

# Introduction to Social Recommendation

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## ABSTRACT

As the exponential growth of information generated on the World Wide Web, Social Recommendation has emerged as one of the hot research topics recently. Social Recommendation forms a specific type of information filtering technique that attempts to suggest information (blogs, news, music, travel plans, web pages, images, tags, etc.) that are likely to interest the users. Social Recommendation involves the investigation of collective intelligence by using computational techniques such as machine learning, data mining, natural language processing, etc. on social behavior data collected from blogs, wikis, recommender systems, question & answer communities, query logs, tags, etc. from areas such as social networks, social search, social media, social bookmarks, social news, social knowledge sharing, and social games. In this tutorial, we will introduce Social Recommendation and elaborate on how the various characteristics and aspects are involved in the social platforms for collective intelligence. Moreover, we will discuss the challenging issues involved in Social Recommendation in the context of theory and models of social networks, methods to improve recommender systems using social contextual information, ways to deal with partial and incomplete information in the social context, scalability and algorithmic issues with social computational techniques.

## Categories and Subject Descriptors

H.3.3 [Information Search and Retrieval]: Information filtering; J.4 [Computer Applications]: Social and Behavioral Sciences

## General Terms

Algorithms, Experimentation

## Keywords

Social Recommendation, Collective Intelligence, Collaborative Filtering, Social Network Model and Theories, Recommender Systems

## 1. AIMS/LEARNING OBJECTIVES

This tutorial aims to present the current state of research in the emerging field of Social Recommendation. After the

completion of the tutorial, the expected learning outcomes are:

1. The audience will have an introduction and overview of what is and defines the emerging topic of Social Recommendation,
2. The audience will learn and be able to understand some current research work as well as industry practices using computational intelligence techniques in social recommendation, e.g., machine learning for social recommender systems, question & answer analysis, and social network analysis, etc.
3. The audience will come to grasp and appreciate the emerging topic of Social Recommendation and be able to incorporate some aspects of what has been learned into their own work.

## 2. SCOPE

The topics included in this tutorial are (but not limited to):

- *Social Recommender Systems*
  - How to understand the social trust and distrust relations in social recommender systems.
  - How to use social signals (including social tags) to improve recommender systems
  - Machine learning techniques for efficient and effective recommendation, e.g., matrix factorization
- *Community Question and Answer*
  - Theory, models, and analysis
  - Question search and recommendation
  - High quality content recommendation
- *Social Network Analysis*
  - How can social friend (different with social trust and distrust) information improve recommender systems
  - Large graph mining theories and models to identify the most influential individuals in social networks
- *Query Log Analysis*

- Personalized web site recommendation by employing collaborative filtering algorithms
- Query intent prediction

in the context of

- *social networks*, e.g., Facebook, Myspace, etc.,
- *social search*, e.g., Google
- *social recommendation*, e.g., Strands, Epinions
- *social media*, e.g., flickr, YouTube, etc.,
- *social news*, e.g., digg, foxytunes, etc.,
- *social knowledge sharing*, e.g., Yahoo! answer, wikipedia, etc.,

## 2.1 Relevance to WWW2010 attendees

The topic of Social Recommendation is timely for the WWW2010 as the topic has emerged in the past few years to highlight the trends and the future of the web development and growth in the context of social behavior and cultural development. As Web 2.0 technologies generate new social patterns and transformative ways to communicate, ways to model, theorize, collect, mine, compute, and understand this novel social phenomenon will be crucial in a step to expand our understanding and knowledge of the Web.

## 2.2 Pre-requisites knowledge of audience

The tutorial will give an overview of Social Recommendation. This will be general knowledge and will not require any specific technical expertise. The tutorial will then move into more specific topics such as collaborative filtering, opinion mining, social network analysis, etc. These topics will require more technical knowledge such as machine learning techniques, probability theory, linear algebra, etc. However, the level will be aimed at college junior/senior level and should be easily followed for academic researchers and practitioners in the industry.

## 2.3 Full description

With the emergence of Web 2.0, social networks have become an integral and important part of our changing social cultural. With the novel transformative ways to connect, collaborate, and create communities on the Web, the phenomenon of cyber social behaviors have emerged that intrigue researchers and practitioners alike. Currently, we have voluminous data collected from web sites, blogs, wikis, query logs, tags, etc. from areas such as social networks, social search, social media, social bookmarks, social news, social knowledge sharing, and human computation games. These data provide a wealth of information available for us to process, analyze, and mine.

Social Recommendation involves the investigation of collective intelligence by using computational techniques such as machine learning, data mining, natural language processing, etc. The key characteristic of Social Recommendation that is different from other challenging problems is the availability of (1) relevant personalized information and (2) the social network, i.e., relational information, among the users. Without these two sources of information, many applications can simply use existing theories, models, algorithms, and applications for processing the information. However, social

recommendation is about how to use these two rich sources of social information to effectively and efficiently compute interesting results.

There are several important components in the investigation of social recommendation.

1. First, a better formal theory and model about cyber social interactions would be important so that future social interactions and phenomenon can be estimated and/or predicted.
2. Second, better algorithms to mine existing spatial (relational) and temporal (time varying) data with efficiency would be needed. In particular, ways to deal with partial information and incomplete information in systems such as recommender systems, tagging systems, etc. will be important to ensure the computed results are appropriately accurate and adequate.
3. Third, some may examine these algorithmic issues from the scalability view point. Since social networks may involve with complex individual and community relationships, algorithms for computing any functional results must be efficient and scalable to cater to an ever increasing Web.
4. Fourth, security and privacy issues are of grave concern on the Web, especially in social networks. Theories and algorithms to protect important personal information are important when relations are easily created and difficult to eliminate. Moreover, ways to sanitize data for research have also attracted much attention lately due to the importance of conducting social recommendation research work.
5. Lastly, one interesting and hotly discussed issue is the monetization of social interaction or recommendation. Here, the matter turns to finding ways for making financial gains from social recommendation. Although this may be interesting, we plan not to discuss this topic in depth.

The tutorial will conclude by summarizing and reflecting back on the cyber social behavior trends that we are observing on the Web and posit that what we have presented in the tutorial is just a tip of the iceberg to a whole area of exciting and dynamic research that is worthy of more detailed investigation for many years to come.