ENHANCING RECOMMENDER SYSTEMS ACCURACY
BY USING USER-ITEMS LATENT FEATURES
SIMILARITY

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Abstract
Various researches and experiments in the field of sociology have time and again proved that humans tend to
associate and bond with people who are similar to them in some or the other aspects. This phenomenon is known as
homophily. In the field of sales and marketing particularly for Ecommerce stores, Recommender system algorithms
use this concept of homophily to predict the level of preference of a given item by a user based on the feedback on
that item by other users and also on past purchases by same users. It is enhancing the customer loyalty by
recommending him relevant products that he might not have actually looked across and hence increasing the cross-
selling of products.

Recommender system algorithms are commonly based on content filtering, collaborative filtering or hybrid
techniques. While the Content-based approaches make recommendations by considering the descriptions of the
items already purchased by the user or his learned profile, Collaborative filtering takes in to account the feedback
and reviews given by large numbers of users for various items and finds correlations / similarities among users.
Hybrid approach combines content and collaborative methods. The employed techniques for Collaborative filtering
includes probabilistic approaches, Bayesian networks, nearest neighbors algorithm; bio-inspired algorithms such
as neural networks and genetic algorithms; fuzzy models, singular value decomposition techniques to reduce
sparsity levels, etc. Memory-based Recommender system approaches the problem by using the entire database.
Every time a prediction needs to be made while Model-based recommendation systems build a model based on the
dataset of ratings. Thus after learning from dataset, the model is used to make recommendations without having to
use the complete dataset every time. By using Latent Factor model hidden features about the relationship between
user and items are learned. Singular Value Decomposition (SVD) transforms both items and users to the same latent
factor space, thus making them directly comparable.

In the proposed recommender system algorithm, we first use the cosine similarity to learn the latent elements that
describe the inherent structure of relationship between items and users. Then for prediction of ratings of an unrated
item by the active user we calculate similarity score between the user and unrated item, user and all other items
rated by active user, based on learned latent features. Now k nearest neighbors to the unrated items are scanned
based on calculated similarity score and their average is used to predict the rating for the unrated item.

This novel method of prediction using user-item similarity based on learned latent features is in contrast with
existing popular method of user-user similarity or, item-item similarity, and it shows significant gains as measured
by various standard accuracy measures for recommender system algorithms as tested on MovieLens dataset (ml-
100k).

Keywords: Personalization, latent factor models, recommender system, collaborative filtering, singular value
decomposition, data mining, E-commerce,