

CS378
Autonomous Multiagent Systems
Spring 2005

Prof: Peter Stone
TA: Nate Kohl

Department of Computer Sciences
The University of Texas at Austin

Week 11a: Tuesday, April 4th

Good Afternoon, Colleagues

Are there any questions?

Logistics

- Progress reports due at beginning of class
 - Attach your proposals

Distributed Rational Decision Making

Self-interested, rational agent

Distributed Rational Decision Making

Self-interested, rational agent

- Self-interested:

Distributed Rational Decision Making

Self-interested, rational agent

- Self-interested: maximize own goals
 - No concern for global good

Distributed Rational Decision Making

Self-interested, rational agent

- Self-interested: maximize own goals
 - No concern for global good
- Rational:

Distributed Rational Decision Making

Self-interested, rational agent

- Self-interested: maximize own goals
 - No concern for global good
- Rational: agents are smart
 - Ideally, will act *optimally*

Distributed Rational Decision Making

Self-interested, rational agent

- Self-interested: maximize own goals
 - No concern for global good
- Rational: agents are smart
 - Ideally, will act *optimally*

The protocol is key

Evaluation Criteria

- Social welfare
- Pareto efficiency
- Stability

Evaluation Criteria

- Social welfare
- Pareto efficiency
- Stability
- Individual Rationality

Evaluation Criteria

- Social welfare
- Pareto efficiency
- Stability
- Individual Rationality
- Efficiency (computational, communication)

Voting vs. auctions

- Voting: maximize social good
 - result affects all

Voting vs. auctions

- Voting: maximize social good
 - result affects all
- Auctions: maximize profit
 - result affects buyer and seller

Auctions

- Valuations:

Auctions

- Valuations:
 - private value

Auctions

- Valuations:
 - private value
 - common value

Auctions

- Valuations:
 - private value
 - common value
 - correlated value

Auctions

- Valuations:
 - private value
 - common value
 - correlated value
- Types:
 - first-price open-cry (English)

Auctions

- Valuations:
 - private value
 - common value
 - correlated value
- Types:
 - first-price open-cry (English)
 - first-price sealed-bid

Auctions

- Valuations:
 - private value
 - common value
 - correlated value
- Types:
 - first-price open-cry (English)
 - first-price sealed-bid
 - descending (Dutch)

Auctions

- Valuations:
 - private value
 - common value
 - correlated value
- Types:
 - first-price open-cry (English)
 - first-price sealed-bid
 - descending (Dutch)
 - second-price sealed-bid (Vickrey)

Auctions

- Valuations:
 - private value
 - common value
 - correlated value
- Types:
 - first-price open-cry (English)
 - first-price sealed-bid
 - descending (Dutch)
 - second-price sealed-bid (Vickrey)

Revenue equivalence: private-value, risk-neutral

Auction example

- Pick an integer between 1 and 20, write it down

Auction example

- Pick an integer between 1 and 20, write it down
- Draw a line under it
- Pick another number, write it under the line.

Auction example

- Pick an integer between 1 and 20, write it down
- Draw a line under it
- Pick another number, write it under the line.
- 1st price auction for my pen

Auction example

- Pick an integer between 1 and 20, write it down
- Draw a line under it
- Pick another number, write it under the line.
- 1st price auction for my pen
- The top number is your utility

Auction example

- Pick an integer between 1 and 20, write it down
- Draw a line under it
- Pick another number, write it under the line.
- 1st price auction for my pen
- The top number is your utility
- Goal: as much profit as possible

Auction example

- Pick an integer between 1 and 20, write it down
- Draw a line under it
- Pick another number, write it under the line.
- 1st price auction for my pen
- The top number is your utility
- Goal: as much profit as possible
- Write down your bid

Auction example

- Pick an integer between 1 and 20, write it down
- Draw a line under it
- Pick another number, write it under the line.
- 1st price auction for my pen
- The top number is your utility
- Goal: as much profit as possible
- Write down your bid
- Repeat with 2nd price auction
- Number under the line is your utility

Auctions

- You value a bunch of flowers at \$100

Auctions

- You value a bunch of flowers at \$100
- What strategy if auction is:
 - English

Auctions

- You value a bunch of flowers at \$100
- What strategy if auction is:
 - English
 - first-price sealed-bid

Auctions

- You value a bunch of flowers at \$100
- What strategy if auction is:
 - English
 - first-price sealed-bid
 - Descending

Auctions

- You value a bunch of flowers at \$100
- What strategy if auction is:
 - English
 - first-price sealed-bid
 - Descending
 - Vickrey

Auctions

- You value a bunch of flowers at \$100
- What strategy if auction is:
 - English
 - first-price sealed-bid
 - Descending
 - Vickrey
- What if it's an antique?

Auctions

- Vickrey, English are truthful

Auctions

- Vickrey, English are truthful
- First-price sealed-bid: bidders bid lower than values

Auctions

- Vickrey, English are truthful
- First-price sealed-bid: bidders bid lower than values
 - Private value case: why?

Auctions

- Vickrey, English are truthful
- First-price sealed-bid: bidders bid lower than values
 - Private value case: why?
- In common (and correlated) value case, bids lower in all mechanisms

Auctions

- Vickrey, English are truthful
- First-price sealed-bid: bidders bid lower than values
 - Private value case: why?
- In common (and correlated) value case, bids lower in all mechanisms
 - Why?

Class Discussion

Richard Edwards on Vickrey Auctions