Game theory

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Exercise Sheet 5
Due: Monday, June 03, 2013

Exercise 5.1 (Support-Lemma, 3 points)

Let α be a mixed strategy profile, $a_i \in supp(\alpha_i)$, $a_i \notin B_i(\alpha_{-i})$, $a_i' \in B_i(\alpha_{-i})$ and α_i' defined by $\alpha_i'(a_i) = 0$, $\alpha_i'(a_i') = \alpha_i(a_i') + \alpha_i(a_i)$ and $\alpha_i'(a_i'') = \alpha_i(a_i'')$ for all $a_i'' \in A_i \setminus \{a_i, a_i'\}$. Show in a formal manner by using the definition of expected utility that $U_i(\alpha_i', \alpha_{-i}) > U_i(\alpha_i, \alpha_{-i})$.

Exercise 5.2 (Mixed strategy Nash equlibria, 3 points)

Use the method that was explained during the lecture for the BoS example (lecture 7, slide 10) together with the support lemma to find all Nash equliibria in mixed strategies for the game with the following payoff matrix.

	B	S	X
B	4, 2	0, 0	0, 1
S	0, 0	2, 4	1, 3

Exercise 5.3 (Mixed strategy Nash equilibrium for BoS, 2+2 points)

Two players wish to go out together to a concert of music by either Bach or Stravinsky. Their main concern is to go out together; but neither player knows whether the other prefers Bach to Stravinsky, or the reverse. Each player's preferences are represented by the expectation of his payoff, the payoffs to pure outcomes being analogous to those given here:

	B	S
B	2, 1	0, 0
S	0, 0	1, 2

This is just one possible setting in which the row player prefers Bach over Stravinsky and the column player the reverse. You may want to take a look at chapter 6.3 of the Shoham and Leyton-Brown "Multiagent Systems" book (http://www.masfoundations.org/).

(a) Model this situation as a Bayesian game.

(b) Find the Nash equilibria for all possible beliefs and show in particular that there are equilibria in which there is a positive probability that the players do not go to the same concert.

ATTENTION:
The next tutorial session is on Thursday, 6th of June.