Special Issue Journal on Agent Cooperation and coordination

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August 2014

Due to the heterogeneity of multi-agent systems a single approach focussing on all one o issues is often not enough. This issue's goals are to present new directions of research into the coordination and control of multi-agent systems, by bringing together researchers working in all the areas. Intelligent agents possess several important computational roles. These include the ability to communicate, cooperate, collaborate, but all these must be coordinated. This special issue presents an overview of the abilities for coordination and cooperation. Self-interest is a key characteristic of multi-agent systems. Agents pursue their individual objectives. These objectives while consistent but canbe completely contradicting – often require cooperation between agents, and in particular, often cannot be ensured by individual agents. As a consequence, actions and behaviors need to be *coordinated* to satisfy the agents' objectives, however they also have to be *controlled* to meet the encompassing goal systems specifications. Coordination games can represent interactions between multiple agents in many real-life situations. Combining model learning techniques, agents tend to become more consistent in effective cooperative behavior.

Topic areas on the special issue will include:

- Formal methods for cooperation and coordination: this area has been successfully applied to coordinate and control multi-agent systems. Among other things, an advantage of formal methods in comparison to non-formal ones is that they allow for rigorous system specification, verification and automation.
- Coordinaiton and cooperation with agent game tree planning
- * The cognitive models of agents, as well as agent communication languages, are heavily influenced by multi-agent logics, logic-based approaches are most often used directly to describe and to reason about the system from the outside, as opposed to actively change the state of the system or to reach agreements by agents inside the system.
- * Agent Coordination and Cooperation congnitive loops:
- There is a cognitive loop that replicates the link between coordination and cooperation in systems such as organizations, management and biological systems. This paper will also present the advantages, consequences and challenges associated with the implementation of

- *Agreement technologies* are tailor-made for allowing agents to arrive at agreements. Their acceptance affects the behavior of the agents and depends on the way norm violations are detected and sanctioned.

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- Aspects that influence agents' behavior, including:

- strategic power
- argumentation abilities,
- ressource limitations,
- social dependencies, and roles.

* Interaction between rational decision makers in general, and coordination problems in particular

Research topics that might be presented with specific goals:

- Identification of coordination and control problems in agreement technologies, game theory and multi-agent logic, and what they have in common.
- Identification of implicit assumption made in. the interagent coordination.
- Exploring the ties between formal systems, logic, games, and agreement technologies.
- Computational methods for the coordination of multi-agent systems.
    - Sequential Optimality and Coordination in Multiagent Systems
    - Agent Learning
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    - - Novel models, languages, formalisms, programming and
    - implementation techniques
    - - Coordination technologies, systems and infrastructures
    - - Applications
    - - Middleware platforms
    - - Formal aspects (semantics, reasoning, verification)
    - - Software architectures and software engineering techniques
    - - Coordination of multi-agent systems, including mobile agents,
    - - Self-organising, self-adaptive and nature-inspired coordination
    - approaches
    - - Relationship with other computational models such as object
    - oriented, declarative (functional, logic, constraint) programming or
    - their extensions with coordination capabilities
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    - *Agent description specification
      agreement technologies

    - formal verification and specification of multi-agent systems
    - multi-agent logics
    - game logics
    - models of coordination and control in multi-agent systems