

Handling Subjective User Feedback for Reputation Computation in Virtual Reality

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PhD Research

- Topic: Design a reputation mechanism for virtual marketplaces
 - Feedback provision
 - Reputation computation (Today's topic)
 - 3D visualization for reputation representation
 - Automatic decision making

Research Progress

- Published papers

- [1] Hui Fang, Jie Zhang, Murat Sensoy and Nadia Magnenat Thalmann, "Aligning Subjective User Feedback for Reputation Computation in Virtual Reality", *In Proceedings of UMAP (poster)*, 2011
- [2] Hui Fang, Murat Sensoy, Jie Zhang and Nadia Magnenat Thalmann, "Handling Subjective User Feedback for Reputation Computation in Virtual Reality", *In Proceedings of the UMAP Workshop on Trust, Reputation and User Modeling*, 2011
- [3] Hui Fang, Jie Zhang, Murat Sensoy and Nadia Magnenat Thalmann, "Design of a Reputation Mechanism for Virtual Reality: A Case for E-Commerce", *In Proceedings of AAMAS Workshop on Trust in Agent Societies*, 2011

Today's Agenda

- Motivation and Objectives
- Related Work
- Feedback Alignment in Reputation Computation
 - Subjectivity Alignment
 - Reputation Computation
- Conclusion and Future Work

Motivation & Objectives

- Emergence of virtual marketplaces (VMs)
 - Buyers use virtual reality to virtually experience products with their five senses
 - From the behavior perspective, previous research just validate that VMs can better induce trust

Motivation & Objectives

- The inherited trust problem in VMs
 - Users may be dishonest
 - Users may have different competency
 - Five-sense oriented feedback provision approach [1]
 - Address the trust problem
 - Overlook the user subjectivity problem in feedback

Motivation & Objectives

- User subjectivity problem involved in feedback
 - Due to subjective terms used in feedback
 - E.g., a simple concept like “soft” has different semantics for different users
 - E.g., the object can be perceived as “adequately soft” by a user A but “inadequately soft” by another user B

Motivation & Objectives

- The necessity of feedback alignment (i.e., align subjectivity terms)
 - To accurately model sellers' reputation
- In this research
 - Propose a subjectivity alignment approach by adopting virtual reality
 - Model reputation based on the aligned feedback

Related Work

- Approaches to address the subjectivity problem in trust and reputation mechanisms
 - Collaborative filtering
 - Trust alignment
 - Reputation mechanism based on detailed reviews

Related Work

- Collaborative filtering
 - Suffer from the risk of losing or discounting some important information
 - Noorian et. al [1]
 - Propose a two layered cognitive approach to filter or discount the ratings provided by other buyers
 - According to the similarity between the ratings provided by a buyer and those of an advisor

Related Work

- Trust alignment
 - Have addressed the information loss problem
 - Regan et al. [1] use Bayesian learning tools to model sellers' properties and correlation between sellers' properties and the advisor's ratings
 - Koster et al. [2] use clustering and inductive logic programming to align the subjective trust evaluation
- Limitations of collaborative filtering and existed trust alignment approaches
 - Shared interactions are needed
 - Offer limited flexibility for users to deal with the dynamic behavior of sellers and dynamic subjectivity of advisors

[1] K. Regan, P. Poupart, and R. Cohen. Bayesian reputation modeling in e-marketplaces sensitive to subjectivity, deception and change. *International Conference on Machine Learning*, 2006.

[2] A. Koster, J. Sabater-Mir, and M. Schorlemmer. Inductively generated trust alignments based on shared interactions. *In Proceedings of 9th International Conference on Autonomous Agents and Multiagent Systems (AAMAS 2010)*, 2010.

Related Work

- Reputation mechanism based on detailed reviews
 - Ontology-based approach
 - Feedback in the form of detailed reviews that elaborate various attributes of the transaction
 - Compute trust/reputation based on feedback
 - Limitation:
 - May fail if some concepts in the ontology or reviews are subjective

