Multiagent Dynamic Reasoning About Belief and Trust

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Abstract/Description:	In this dissertation we design a system that allows Semantic Web agents to reason within what has come to be known as the Web of Trust. We integrated reasoning about belief and trust, so agents can reason about information from different sources and deal with contradictions. Software agents interact to support users who publish, share and search for documents in a distributed repository. Each agent maintains an individualized topic taxonomy for the user it represents, updating it with information obtained from other agents. Additionally, an agent maintains and updates trust relationships with other agents. When new information leads to a contradiction, the agent performs a belief revision process informed by a degree of belief in a statement and a degree of trust an agent has for the information source. The system described has several key characteristics. First, we define a formal language with well-defined semantics within which an agent can express the relevant conditions of belief and trust, and a

	set of inference rules. The language uses symbolic labels for belief and trust intervals to facilitate expressing inexact statements about subjective epistemic states. Second, an agent's belief set at a given point in time is modeled using a Dynamic Reasoning System (DRS). This allows the agent's knowledge acquisition and belief revision processes to be expressed as activities that take place in time. Third, we explicitly describe reasoning processes, creating algorithms for acquiring new information and for belief revision. Fourth, we design a general architecture for system implementation. An object-oriented model presents classes and methods implementing the formal model. The database model is flexible and allows for future extensions. Finally, an external representation for system data is presented based on open Semantic Web standards.
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Multiagent learning • Learning is process of improving performance via experience • Can agents learn to coordinate actions with other agents? • What to learn? ⇒ How to select own actions ⇒ How other agents select actions ⇒ Other agents' goals, plans, beliefs, S. Albrecht, P. Stone. 6. Reasoning about hypothetical agent behaviours and their parameters. In Proceedings of the 16th International Conference on Autonomous Agents and Multiagent Systems, pages 547–555, 2017. S. Albrecht, J. Crandall, and S. Ramamoorthy. Belief and truth in hypothesised behaviours. Articial Intelligence, 235:63–94, 2016. E. Alonso, M. D'Inverno, D. Kudenko, M. Luck, and J. Noble. The notion of a dynamic reasoning system is applied to model the agent's knowledge acquisition and belief revision processes as activities that take place in time. DOI: 10.3233/MGS-2008-4307. Journal: Multiagent and Grid Systems, vol. 4, no. 3, pp. 335-346, 2008. Published: 29 August 2008. Price: EUR 27,50. Research in multiagent systems (MAS) addresses autonomy by drawing on concepts and techniques from articial intelligence. However, MAS research generally lacks an adequate understanding of modern distributed computing. Second, reasoning about such data quickly enough to inform intelligent decision making can be nontrivial but is becoming ever more tractable because of improved technology and advances in algorithms. For this reason, cloud computing, which provides elastic storage and compute capacity to contend with the scale and variations in the scale of IoT applications is also a key enabler. Second, MAS has developed approaches for trust. One category of approaches deals with gathering, maintaining, and disseminating reputation information.