CS 416
Artificial Intelligence

Lecture 8

Adversarial Search

Chess Match

- Ends in a 3-3 Draw

Assignment 1

Adversarial Search

- Problems involving
  - Multiple agents
  - Competitive environments
  - Agents have conflicting goals
- Also called games

Since the dawn of time?

- Oldest known written fair-division problem (T. Hill, GaTech)
  - A man dies owing 100, 200, and 300 zuz to each of three claimants, A, B, and C respectively
  - Modern bankruptcy provides shares of the estate proportional to their indiviual claims, no matter what size of the estate
    - A receives 1/6
    - B receives 2/6
    - C receives 3/6

Oldest game theory problem

- Written in the Talmud (2nd Century)
  - If the estate is only 100 zuz
    - Each claimant receives equal shares
  - If the estate is 200 zuz
    - A receives 50, B and C receive 75 even though their claims are not equal
  - Why?

Unexplained until 1984

- Aumann and Maschler (Israeli Mathematicians)
  - Realistically, when you die, people could come out of the woodwork saying you owe them money. Some could coalesce into deceptive groups. How can we reduce the incentives (rewards) of forming such groups?
  - Minimize largest dissatisfaction among all possible coalitions
  - Truly many similar solutions to this problem
  - see http://www.math.gatech.edu/~hill/publications/cv.dir/madevice.pdf

Game Theory

- Studied by mathematicians, economists, finance
- In AI we limit games to:
  - deterministic
  - turn-taking
  - two-player
  - zero-sum
  - perfect information