A Trust Model for Sharing Ratings of Information Providers on the Semantic Web

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Abstract. In the context of the Semantic Web, it may be beneficial for a user (consumer) to receive ratings from other users (advisors) regarding the reliability of an information source (provider). We offer a method for building more effective social networks of trust by critiquing the ratings provided by the advisors. Our approach models the consumer's private reputations of advisors based on ratings for providers whom the consumer has had experience with. It models public reputations of the advisors according to all ratings from these advisors for providers, including those that are unknown to the consumer. Our approach then combines private and public reputations by assigning weights for each of them. Experimental results demonstrate that our approach is robust even when there are large numbers of advisors providing large numbers of unfair ratings. As such, we present a framework for sharing ratings of possibly unreliable sources, of value as users on the Semantic Web attempt to critique the trustworthiness of the information they seek.

1 Introduction

The vision of the Semantic Web is to construct a common semantic interpretation for World Wide Web pages, in order to one day reliably run software to understand the information conveyed in any of its documents. In building the Semantic Web, however, information may be supplied by a wide selection of sources, with the result that a user seeking information will need to judge whether the content of any given source is in fact trustworthy. It is therefore
important to develop models for trust in the context of the Semantic Web. Various approaches to date have been formulated about how best to form a Web of Trust, in order to share information and selectively choose trustworthy partners from whom information may be obtained. In our research, we are considering a problem that arises when social networks are formed in order to share trust ratings - that of unfair ratings. Dellarocas [2] distinguishes unfair ratings as unfairly high ratings and unfairly low ratings. Unfairly high ratings may be used to increase the trustworthiness of others and promote their services. They are often referred to as "ballot stuffing". Unfairly low ratings of others are often referred to as "bad-mouthing". In brief, the ratings of the trustworthiness of others, obtained from third parties, may in fact be suspect. What is required therefore is a mechanism for effectively adjusting the basis on which decisions of trust are made, to discount these possibly unfair ratings.

In this paper, we discuss our research in the context of sharing ratings of sources (called information providers) among users on the Semantic Web. We present an approach for modeling the trustworthiness of advisors - those users providing reputation ratings for potential providers from whom information may be obtained. We refer to the user seeking advice as the consumer. We first represent private reputation values, based on what is known about the advisors' ratings for providers with whom the consumer has already had some experience. We then describe how to construct a public model of trustworthiness of advisors based on common, centrally held knowledge of providers and the ratings provided by advisors, including the reputation ratings of providers totally unknown to the consumer. We then outline how both private and public models can be combined, in order to obtain a value for the trustworthiness of each possible advisor. In summary, we offer a method for building more effective social networks of trust, by critiquing the advice provided by advisors.

In Section 2 we introduce the Semantic Web setting for sharing information about sources, and present some current research on modeling the trustworthiness of information sources based on ratings provided by advisors. Section 3 presents our approach for modeling the trustworthiness of advisors according to the ratings provided by them in the context of the Semantic Web. Section 4 provides an example that goes through each step of our approach. Section 5 includes some experimental results demonstrating what happens when there are large numbers of advisors providing large numbers of unfair ratings. Conclusions and future work are outlined in Section 6.