CS395T
Agent-Based Electronic Commerce
Fall 2003

Peter Stone

Department or Computer Sciences
The University of Texas at Austin

Week 5a, 9/23/03

Logistics

- Please try to ask more specific questions

Logistics

- Please try to ask more specific questions

  - Instead of "I'm unclear on x," I prefer "I interpret x to mean y. Is that correct?"

UTCS Department of Computer Sciences
The University of Texas at Austin

Logistics

- Please try to ask more specific questions

  - Instead of "I'm unclear on x," I prefer "I interpret x to mean y. Is that correct?"

- Some project details

Logistics

- Please try to ask more specific questions

  - Instead of "I'm unclear on x," I prefer "I interpret x to mean y. Is that correct?"

- Some project details

  - Possibly group oriented

Logistics

- Please try to ask more specific questions

  - Instead of "I'm unclear on x," I prefer "I interpret x to mean y. Is that correct?"

- Some project details

  - Possibly group oriented
  - Winning vs. good research

Logistics

- Please try to ask more specific questions

  – Instead of "I'm unclear on x," I prefer "I interpret x to mean y. Is that correct?"

- Some project details

  – Possibly group oriented
  – Winning vs. good research
    (what grade would livingagents get?)

Logistics

- Please try to ask more specific questions

  – Instead of "I'm unclear on x," I prefer "I interpret x to mean y. Is that correct?"

- Some project details

  – Possibly group oriented
  – Winning vs. good research
    (what grade would livingagents get?)
  – How many games will there be?

Logistics

- Please try to ask more specific questions

  – Instead of "I'm unclear on x," I prefer "I interpret x to mean y. Is that correct?"

- Some project details

  – Possibly group oriented
  – Winning vs. good research
     (what grade would livingagents get?)
  – How many games will there be?

- Any questions?

28 Simultaneous Auction

Flights: Inflight days 1-4, Outflight days 2-5 (8)

- Unlimited supply; prices random walk; immediate clear; no resale

28 Simultaneous Auction

Flights: Inflight days 1-4, Outflight days 2-5 (8)

- Unlimited supply; prices random walk; immediate clear; no resale

Hotels: Tampa Towers/Shanties 1-4 (8)

- 16 rooms per auction; 16th-price ascending auction; quote is ask price; no resale
- Auctions can close early

Peter Stone

28 Simultaneous Auction

Flights: Inflight days 1-4, Outflight days 2-5 (8)

- Unlimited supply; prices random walk; immediate clear; no resale

Hotels: Tampa Towers/Shanties 1-4 (8)

- 16 rooms per auction; 16th-price ascending auction; quote is ask price; no resale
- Auctions can close early

Entertainment: MU/AP/AW days 1-4 (12)

- Continuous double auction; initial endowments; quote is bid-ask spread; resale allowed

Client Preferences and Utility

note: "utility" and "value" transposed

Client Preferences and Utility

note: "utility" and "value" transposed

Preferences: randomly generated per client

- Ideal arrival, departure days
- Good Hotel Value
- Entertainment Values

Client Preferences and Utility

note: "utility" and "value" transposed

Preferences: randomly generated per client

- Ideal arrival, departure days
- Good Hotel Value
- Entertainment Values

Utility: 1000 (if valid) − travel penalty + hotel bonus + entertainment bonus

Client Preferences and Utility

note: "utility" and "value" transposed

Preferences: randomly generated per client

- Ideal arrival, departure days
- Good Hotel Value
- Entertainment Values

Utility: 1000 (if valid) − travel penalty + hotel bonus + entertainment bonus

Score: Sum of client utilities − expenditures

Score handicapping – Sec. 6.1

- Needed to compare small numbers of games

Department of Computer Sciences
The University of Texas at Austin

Score handicapping – Sec. 6.1

- Needed to compare small numbers of games

- Done by an impartial party (U. Michigan)

Department of Computer Sciences
The University of Texas at Austin

Score handicapping – Sec. 6.1

- Needed to compare small numbers of games

- Done by an impartial party (U. Michigan)

- Mapping from client profiles to score

Peter Stone

Score handicapping – Sec. 6.1

- Needed to compare small numbers of games

- Done by an impartial party (U. Michigan)

- Mapping from client profiles to score

- Three measures found to be significant:

  1. total client preferred travel days
  2. total entertainment values
  3. ratio of "easy" days (1 and 4) to hard (2 and 3) in preferred trip intervals

Score handicapping – Sec. 6.1

- Needed to compare small numbers of games

- Done by an impartial party (U. Michigan)

- Mapping from client profiles to score

- Three measures found to be significant:

  1. total client preferred travel days
  2. total entertainment values
  3. ratio of "easy" days (1 and 4) to hard (2 and 3) in preferred trip intervals

- Regression analysis to compute factors for individual games

Allocation

Given holdings, prices, determine G^*:
Optimal complete itinerary assignments

Allocation

Given holdings, prices, determine G^*:
Optimal complete itinerary assignments

- Greedy solution?

