Proposal

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Electronic markets hold the potential for great economic efficiency, with a free flow of goods between autonomous buying and selling agents. The general challenge is how, given a set of rules governing the market, we can best design these agents so as to maximize their individual utility. An issue which arises in this domain is that self-interested sellers may deceive buyers about the quality of goods being sold. This research will develop techniques for buying agents to avoid selling agents with low quality goods by modeling the reputation of selling agents.

The domain of reputation modeling in electronic markets has inherent uncertainty due to possible deception on the part of other agents. This uncertainty has previously been addressed using a variety of statistical techniques such as the Dempster-Shafer theory of evidence [6] and beta probability density functions [2]. This research will examine how Bayesian techniques can be applied to the problem. Specifically, how belief networks can be used to model how different observations made by an agent, such as the type of good and the price at which it is offered, can be combined to form a single seller reputation and how this can inform the expected quality of a good bought from that seller. We will investigate how the belief network can be updated to reflect the results of any purchase decisions made by a buying agent.

A single buying agent can hone its decision making process and reason about sellers it has not directly interacted with by reaching out to other buying agents and sharing reputation information. We will examine the how a buying agent's belief network can be augmented to reflect information provided by other buyers. This research will propose a general structure for such a belief network and investigate how it can be queried and updated to infer product quality from a reputation model. The resulting techniques will be compared and contrasted with approaches to solve the problems posed using simpler deterministic heuristics.

If there is a time a decision theoretic extension will be investigated which takes into account the cost of contacting fellow buying agents (and the information gained) and approximates optimal policies for which buying agents to ask, and which sellers to ultimately make a purchase from.

References to relevant research that will be surveyed can be found on the following page.

References

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[4] Weihua Song, Vir V. Phoha, and Xin Xu. The hmm-based model for evaluating recommender's reputation. In *IEEE International Conference on E-Commerce Technology for Dynamic E-Business*, Beijing, China, September 2004.

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