COST Action IC1205 on Computational Social Choice: STSM Report

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During my visit at the University of Liverpool, I worked with my host Dr. Georgios Christodoulou, as well as my advisor Dr. Vangelis Markakis and Georgios Amanatidis from Athens University of Economics and Business, who were visiting there at the same time. We studied the problem of allocating a set of indivisible items to a set of agents from the perspective of mechanism design, with respect to maximin share fairness.

Maximin share fairness is defined as follows: Given a set of n players, the maximin share of player i is the best he can guarantee to himself, if he is free to partition the items into n bundles, and then receive his least desirable bundle. The objective is to find an allocation, so that everyone is guaranteed his maximin share.

Mostly, we focused on mechanisms that receive ordinal input, i.e. each player submits a linear order on the set of the items, although the player himself has cardinal values for the objects and an additive valuation function on the subsets of items. Specifically, our goal was to characterize deterministic, truthful mechanisms that allocate all the items, and each player is guaranteed a positive fraction of his maximin share. For $n = 2$ players and $m \leq 4$ items we achieved a full characterization of such mechanisms, while for general m we formed a conjecture of what these mechanisms should be. Further, we made an attempt to extend our characterization to mechanisms that receive cardinal input, but this seems highly non trivial even for 3 items.

Currently, we are working on proving the characterization for general m. Assuming our conjecture is correct, this characterization would imply that for $n = 2$ there is no deterministic, truthful mechanism that allocates all the items, and each player is guaranteed more than $2/m$ of his maximin share (this $2/m$ ratio is achieved by a very simple mechanism proposed in Amanatidis et al. (IJCAI'16)).

This work is a follow up on a previous joint paper that appeared recently at IJCAI 16, and we expect that within the next months we will have a new paper ready for submission, based on the research initiated by this trip.