Coalitional Bargaining in Networks

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We analyze an infinite horizon, non-cooperative bargaining model for a general coalitional formation framework. In each period of the game an opportunity for a feasible coalition to form arises according to a stochastic process, and a randomly selected agent in the coalition makes a take-it-or-leave-it offer. Agents that reach an agreement exit the game and are replaced by clones. We characterize the unique stationary payoff by a convex program. We examine the implications of this characterization when the feasible coalitions are determined by an underlying network. We show how an agent’s payoff is related to the centrality of his position in the network.

Categories and Subject Descriptors: F.0 [Theory of Computation]: General

Author Key Words and Phrases: Economics, Network Games, Noncooperative Bargaining

1. INTRODUCTION

In the study of economic models of trade, it has long been recognized that institutional or physical barriers limit direct trade between some pairs of agents. Network models have been used to study such scenarios since the early 1940s, but only recently did they become objects of active research in economics. Agents in these models are represented by the nodes of a network, and the presence or absence of a link indicates the possibility or impossibility of trade between the relevant pair of agents. A goal of this line of work is to examine the impact of such barriers to trade and understand how an agent’s position in this network influences his share of resources.

Empirical studies suggest that agents at a central location of the network have high bargaining power. Theoretical literature on the relation between network centrality and bargaining power is extensive. However, most papers along this line are based on an axiomatic approach. This is not entirely satisfactory if one believes the interactions between the agents to be non-cooperative. Furthermore, without a micro foundation it is hard to justify and compare different measures of network centrality.

In this paper we provide such a micro foundation by a non-cooperative bargaining model for a general coalition formation framework. We characterize its unique stationary equilibrium payoff by a convex program, and use this payoff as an index of bargaining power. We show several applications. In particular, in an application of trading networks with intermediaries, we prove that an agent’s bargaining power coincides with the level of congestion in an associated traffic network.

This research was supported in part by NSF under grant CNS-0905407.

A full version of this paper can be found by following this link: http://users.eecs.northwestern.edu/~thanh/paper/bargaining.pdf

The author thanks Rakesh Vohra, Randall Berry, Michael Honig, Eva Tardos and Vijay Subramanian for helpful conversations and comments.

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ACM 978-1-4503-1415-2/12/06.