A bilattice-based trust model for personalizing recommendations

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Collaboration, interaction and information sharing are some of the key concepts of the next generation of web applications known as 'Web 2.0' [2]. A recommender system (RS) [3] matches this description very well. Such a system is designed to suggest items (movies, articles, ...) to users who might be interested in them. One of the widely used approaches is collaborative filtering, a technique that attempts to identify similar users and recommends items that those users liked. In order to determine the necessary interconnections between these users (and between users of a social network in the broad sense), a collection of data mining techniques commonly referred to as social network analysis is applied.

Many online social networks consist of agents (humans or machines) connected by scores indicating how much they trust, or distrust, each other. Typically, such a trust network is sparse. Hence, a very important problem in trust networks is the determination of the scores of the agent pairs for which no explicit score is given. Trust propagation and aggregation operators can be used to solve this problem. Other applications in the context of social network analysis include e.g. to locate (un)trustworthy people in a network.

We explain how to alleviate key problems in RSs by establishing a trust network among its users. We propose a new model in which trust scores (i.e. couples consisting of a trust value and a distrust value) are derived from a bilattice [1] that preserves valuable trust provenance information including partial trust, partial distrust, ignorance and inconsistency. Being able to distinguish between those four concepts yields more accurate trust predictions, and consequently more and better recommendations. However, such an approach brings along some new difficulties as well. We focus on the trust score propagation problem and discuss possible ways to combine a recommendation from an unknown agent with the available trust scores, to obtain a personalized recommendation.

References

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