Online social networks and recommender systems have become an effective channel for influencing millions of users by facilitating exchange and spread of information. This dissertation addresses multiple challenges that are faced by online social recommender systems such as: i) finding the extent of information spread; ii) predicting the rating of a product; and iii) detecting malicious profiles. Most of the research in this area do not capture the social interactions and rely on empirical or statistical approaches without considering the temporal aspects. We capture the temporal spread of information using a probabilistic model and use non-linear differential equations to model the diffusion process. To predict the rating of a product, we propose a social trust model and use the matrix factorization method to estimate user’s taste by incorporating user-item rating matrix. The effect of tastes of friends of a user is captured using a trust model which is based on similarities between users and their centralities. Similarity is modeled using Vector Space Similarity and Pearson Correlation Coefficient algorithms, whereas degree, eigenvector, Katz, and PageRank are used to model centrality. As rating of a product has tremendous influence on its saleability, social recommender systems are vulnerable to profile injection attacks that affect user’s opinion towards favorable or unfavorable recommendations for a product. We propose a classification approach for detecting attackers based on attributes that provide the likelihood of a user profile of that of an attacker. To evaluate the performance, we inject push and nuke attacks, and use precision and recall to identify the attackers. All proposed models have been validated using datasets from Facebook, Epinions, and Digg. Results exhibit that the proposed models are able to better predict the information spread, rating of a product, and identify malicious user profiles with high accuracy and low false positives.

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The public is welcome to attend.