Department of Computer Sciences

The University of Texas at Austin

Allocation

> Given holdings, prices, determine G^*:
> Optimal complete itinerary assignments

- Greedy solution?

- Mixed-integer LP with 3 constraints:

Allocation

Given holdings, prices, determine G^*:
Optimal complete itinerary assignments

- Greedy solution?

- Mixed-integer LP with 3 constraints:

  1. Purchase enough to meet demand
  2. Entertainment tickets must be used legally
  3. All variables integral

Allocation

> Given holdings, prices, determine G^*:
> Optimal complete itinerary assignments

- Greedy solution?

- Mixed-integer LP with 3 constraints:

  1. Purchase enough to meet demand
  2. Entertainment tickets must be used legally
  3. All variables integral

- Enforce 1 and 2 (admissible);

Allocation

Given holdings, prices, determine G^*:
Optimal complete itinerary assignments

- Greedy solution?

- Mixed-integer LP with 3 constraints:

  1. Purchase enough to meet demand
  2. Entertainment tickets must be used legally
  3. All variables integral

- Enforce 1 and 2 (admissible);
  "Branch and bound" over adjustments for 3

Allocation

> Given holdings, prices, determine G^*:
> Optimal complete itinerary assignments

- Greedy solution?

- Mixed-integer LP with 3 constraints:

  1. Purchase enough to meet demand
  2. Entertainment tickets must be used legally
  3. All variables integral

- Enforce 1 and 2 (admissible);
  "Branch and bound" over adjustments for 3

- Globally optimal solution; *usually* $< .01$ sec

Sampling

- Example on p. 215

Sampling

- Example on p. 215

- What happens if you use mean price instead of sampling?

Sampling

- Example on p. 215

- What happens if you use mean price instead of sampling?

- Mean price is $68.75

Sampling

- Example on p. 215

- What happens if you use mean price instead of sampling?

- Mean price is $68.75

- Bid in this case would be $31.25

Peter Stone

Boosting

- Why predict increase in price, not actual price?

Boosting

- Why predict increase in price, not actual price?

- p.221: how do "redundant variations" help?

Boosting

- Why predict increase in price, not actual price?

- p.221: how do "redundant variations" help?

- Example: trying to learn which days are good for swimming from a list of days

Boosting

- Why predict increase in price, not actual price?

- p.221: how do "redundant variations" help?

- Example: trying to learn which days are good for swimming from a list of days

- Concept: > 80 degree, sunny $\Longrightarrow$ swim

Boosting

- Why predict increase in price, not actual price?

- p.221: how do "redundant variations" help?

- Example: trying to learn which days are good for swimming from a list of days

- Concept: > 80 degree, sunny $\implies$ swim

- List sunny days, list > 80 days, list swimming days

Boosting

- Why predict increase in price, not actual price?

- p.221: how do "redundant variations" help?

- Example: trying to learn which days are good for swimming from a list of days

- Concept: > 80 degree, sunny $\implies$ swim

- List sunny days, list > 80 days, list swimming days

- What redundant feature would help?

Flight costs and benefits

- Cost is how much prices are expected to rise

  - *flight-lookahead* parameter

- Benefit is how likely you are to change your mind as prices become clear.

  - Hotel A will be either $10 (40%) or $100 (60%)

Flight costs and benefits

- Cost is how much prices are expected to rise

    - *flight-lookahead* parameter

- Benefit is how likely you are to change your mind as prices become clear.

    - Hotel A will be either $10 (40%) or $100 (60%)
    - When $10, flight X is $250 better, else flight Y is $250 better

Flight costs and benefits

- Cost is how much prices are expected to rise

  - *flight-lookahead* parameter

- Benefit is how likely you are to change your mind as prices become clear.

  - Hotel A will be either $10 (40%) or $100 (60%)
  - When $10, flight X is $250 better, else flight Y is $250 better
  - If buy now, buy flight . . .

Flight costs and benefits

- Cost is how much prices are expected to rise

    – *flight-lookahead* parameter

- Benefit is how likely you are to change your mind as prices become clear.

    – Hotel A will be either $10 (40%) or $100 (60%)
    – When $10, flight X is $250 better, else flight Y is $250 better
    – If buy now, buy flight . . . Y

Flight costs and benefits

- Cost is how much prices are expected to rise

  – *flight-lookahead* parameter

- Benefit is how likely you are to change your mind as prices become clear.

  – Hotel A will be either $10 (40%) or $100 (60%)
  – When $10, flight X is $250 better, else flight Y is $250 better
  – If buy now, buy flight . . . Y
  – Benefit of postponing?

Flight costs and benefits

- Cost is how much prices are expected to rise

  - *flight-lookahead* parameter

- Benefit is how likely you are to change your mind as prices become clear.

  - Hotel A will be either $10 (40%) or $100 (60%)
  - When $10, flight X is $250 better, else flight Y is $250 better
  - If buy now, buy flight . . . Y
  - Benefit of postponing?
  - 40% * $250 = $100