Arbitrators in Overlapping Coalition Formation Games

Yair Zick and Edith Elkind

Abstract

Overlapping Coalition Formation (OCF) games [Chalkiadakis et. al. 2008, 2010] are cooperative games where the players can simultaneously participate in several coalitions. Capturing the notion of stability in OCF games is a difficult task: a player may deviate by abandoning some, but not all of the coalitions he is involved in, and the crucial question is whether he then gets to keep his payoff from the unaffected coalitions. In [Chalkiadakis et. al. 2010] the authors introduce three stability concepts for OCF games—the conservative, refined, and optimistic core—that are based on different answers to this question. In this paper, we propose a unified framework for the study of stability in the OCF setting, which encompasses the concepts considered in [Chalkiadakis et. al. 2010] as well as a wide variety of alternative stability concepts. Our approach is based on the notion of an arbitrator, which can be thought of as an external party that determines payoff to deviators. We give a complete characterization of outcomes that are stable under arbitration. In particular, our results provide a criterion for the outcome to be in the refined or optimistic core, thus complementing the results in [Chalkiadakis et. al. 2010] for the conservative core, and answering questions left open in [Chalkiadakis et. al. 2010]. We also introduce a notion of the nucleolus for arbitrated OCF games, and argue that it is non-empty. Finally, we extend the definition of the Shapley value to the OCF setting, and provide an axiomatic characterization for it.