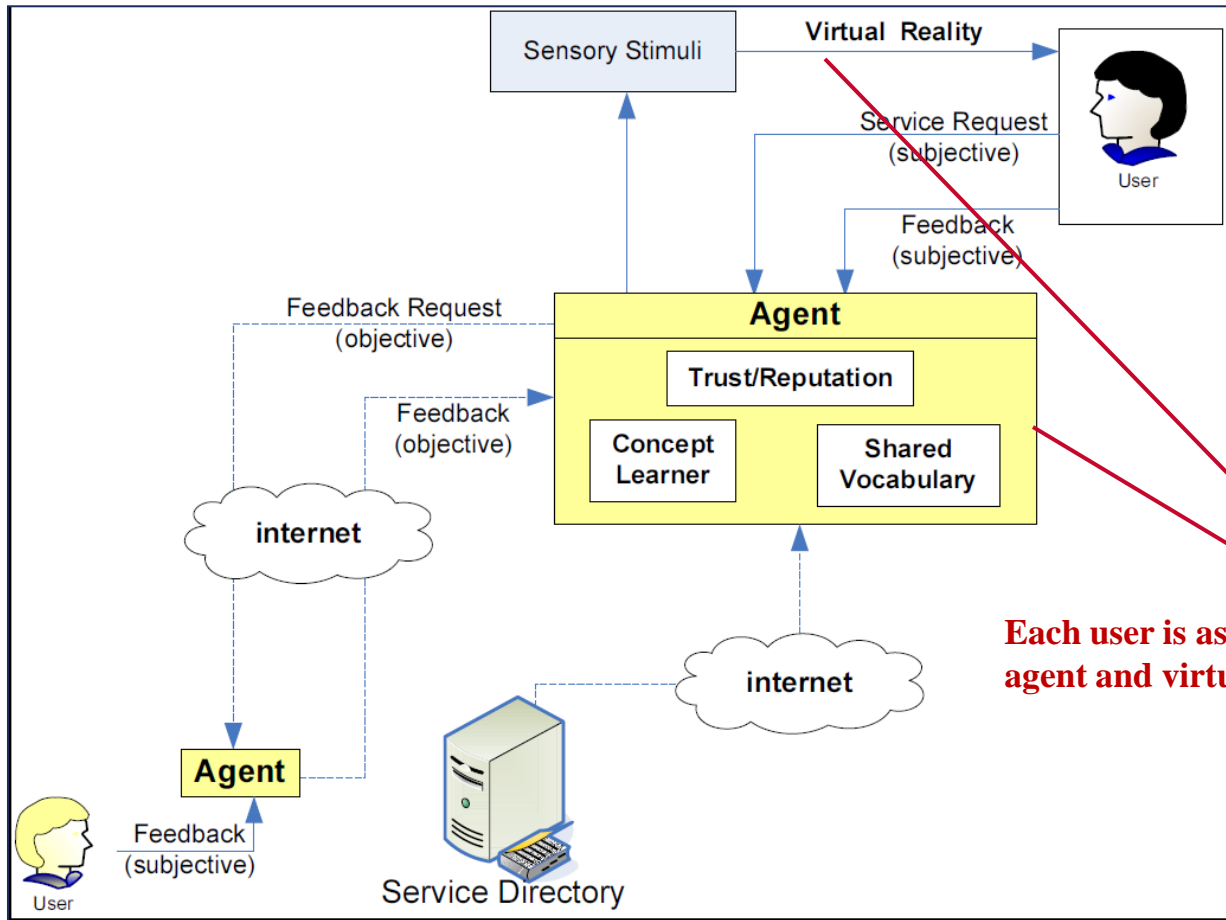
Related Work

- Our approach
 - Based on the detailed reviews
 - Agents learn users' subjectivity based on the users' own experience with the sellers
 - No shared interactions are needed
 - Align advisors' feedback about each interaction with sellers
 - Be able to deal with the dynamic behavior of sellers

Feedback Alignment

- User coupled with agent and virtual simulators
- Concept Learner Engine
 - To learn semantic metrics
- Semantic Metrics Aligned
- Reputation Computation
 - Based on the aligned feedback

Feedback Alignment



Each user is assisted with a software agent and virtual reality simulators

Fig. 1. The approach overview

Feedback Alignment

- Concept learner engine
 - An iterative and continuous process
 - Learn the semantic metric of each subjective term in its user's vocabulary
 - Map onto objective sensory data
 - Semantic metrics in the form of trapezoidal membership functions

