AI**: Robust, fully autonomous agents in the real world

- **Bottom-up metaphor**:
  
  Russell, ‘95: “Theoreticians can produce the AI equivalent of bricks, beams, and mortar with which AI architects can build the equivalent of cathedrals.”
Bottom-up approach
The bricks
The beams and mortar
Towards and cathedral?
Or something else?
Top-down approach

“Good problems . . . produce good science” [Cohen, ’04]
Meeting in the middle
Ethics, implications

- Robust, fully autonomous agents in the real world
- What happens when we achieve this goal?
Some Hard Questions…

- Who is liable if a robot driver has an accident?
- Will machines surpass human intelligence?
- What will we do with superintelligent machines?
- Would such machines have conscious existence? Rights?
- Can human minds exist indefinitely within machines (in principle)?
Tournament highlights
Tournament results
Winners

- 3rd place: Josh Kelle
- 2nd place: Sam Thompson
- 1st place: Jaime Rivera and K. K.

- Congrats to all!
Roomba pacman

Students at Colorado University: http://pacman.elstonj.com
Bugman

- AI = Animal Intelligence?
  - Wim van Eck at Leiden University
  - Pacman controlled by a human
  - Ghosts controlled by crickets
  - Vibrations drive crickets toward or away from Pacman’s location

[DEMO]

http://pong.hku.nl/~wim/bugman.htm