

# Impact of Users' Cultural Background on Multi-faceted Trust-based Recommender Systems

Noemi Mauro<sup>1,\*</sup>, Zhongli Filippo Hu<sup>1</sup>, Giovanna Petrone<sup>1</sup>, Marino Segnan<sup>1</sup> and Claudio Mattutino<sup>1</sup>

<sup>1</sup>Computer Science Department, University of Torino, Corso Svizzera, 185, 10149, Torino, Italy

## Abstract

Trust-based recommender systems usually overlook the cultural background of people when making suggestions. In this paper, we propose some strategies to include the home country of users in trust-based recommendation algorithms and we aim to understand if this information can improve the recommender system performance.

## Keywords

Multi-faceted Reputation Model, Trust-based Recommender Systems, Social Relations, Cultural Background of Users, Web searching and information discovery, Recommender systems

## 1. Introduction

Building on the theories of homophily [1] and social influence [2], which associate social links with user similarity, trust-based recommender systems leverage information about the trust between the members of a social network to face the cold start problem affecting recommender systems [3], especially the collaborative ones [4]. Trust can be inferred by exploiting different types of information, such as the occurrence of collaboration events that involve users [5] (such as bookmarking), the presence of friend relations in social networks [6, 7, 8], users' reputation [9], but also the expression of support to other statements, such as the setting of "like" or "useful" opinions on the reviews posted in the social network [10].

In [11, 12], the authors presented a family of multi-faceted trust-based recommender systems that employ different sources of public information about users' reputation, and trust between users, to improve collaborative filtering results. They proposed the Multi-faceted Trust Model to define trust among users in a compositional, configurable way. That model flexibly integrates social links with public anonymous feedback received by user profiles and user contributions in social networks. The offline experiments carried out in that work provided encouraging results, outperforming state-of-the-art trust-based, and collaborative recommender systems in accuracy, ranking of items, and error minimization both when it uses complete information about the trust

and when it ignores social relations. However, as that model overlooks the home country of the people providing trust evidence, it does not support the investigation of the possible impact of the origin of people on consumer feedback.

In [13, 14], the authors showed that cultural differences between the people who provide reviews about items (in that case, Eastern and Western social network members who rate restaurants) strongly impact the evaluation of items. Thus, there is not only an individual perspective on the evaluation of products and services but also a more general influence given by the origin of the people who experience items and rate them. In this perspective, we propose an analysis of trust in recommender systems that takes the home country of users into account for rating prediction. Our idea is that of using the information about the cities where people live as a proxy for their cultural background and validate the impact on the performance of a multi-faceted trust-based recommender system.

## 2. Proposal


For this type of analysis, we believe that it is important to focus on experience goods and services, rather than search goods (e.g., a washing machine) [15], whose selection might be less influenced by cultural backgrounds. The authors of [11, 12] used the Yelp dataset [16], filtered on the restaurants and hotel categories. As Yelp reports the city and the country of its members on their profiles, we will use that dataset as well. Our idea is to use this information in the following directions:

1. We plan to consider the home country of the people when computing the influence between users in the social network. Specifically, the strength of the link between two users could be computed by taking into account their similar interests and

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\*Corresponding author.

✉ noemi.mauro@unito.it (N. Mauro); zhonglifilippo.hu@unito.it (Z. F. Hu); giovanna.petrone@unito.it (G. Petrone); marino.segnan@unito.it (M. Segnan); claudio.mattutino@unito.it (C. Mattutino)

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- also their home country. For instance, if we aim at suggesting restaurants, two users coming from the same country have more chances to have similar tastes rather than two people coming from different continents.
2. We plan to extend the work described in [17] to compute the helpfulness of the reviews and use that information as evidence of trust. Indeed way of writing a review and consequently the review's helpfulness could be connected to the home country of the users. For example, Kim et al. [18] found out that customers are likely to perceive the reviews from users of the same country as more helpful, regardless of valence or the number of reviews. Therefore, the helpfulness of reviews is moderated by reviewers' and readers' cultural backgrounds. This suggests that differences in cultural background can be an element that affects the helpfulness of a review.
  3. We plan to jointly exploit the origin country of users, and the item aspects they care about, to improve the computation of users' similarity. We will extract item aspects from reviews and connect them to the home country of the users considering that people from a specific country could be more interested in some aspects than others. Our proposal is to build a user model that contains the aspects that users cite more frequently in their reviews to describe their priorities. Subsequently, when computing the similarity between users, we could give more weight to the aspects that are in common between users given their home country.
  4. We are interested in understanding to what extent the home country of users impacts other users' personality traits. Specifically, the home country of users could be connected to other traits such as the Need for Cognition [19] or the Curiosity trait [20] of users and this could impact the rating prediction of the recommender system.

We will investigate the above points by means of an experiment on an extended version of the Multi-faceted Trust Model developed in [12, 11].

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