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Introduction to the Special Section on Reputation in Agent Societies

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Abstract

This special section includes papers from the 'Reputation in Agent Societies' workshop held as part of 2004 IEEE/WIC/ACM International Joint Conference on Intelligent Agent Technology (IAT'04) and Web Intelligence (WI'04), September 20, 2004 in Beijing, China. The purpose of this workshop was to promote multidisciplinary collaboration for Reputation Systems modeling and implementation. Reputation is increasingly at the centre of attention in many fields of science and domains of application, including economics, organisations science, policy-making, (e-)governance, cultural evolution, social dilemmas, socio-dynamics, innofusion, etc. However, the result of all this attention is a great number of *ad hoc* models and little integration of instruments for the implementation, management and optimisation of reputation. On the one hand, entrepreneurs and administrators manage corporate and firm reputation without contributing to or accessing a solid, general and integrated body of scientific knowledge on the subject matter. On the other hand, software designers believe they can design and implement online reputation reporting systems without investigating what the properties, requirements and dynamics of reputation in natural societies are and why it evolved. We promoted the workshop and this special section with the hope of setting the first steps in the direction of a new, cross-disciplinary approach to reputation, accounting for the social cognitive mechanisms and processes that support it and working towards t a consensus on essential guidelines for designing or shaping reputation technologies.

Keywords:
Reputation, Agent Systems

Why Reputation?

1.1

Thanks especially to the impulse coming from work on software agents, reputation is in the process of rising up to the status of a well-defined scientific topic.

1.2

Reputation is social knowledge on which a number of social decisions are based. Regulating society from its earliest days (Dunbar 1998), reputation becomes even more relevant with the pace of development of ICT technologies, which dramatically enlarge the range of interactions and generate new types of aggregation.

1.3

Presently, reputation is increasingly at the centre of attention in many fields of science and domains of application, including economics, organisations science, policy-making, (e-)governance, cultural evolution, social dilemmas, socio-dynamics, innofusion, etc.

1.4

The role of reputation as a partner selection mechanism started to be appreciated in the study of cooperation in the early eighties (Kreps and Wilson 1982). However, little understanding of its social and cognitive underpinnings was achieved at that stage. Despite important advances in the study of cooperation networks, no explicit theory of the cognitive ingredients and processes which make up reputation was provided. Evolutionary game theorists did not model the decision to report on reputation to others, misperceiving the potential of reputation as preventive social knowledge. Even when this aspect of reputation is addressed (Raub and Weesie 1990), the selective mechanism of transmission is not accounted for. Only recently the first testable theories for a cognitive approach to reputation have started to appear (Conte and Paolucci 2002).

1.5

Existing online reputation reporting systems are known to be only moderately efficient (Resnick and Zeckhauser 2001; Bolton et al. 2002). In all of these systems, the notion of reputation is essentially reduced to centralized image: no direct exchange of information takes place among participants but only final reports to a central authority, which calculates the reputation value. People are not likely to provide reputational feedback (under-provision) and if they do, they lean on providing only good reports (over-scoring). However, eBay prospers and is highly profitable. How is this possible?

1.6

Despite its critical role, reputation generation, transmission and use are unclear. There are a great number of *ad hoc* models, and little integration of instruments for the implementation, management and optimization of reputation. On the one hand, entrepreneurs and administrators deem it possible to manage corporate and firm reputation without contributing to or accessing a solid, general and integrated body of scientific knowledge on the matter. On the other hand, software designers believe they can design and implement online reputation reporting systems without investigating what the properties, requirements and dynamics of reputation in natural societies are and why it evolved.

1.7

What is still missing is the merging of the many disciplines approaching and exploiting reputation into an interdisciplinary integrated approach accounting for the social cognitive mechanisms and processes. We still need to reach a consensus on essential guidelines for designing or shaping emergent technologies; and reputation is both an emergent topic of science and an emergent technology. The aim of the workshop, and of this special section, is to promote high inter-disciplinary collaboration in the following directions:

- Developing an integrated theory of reputation as an intelligent artifact
- Accounting for mechanisms, properties and social dynamics of reputation
- Allowing a theory-driven design of emergent technologies of reputation for solving societal problems.

In the view of the editors of this special section, reputation is an old artefact for answering a new challenge: the regulation of complex, global, electronic societies. Innovation demands that the potential of old instruments are fully understood and exploited, in order to be incorporated into novel, intelligent technologies.

The papers

2.1

Andreas Schlosser, Marco Voss, and Lars Brückner, in their article On the Simulation of Global Reputation Systems, have the objective to facilitate comparison among computational reputation models from the point of view of the metrics they are using. The authors present a

formal model that allows the description of a reputation system by its specific metric, making possible comparisons with other systems. Using the formal model, a review and a classification of the different types of metrics used in computational reputation models is made. After that, a simulation of these metrics is carried out to see how they perform. Finally, the authors propose a new metric that tries to overcome the weaknesses of the evaluated metrics.

2.2

The goal of Marco A. Janssen is to analyse the effectiveness of reputation systems with voluntary feedback. Specifically, in the article Evolution of Cooperation when Feedback to Reputation Scores is Voluntary, the author performs a set of experiments to answer the question, "what frequency of providing honest feedback is required in order to make a reputation system functional?" A simple reputation model is proposed and used in the context of a one-shot two-person Prisoner's Dilemma game. This framework is the base to analyse different scenarios where the agents use different parameters, with the probability of providing feedback being the central one.

Future perspectives

3.1

The future of reputation systems is, at the time of writing, still unclear. Several research groups are working on different directions of development. Our vision is that a theory-driven technology of reputation in agent societies will not be realised in full until we will have a deeper understanding of the following issues:

- word-of-mouth and the quality of services: in this field, applications of quality evaluation for the sake of consumers and their scientific investigations already exist and are on the increase (e.g. mathematical models of spreading evaluations of movies, books, etc.). However, these applications benefit neither from a cognitive theory of evaluations, nor from a study of its dynamic components. To what extent could agent environments contribute to the spreading of what type of evaluations?
- social control in an agentized environment: one of the main problems with the use of conventions and obligations in agentized applications, i.e. the locus of accountability for transgressions, can be addressed in an innovative way by means of a reputation-based mechanism for social control, meant both as a deterrent and as an incentive: reputation is an emergent property whose targets and vectors (but not, perhaps, beneficiaries) need not be human.
- corporate reputation and institutions: as shown by economic indicators, reputation is an asset, adding to the economic value of firms. What about the reputation-based value added of institutions, possibly of e-institutions?

To propose a focal point for the studies of reputation, a STREP project on electronic reputation (eRep) has been submitted from a group including the authors. The project has just completed negotiation and is due to begin on 1 April 2006.

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