CS344M Autonomous Multiagent Systems

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Good Afternoon, Colleagues

Are there any questions?

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- Can you handle mutual exclusivity of actions?
- What's the theory of Nash Eq.?
 - Probabilistic strategies

Logistics

• Progress reports due in 2 weeks

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- Change on main class website

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- FAI talk on Friday Andrew McCallum NLP

Game Theory Premises

• Simultaneous actions: (mutual exclusivity?)

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- Simultaneous actions: (mutual exclusivity?)
- No communication
- Outcome depends on combination of actions
- Utility (payoff) encapsulates everything about preferences over outcomes

Solution Concepts

- Dominant strategy
- Nash equilibrium
- Pareto optimality
- Maximum social welfare
- Maximin strategy

Prisoner's Dilemma

		Column	
		C(1)	D(2)
Row	C(1)	3,3	0,5
	D(2)	5,0	1,1

Chicken

Column
C(1)
D(2)

C(1)
3,3
1,5

Row
D(2)
5,1
0,0

My wife and I agree to meet at a concert

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- Unfortunately, there are 2: Bach and Stravinsky

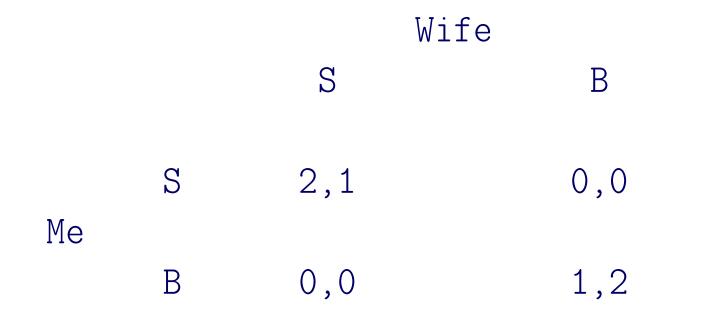
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- Propose a payoff matrix



Does every game have a pure strategy Nash equilibrium?

Matching Pennies

- We each put a penny down covered
- If they match, I win, if they don't, you win

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Nash equilibrium?

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 - Nobel prize and academy award!

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 - Nobel prize and academy award!
- Not known if complexity of finding one is NP-complete or in P

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- Is the maximum social welfare outcome necessarily Pareto optimal?
- If both players play maximin, is it necessarily a Nash equilibrium?

		Р	layer 2
		Action 1	Action 2
Player 1	Action 1	4,8	2,0
	Action 2	6,2	0,8

			Player	2	_
		Action	1	Action	2
Player 1	Action 1	4,8		2,0	
1 1 3 y 3 1 1	Action 2	6,2		0,8	

What if player 2 picks action 1 3/4 of the time?

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- Player 1 must be indifferent between actions 1 and 2

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Do actual numbers matter?

Rock/Paper/Scissors

• Nash equilibrium?

Rock/Paper/Scissors

- Nash equilibrium?
- Why is anything else not an equilibrium?

Correlated Equilibria

Sometimes mixing isn't enough: Bach/Stravinsky

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Want only S,S or B,B - 50% each