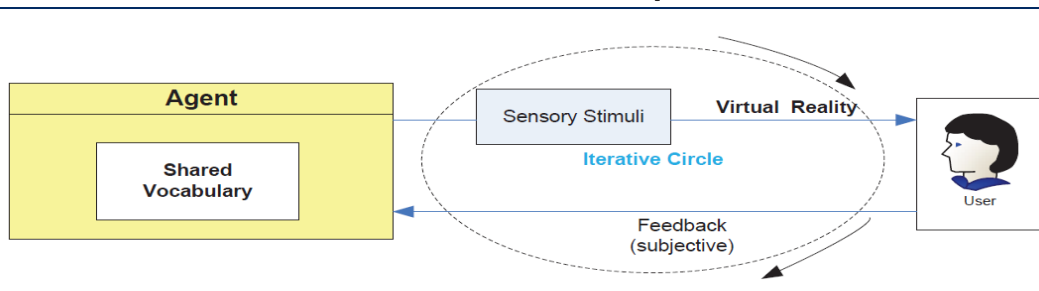


Fig. 2. Concept Learner Engine

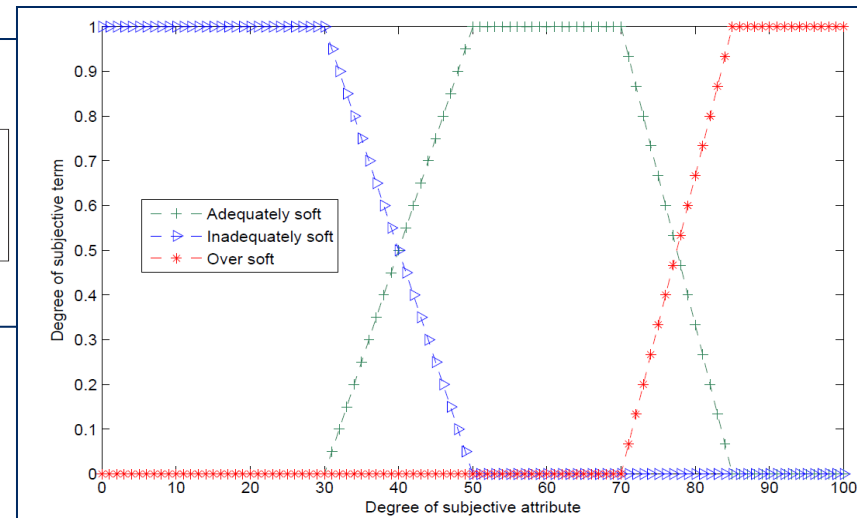


Fig. 3. Example of semantic metrics

Feedback Alignment

- Semantic metrics aligned
 - Agent shares the semantic metrics with the agents of other users
 - Agent aligns the advisor's feedback based on these shared semantic metrics and its user's own semantic metrics
 - Two scenario
 - Scenario I: Objective sensory data available in the advisor's feedback
 - » The agent of the buyer directly maps the objective sensory data to corresponding subjective term
 - » The subjective term **with the highest truth degree** is chosen as the buyer's perception

Feedback Alignment

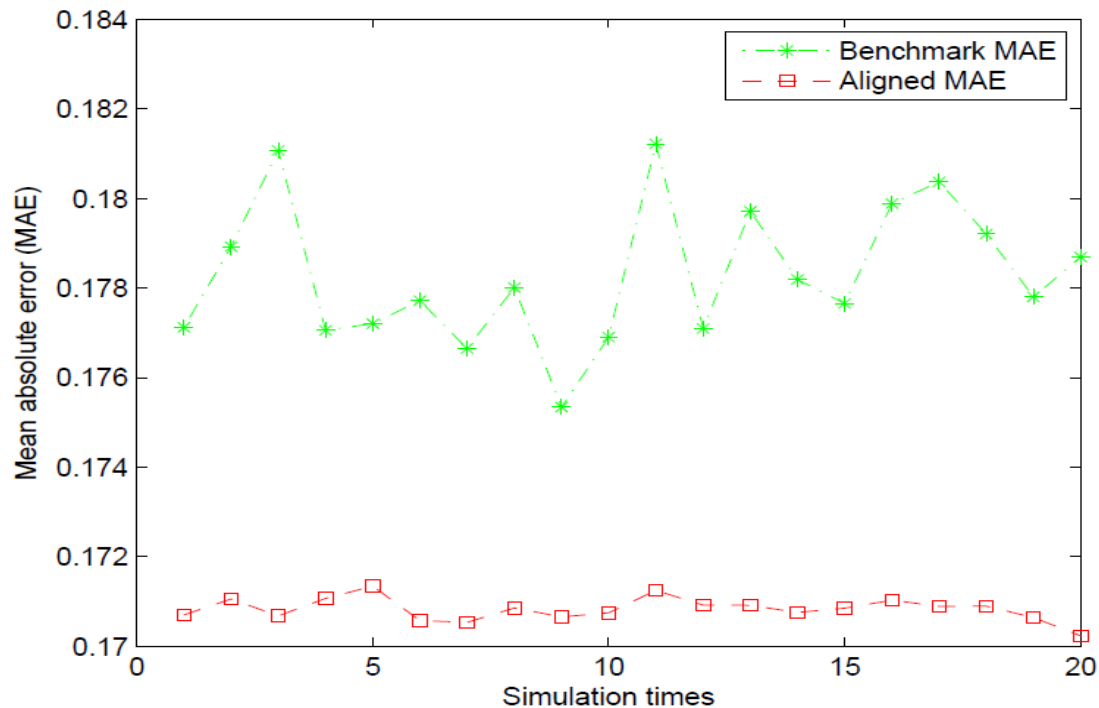
- Semantic metrics aligned
 - Scenario II: Only subjective terms available in the advisor's feedback
 - Agent of the buyer computes the **similarity** between the corresponding semantic metrics of its buyer and the advisor's semantic metric of the subjective term in the feedback
 - Similarity metric between trapezoidal membership functions [1]
 - The subjective term **with the highest similarity** degree is chosen as the buyer's perception

Feedback Alignment

- Reputation Computation
 - Collect the set of feedback toward the target seller
 - Align the collected feedback
 - Based on the buyer's own preference toward each attribute, compute the satisfactory degree of each feedback
 - Compute the average degree of satisfaction

Experiments

- Comparison with Benchmark approach
 - Our approach can more **accurately and stably** model sellers' reputation



Conclusion and Future work

- Conclusion
 - Take advantages of various virtual reality simulators for human users' five senses to align subjectivity in advisors' feedback
 - Experiments verifies that buyers can more accurately model the reputation of sellers, and also **improve the efficiency and robustness** of existing trust and reputation mechanisms
- Future work
 - Design a demo to present our reputation mechanism

Q & A

Thanks!
Any questions?