Title: Hedonic Expertise Games

Authors: Bugra Caskurlu, Fatih Erdem Kizilkaya, Berkehan Ozen

Abstract: We introduce a hedonic game form, Hedonic Expertise Games (HEGs), that naturally models a variety of settings where agents with complementary qualities would like to form groups. Students forming groups for class projects, and hackathons in which software developers, graphic designers, project managers, and other domain experts collaborate on software projects, are typical scenarios modeled by HEGs. This game form possesses common ranking property, and additionally, the coalitional utility function is monotone. We present comprehensive results for the existence/nonexistence of stable and efficient partitions of HEGs with respect to the most common stability and optimality notions used in the literature. Specifically, we show that the strict core of a HEG instance may be empty, and yet every HEG instance has a strong Nash stable and Pareto optimal partition. Furthermore, it may be the case that none of the socially optimal partitions of a HEG instance is Nash stable or core stable. We show that all these existence/nonexistence results also hold for the monotone hedonic games with common ranking property (monotone HGCRP). We also present several results for HEGs from the computational complexity perspective, some of which are as follows: A contractually Nash stable partition (and a Nash stable partition in a restricted setting) can be found in polynomial-time. A core stable partition can be approximated within a factor of 1-1/e, and that this bound is tight. We present a natural game dynamics for monotone HGCRP that converges to a Nash stable partition in a relatively low number of moves.