

User's Satisfaction Modelling in Personalized Recommendations

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Thanks to the huge information increase in the last years, the domain of personalized recommenders became intensively studied area. Two basic approaches for the personalized recommendation have been proposed in the literature. The collaborative filtering approach uses the similar users to predict ratings for the unrated items. On the contrary the content based recommendation uses the content similarity to predict these ratings. These two approaches are often mixed in order to bring better results and to minimize shortcomings of each approach (e.g. cold-start, sparse ratings).

One of the proposed enhancements to the recommenders' approaches is considering of the user's context. In this case the final predicted rating is not based only on the user and the item, but his/her context is considered additionally.

In the group recommenders (recommendations for the group of users) is well known the problem of the satisfaction modelling [1]. Users, which experience the content within the group, are influenced by the other users and thus the predicted rating can be dramatically influenced. For the user's satisfaction modelling, we propose a novel method, which considers user's context during the recommendation process and reacts to actual user's circumstances by adjusting the predicted ratings for items (Figure 1). Proposed approach is based on the assumption that actual user's ratings are influenced by the previous experienced content and actual user's situation. This computation reflects to the user's feelings intensity in the history and contributes to the actual predicted rating. Proposed satisfaction modelling consists of three steps:

1. Predict ratings for unrated items
2. Spread activation through user's item specific influence graph
3. Combine user's ratings history and result of influence graph

For every user and the every predicted item's rating is the influence graph constructed. In this graph the vertexes represent the user's context (e.g. mood, day type), predicted item rating and edges models the context influence (based on the assumption that the

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context can be strengthen by other context). Next the spreading activation is applied, which results to the adjusted rating based the actual context. As the graph consists of the context and item the performance decrease (comparing to standard approach) is minimal. Proposed approach considers the user's rating history as well, while the previous ratings are combined with the adjusted rating from spreading activation. This is done by weighting the history ratings and combine in the ration 1:2 with the adjusted rating. In this manner we are able to adapt to various user's contexts and domains.

Our statistically significant results support our hypothesis, that proposed approach outperforms standard prediction (average difference MAE-0,28, RMSE-0,30), and with incorporating to the recommender system it brings the recommendation improvement.

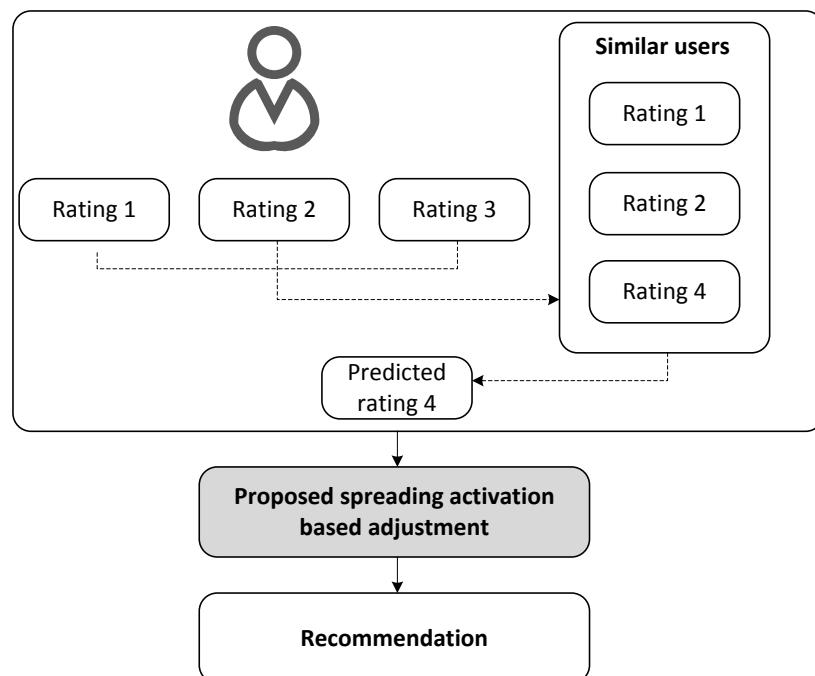


Figure 1. Collaborative recommendation process, enhanced by proposed satisfaction modelling (gray box).

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References

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