CSC 242
Artificial Intelligence

Henry Kautz
Spring 2014
Welcome

• Instructor: Henry Kautz

• Chair, Computer Science

• Director, Institute for Data Science

• Past President, Association for the Advancement of Artificial Intelligence

• Research: combinatorial search algorithms; data mining; human-computer interaction; healthcare
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- Undergraduate in Tianjin, China
- Research in computer architecture
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- Undergraduate TA's:
  - Sean Esterkin - Class of 2014 - TA's CSC 282 Algorithms last fall; Did an REU (Research Experience for Undergraduates) at Salisbury University on Fractals
  - Daniel Scarafoni - Class of 2015 - Recipient of FIRST Robotics Scholarship; Undergrad research on automated reasoning and crowd intelligence

- Daily office hours will be posted on course home page
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Honesty

• Dishonesty:

  • Claiming work by others as your own without attribution
  
  • Unauthorized collaboration with other students

• All cases will be referred to Academic Honesty Board

  • No second chances
Accommodations

• I will make appropriate accommodations for students with learning differences

• Inform me in writing within the first two weeks of class

• Make an appointment to talk with me about differences that require accommodations beyond extra time on tests
Coursework
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• 4 team programming projects (40%)
  • Teams will be assigned by me (randomly)
  • Different teams for each project
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- Homeworks: not graded; are preparation for:
  - 3 in-class exams plus final exam (50%)
  - Frequent unannounced online quizzes (10%)
- Bring your laptop or smartphone to every class
Seating

- Starting 2nd week of class, seats will be assigned
- Seating chart changed monthly
- Reduce division between talkative students up front and quiet students lurking in the back of the room
- Reduce temptation to copy from your friends on exams
Programming

• Projects must run on Linux on URCS instructional network

• If you do not have an account (non-majors), contact grad TA Xiaowan Dong

• Can use any language: Java, C, Python, LISP, Prolog
Prosopagnosia

• Face blindness

• Other aspects of visual processing (e.g., object discrimination) remain intact

• Acquired or congenital (development) damage to fusiform gyrus
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Living with Prosopagnosia

• No effective therapies

• Matching to photographs unsuccessful

• Subjects try to consciously use visual clues to identify people
  • Distinctive hair, glasses, ways of dressing, place where seen

• Can sometimes learn to recognize a small number of people after months or years of frequent interaction
Oliver Sacks

- Physician, best-selling author, and professor of neurology at the NYU School of Medicine


- Employs a full-time assistant to help recognize people
Oliver Sacks

• “I am much better at recognizing my neighbors' dogs (they have characteristic shapes and colors) than my neighbors themselves. Thus when I see a youngish woman with a Rhodesian ridgeback hound, I realize that she lives in the apartment next to mine. If I see an older lady with a friendly golden retriever, I know this is someone from down the block. But if I should pass either woman on the street without her dog, she might as well be a complete stranger.”
Mike May

- Blinded age 3, sight restored at 43
- Had to consciously learn to recognize objects - visual neurons had been repurposed
- Biography: *Crashing Through*
  - Rode a bike as a blind child
  - Became champion blind skier
Near the back of the store, May spotted a large object at the end of the aisle. He moved near it and put his reasoning powers to work: The object wasn't moving. It was large and squarish. It was positioned near pallets.

"Is that a forklift?" he asked Jennifer.

Her face went white. She waited for a moment, then leaned in to May's ear.

"No," she whispered. "That's a very, very heavy woman."

Henry Kautz

- Researcher in artificial intelligence
- Moderate prosopagnosia
- After 7 years, can recognize about 20 people at UR
- Relies on email and notes to deduce names
- Worked with two graduate students for 6 months without realizing they were the same person who sometimes used a nickname

Zimmerman  Dylan
The Brains’ Two Systems

- System 1: operates automatically and quickly, with little or no effort and no sense of voluntary control
  - Normal perception, making stereotypical judgements
  - Face recognition, speech recognition
- System 2: allocates attention to the effortful mental activities that demand it, including complex computations.
  - Conscious reasoning, self-monitoring
  - Chess, computer programming
Test

• Say the COLOR of each of the following words:
  • CAR
  • TREE
  • BANK
  • TIME
Test

• Say the COLOR of each of the following words:
  • RED
  • BLUE
  • BROWN
  • ORANGE
artificial intelligence

noun

1. the theory and development of computer systems able to perform tasks that normally require human intelligence

What kind of intelligence(s)?

What kind of computer systems?
Origins of the Field of AI
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- Bayesian Networks (Pearl 1998): brought probability and decision theory into AI - provided the mathematics needed to (slowly) unify the field
Breakthroughs

• For each of the following stories, think about:

  • Which specific kinds of intelligence behavior were achieved? In humans, would they be System 1 (automatic) or System 2 (conscious)?

  • How did the systems achieve this behavior? Could the operation of the system be plausibly analogous to the operation of the human brain?
Shakey the Robot
1972
Deep Blue
1997
Stanley
2005
The Assistant

2013
Syllabus

• Heuristic Search
  • Project: Othello Tournament
• Logical Reasoning
  • Project: Automated Planning
• Probabilistic Reasoning
  • Project: Email Spam Detection
• Machine Learning
  • Project: Face Recognition