

# **PITTCULT: Recommender System using Trusted Human Network**

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As information on the Web continues to increase, available on more and more sites, it is increasingly important to be able to collect information in one place and filter out unnecessary information for users. PITTCULT is to share and recommend cultural event information in the Pittsburgh area. This system basically utilizes human psychology to conform to opinions of friends. When people go to a music concert or exhibition, they commonly ask their friends' opinions, and invite them to go along. Centered on this trusted human network, users can recommend items to their friends and rate their friends' taste about a certain genre of cultural events.

As a popular recommendation technology, collaborative filtering-based recommendation (CF) is designed to find like-minded peers and is known to recommend more diverse and serendipitous recommendations. It works well in a domain where contents are not easily comparable, like music, movies, jokes and cultural events (Schafer, et al., 2007). However, CF has a data sparsity problem. If the users' ratings are relatively fewer than the number of items, there will be too little overlap among users to make recommendation. In addition, there is cold-start problem for new users who have no or insufficient ratings (Massa & Avesani, 2007; Schafer, et al., 2007). Another problem of CF is created by ad-hoc users. Users possessing malicious intentions can harness others' ratings to make a profit or distort the system (Lam & Riedl, 2004). In addition, even a well-intentioned user may have such eccentric taste that the distributions of ratings are too different to find a peer group. To cope with these various problems, a recommender system based on trust is proposed.

O'Donovan and Smyth proposed a profile-item-based recommendation to take into consideration both the similarities among users and the trustworthiness of recommendation histories for CF. In the study using MovieLens data, a given user could be more reliable than others and a conclusively different peer group for a separate item could be chosen (O'Donovan & Smyth, 2005). Massa and Avesani also examined CF from a trust perspective. They expanded the existing CF technology by adding local trust metrics using MoleTrust. As experiment using trust values in Epinions.com, they concluded that local trust-based CF is more effective than a traditional CF in terms of recommendation quality and its ability to cope with both the data sparsity problem and cold-start problem (Massa & Avesani, 2007). However, these recommendation technologies were based solely on an accumulated user history from existing sites and an algorithm would need to be implemented in the real system.

The recommendation in PITTCULT is based on trust ratings among users. In the system, trust values can be measured in two ways. First, on a user's profile page, it is possible for other users to explicitly specify whether they trust or distrust the user for each event type. Secondly, users are able to send invitations for an interesting event to other users of PITTCULT. According to ratings that the recipient of

the invitations or recommendations defines, the system calculates how much the receiver implicitly trusts the sender.

Once a user defines one or more users' trust levels, PITTCULT generates recommendations. Every time a trustee saves an event as 'interesting' with her rating, a recommendation is made by the trustee's rating with weight calculation of the trust ratings. Because the recommendation is based on users' trust values, there is no chance that an ad-hoc user can copy others' profiles. In addition, CF based on trust reduces the cold-start problem because it can generate a recommendation even with only one rating by a single user (Massa & Avesani, 2007). In addition, PITTCULT has more detailed ratings than other trust-based recommender. With a finer level of trust ratings, the PITTCULT system can match the eccentric preferences of users.

In order to test how useful the system is and to collect user requirements, we conducted user study with 8 users. 7 of those users were graduate students, and one user was a school employee who organizes school events. The system was briefly explained to the users, after which they tried the system for a moment, then answered a questionnaire. The questions consisted of two parts – the usability of the current system and requirements for future implementation.

By using 5 likert scales (5 – very good, 1 – very bad), the evaluation found that the current interface for displaying events was good ( $M = 4.88$ ). The function for saving interesting events to their repository ( $M = 4.88$ ) and recommendation ( $M = 4.75$ ) were also adjudged to be good. All other evaluations, although scoring less well, still exceeded a rating of 'good' ( $M = 4.41$ ). For future implementation, users mostly wanted to have event reviews ( $M = 4.75$ ) and community support such as interest groups ( $M = 4.38$ ), along with receiving recommendations and event reminders by mail ( $M = 4.38$ ).

This paper discussed the problems of typical collaborative filtering system – data sparsity, ad-hoc users with malicious intentions, and eccentric user preferences. To cope with these problems, a state-of-the-art cultural event recommender was described, utilizing explicit and implicit trust ratings. When a user study was executed to evaluate the current state of the system and to collect user requirements, the overall evaluation was positive. In the future, along with review and community activities, personalized faceted navigation, context-based recommendations of like occasions, time or target audiences, and utilization of data from other social web-based systems will be studied.

## Reference

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