Some of the papers available for presentation (with suggestions and instructions)

April 5, 2011

The papers in question are:

1. Mingyu Guo e Vincent Conitzer, *Worst-Case Optimal Redistribution of VCG Payments in Multi-Unit Auctions*, in Games and Economic Behavior 2009. (link)

   (Only until Secion 6 included)

2. Noam Nisan e Ilya Segal, *The Communication Requirements of Efficient Allocations and Supporting Lindhal Prices*. (link)

   (Short version of the paper available at the link above)

3. Nimrod Megiddo, *Cost Allocation for Steiner Trees*, in Networks, 1978. (link)

4. Noam Nisan, *A note on the computational hardness of Evolutionary stable strategies*, in Electronic Colloquium on Computational Complexity (ECCC), 2006. (link)

Instructions and suggestions for each of the papers:

1. **Guo-Conitzer:** Present the material **only until Section 6 included**. In your presentation try to explain the following things:

   (a) What's the difference between the problem studied in the paper and the cost-sharing problem seen in the lectures?

   (b) Why can't we use 2^{nd}-price (Vickrey) auction? Try to explain this with a small example.

   (c) What's the difference between the Bailey-Cavallo mechanism and the one based on "linear redistribution"? Try to give an example in which the two mechanisms do different things.

2. **Nisan-Segal:** If you download the paper from the Internet, be sure you take the short version that Nisan calls "short CS-friendly exposition of the main result" in his web page. In your presentation try to explain the following things:

   (a) Meaning of combinatorial auction. How many possible allocations exist if there are 2 bidders and 10 items?

   (b) Explain how the VCG mechanisms can be applied to get a truthful mechanism (can you use any allocation algorithm in your mechanism?).

   (c) Try to explain the main result of the paper in terms of "eBay auctions" involving two buyers and one seller: how many messages (bits) should be exchanged in total before the seller finds an optimal allocation of the items?

3. **Megiddo:** I suggest to **ignore certain terms** like "cooperative game" and "characteristic function". In your presentation try to explain the following things:

   (a) The meaning of "supplier" and "consumer" as they are used in the paper. What do these term represent for the problem of "multicast in the tree" seen in the lectures (cost-sharing mechanisms)?

(b) The paper concerns how to divide some global cost among the "suppliers" so to satisfy a condition called "core": try to explain intuitively the meaning of "core" (how much we charge a group of people S compare to the cost of connecting *only* the group S to the supplier). If you can, give an example that does *not* satisfy this condition (core).

(c) Try to explain the main result in terms of constructing a pipeline network for the water, so that the overall cost is divided in a "fair" way. (i.e., it satisfies the definition of core). What does the (main result of the) paper say?

4. **Nisan:** This paper require knowledge of the concepts of NP-hard (and reductions). I suggest to **ignore the classes D^p and Σ_2** and to talk only about NP-hard and co-NP-hard (as Nisan himself suggests after Theorem 1). In your presentation try to explain the following things:

   (a) The meaning of the payoff $u(i, j)$ in the paper vs the (more general) payoffs of two-player games, that is, $u_1(i, j) = u(i, j)$ and $u_2(j, i) = u(i, j)$.

   (b) Why ESS is a special case of Nash equilibrium. For instance, consider the following games and their **pure Nash equilibria**:

	C	N
C	**-4,-4**	0,-5
N	-5,0	-2,-2

	S	R
S	0,0	**-1,1**
R	**1,-1**	-100,-100

	C	D
C	**-4,-4**	-3,-5
D	-5,-3	**2,2**

   Which of these equilibria are *not* ESS? Which of the conditions of ESS are not satisfied?

   (c) The main result (Corollary 1) and how to prove it: the problem used in the reduction (graphs with max-clique *different* from k) and the idea of the reduction (essentially the four claims).