Evaluating Approaches for Trust and Reputation Research: Exploring a Competition Testbed

Panel Discussion at the AAMAS 2004 Workshop on Trust in Agent Societies

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Panel Agenda

- Motivation for Competition Testbed
- Important Research Problems
- Potential Competition Domains
- Conclusions and Future Action Items
Motivation

- Trust in MAS is a young field of research, experiencing breadth-wise growth
  - Many trust-modeling technologies
  - Many metrics for empirical validation

- Lack of unified research direction
  - No unified objective for trust technologies
  - No unified performance metrics and benchmarks
A Competition Testbed…

- Presents a common challenge to the research community
  - Facilitates solving of prominent research problems
- Provides a versatile, universal site for experimentation
  - Employs well-defined metrics
  - Identifies successful technologies
- Matures the field of trust research
  - Utilizes an exciting domain to attract attention of other researchers and the public
Example Competition Testbed Domain

- Domain Description
  "In the Robocup competition, autonomous robot teams compete in a soccer game."

- Competition Problem
  "Researchers must design and implement a robot soccer team that can beat all other competing robot teams."

- Metrics
  "Number of goals scored."

- Research Objectives Accomplished
  "Improvements to coordination algorithms, advancements in machine learning for faster robot walks, etc."
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Trust Research Problems

- Agents must interact with others for needed resources
  - Tangible goods, information, services
- Interactions are risky
  - Agents make agreements, which may or may not be fulfilled
- Minimize risk by interacting with agents most likely to fulfill agreements
  - Agent must predict outcome of interactions
  - Agent must predict and avoid risky (unreliable) agents

Trust and reputations model these predictions
Modeling Trust

How can an agent build trust models that are

- Reliable: accurate model of agent reliability [Yamamoto]
- Efficient: low cost and time to model [Yamamoto]
- Scalable: for large MAS
- Generic: applicable to many domains [Hyunh]
- Flexible: able to model agents or other entities ("objects") [Fujimura]
Acting on Trust

- How should an agent’s trust models influence its decisions?
- How should an agent treat incompetent or malicious agents? [Biswas, et. al.] [Barber and Kim]
Research Objectives Worksheet

- Research Problems
- Metrics
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Desirable Testbed Characteristics

- A common challenge
- Versatile, universal experimentation site
- Exciting domain
Domain Characteristics

- Open MAS (agents can enter or leave)
- Dynamic: resource needs, agent trustworthiness may change over time
- Resources may be information, services, tangible goods
- Agent may interact many or few times with a given entity
  - Direct interaction trust models
  - Reputation mechanisms
Experimental Domains

- Internet Rating Services [Fujimura]
  - Reliability against “ballot-stuffing” and “bad-mouthing”
  - Incentives to share reputation information
    - Measured by number of interactions

- Online Markets [Yamamoto] [Dellarocas] [Sabater]
  - Efficiency of transactions
  - Agent utility per interaction
  - Percentage of successful interactions

- Prisoner’s Dilemma [Marsh] [Mui] [Jurca and Faltings] [Sabater]
  - Payoff to individual agent
  - Descendant population

- Information Domains [Fullam and Barber]
  - Accuracy of received information
Potential Competition Domain Ideas

- Legal Reasoning [Jøsang]
  - Handling disputes, assessing value of witness testimony
- Webpage Ranking [Fujimura]
- Team Formation [Sabater]
- Online Markets [Yamamoto]
Proposing Competition Testbed Domains

- **Domain Description**
  
  "In the Robocup competition, autonomous robot teams compete in a soccer game."

- **Competition Problem**
  
  "Researchers must design and implement a robot soccer team that can beat all other competing robot teams."

- **Metrics**
  
  "Number of goals scored."

- **Research Objectives Accomplished**
  
  "Coordination algorithms, advancements in machine learning for faster robot walks, etc."
Panelist Input

- Proposed Competition Domains
- Discussion
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Conclusions

- Interest in Competition Testbed
- Favored Competition Domains
- Logistics and Limitations
- Future Action Items