

## Extending BDI Multiagent Systems with Agent Norms

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**Abstract :** Open Multiagent Systems (MASs) are societies in which heterogeneous and independently designed entities (agents) work towards similar, or different ends. Software agents are autonomous and the diversity of interests among different members living in the same society is a fact. In order to deal with this autonomy, these open systems use mechanisms of social control (norms) to ensure a desirable social order. This paper considers the following types of norms: (i) obligation &mdash; agents must accomplish a specific outcome; (ii) permission &mdash; agents may act in a particular way, and (iii) prohibition &mdash; agents must not act in a specific way. All of these characteristics mean to encourage the fulfillment of norms through rewards and to discourage norm violation by pointing out the punishments. Once the software agent decides that its priority is the satisfaction of its own desires and goals, each agent must evaluate the effects associated to the fulfillment of one or more norms before choosing which one should be fulfilled. The same applies when agents decide to violate a norm. This paper also introduces a framework for the development of MASs that provide support mechanisms to the agent's decision-making, using norm-based reasoning. The applicability and validation of this approach is demonstrated applying a traffic intersection scenario.

**Keywords :** BDI agent, BDI4JADE framework, multiagent systems, normative agents

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