An Integrated trust and reputation model for open multi-agent systems

A paper by Trung Dong Huynh, Nicholas R. Jennings & Nigel R. Shadbolt (2006)

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Overview

1. Terminology
2. The FIRE Model
3. Results
4. Conclusions

.. an open MAS?

"…systems in which agents can freely join and leave at any time and where the agents are owned by various stakeholders with different aims and objectives."

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This causes some uncertainties:

1. Agents tend to be self-interested and may be unreliable
2. No agent can know everything about the environment
3. No central authority can control everything

Sources of trust/reputation

Source	Type
Direct experience	Interaction trust
Witness experience	Witness reputation
Role-bases rules	Role-based trust
Third-party references	Certified reputation

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Uses all four sources of information

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- Agents are willing to share their experiences with others (as witnesses or as referees)
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So… we do not consider the problem of lying and inaccuracy.

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However… these ratings are not equally relevant:

- Older ratings might not be as relevant as new ones
- Some ratings are more credible than other depending on the source

So in what other way can we quantify trust?

How to quantify trust?

The FIRE way

Every rating is a tuple $r = (a, b, c, i, v)$.

Where a and b are the agents participating in transaction i. Value $v \in [-1, +1]$ is the rating given by agent a to agent b regarding regarding topic c (e.g. quality, honesty).

These ratings are stored in the agent's local database.

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Since ratings become outdated over time, an agent only stores the latest H transactions it gave to other agents.

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This gives us:

$$\mathcal{T}_K(a,b,c) = \frac{\sum_{r_i \in \mathcal{R}_K(a,b,c)} \omega_K(r_i) \cdot v_i}{\sum_{r_i \in \mathcal{R}_K(a,b,c)} \omega_K(r_i)} \quad (1)$$

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What about reliability

Summary