

Extending Social Reasoning to Cope with Multiple Partner Coalitions

Nuno David¹, Jaime Simão Sichman², and Helder Coelho³

¹ ISCTE/DCTI, Department of Information and Technology Sciences, Lisbon, Portugal
Nuno.David@iscte.pt

² LTI/PCS/EP/USP, University of São Paulo, São Paulo, Brazil
jaime@pcs.usp.br

³ DI/FC/UL, University of Lisbon, Lisbon, Portugal
hcoelho@di.fc.ul.pt

Abstract. We present a utility-driven rationality and a complementary-driven rationality based model, relative to multiple partner coalitions, motivated by relations of dependence and instrumental goal adoption. For this purpose, we analyze social dependency patterns and its corresponding dependency networks. The networks are used as a source of quantitative and qualitative information with which an agent is able to choose the best set of partners and adequate proposals to form coalitions. An e-commerce example is presented, showing the usefulness of the mechanism in real world multi-agent systems.

1 Introduction

In some classes of multi-agent systems (MAS), the notion of autonomy usually suggests that agents do not necessarily attempt to do what is requested of them. This so-called non-benevolence assumption is frequently undertaken from two divergent points of view: (1) a quantitative utility oriented perspective, from which the most obvious examples are game theoretic models (e.g. [9]), or (2) a socio-psychological perspective, from which we may refer to the theory of dependence and social power [1][2]. Common to both perspectives is the problem around the choice of partners and proposals for coalition formation. With respect to the first approach, choice of partners and proposals has been fundamentally associated with the classic principle of economic rationality (maximizing the agent's expected utility as suggested by decision theory, (e.g. [3])). As for the second approach the literature is not so extensive. Sichman and his partners [5][6] adopt a pure complementary-driven rationality and propose a taxonomy of *dependency situations* as a criterion for choosing partners susceptible to accept proposals of coalitions. Nevertheless, the latest research does not consider multiple partner coalitions and the taxonomy is solely based on the agents' goals, beyond the set of possible plans, actions and its corresponding costs, which are required for an effective proposal of coalition.

In this paper, we extend the *social reasoning mechanism* [6] and present both a utility-driven rationality (quantitative) and a complementary-driven rationality (dependence) based model, relative to multiple partner coalitions, motivated by relations of dependence and instrumental goal adoption [1][2]. To achieve this aim,