

Zhen-ming Yuan, Chi Huang, Xiao-yan Sun, Xing-xing Li, Dong-rong Xu, 2015. A microblog recommendation algorithm based on social tagging and a temporal interest evolution model. *Frontiers of Information Technology & Electronic Engineering*, **16**(7):532-540. [doi:10.1631/FITEE.1400368]

# A microblog recommendation algorithm based on social tagging and a temporal interest evolution model

**Key words:** Recommender system, Collaborative filtering, Social tagging, Interest evolution model

Contact: Zhen-ming Yuan

E-mail: [zmyuan@hznu.edu.cn](mailto:zmyuan@hznu.edu.cn)

 ORCID: <http://orcid.org/0000-0002-7255-2010>

# Introduction

- Personalized microblog recommendations face challenges of user cold-start problems and the interest evolution of topics.
- In this paper, we propose a collaborative filtering recommendation algorithm based on a temporal interest evolution model and social tag prediction.
- Four stages of our CF recommendation algorithm include model preparation, tag optimization based on the interest evolution model, social tag prediction, and microblog recommendation.

# Four stages of CF recommendation algorithm

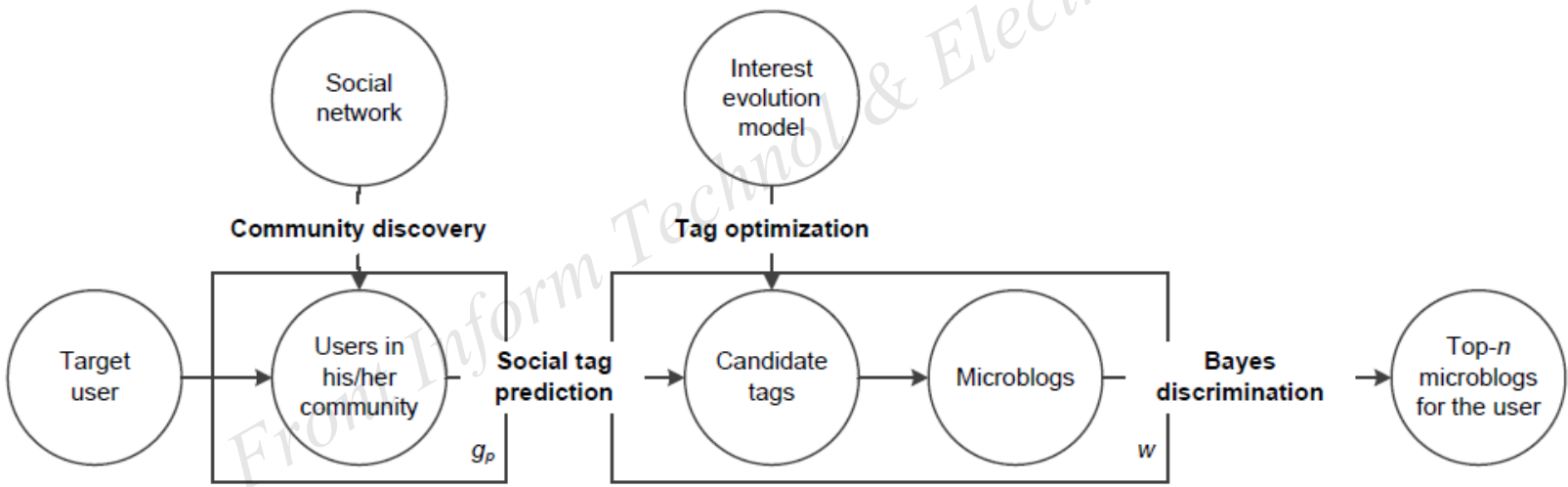


Fig. 1 An overview of our microblog recommendation algorithm (model preparation omitted)

The three-mode tensor is then factorized into three 2D matrices, which represent the pairwise relationships between the users, tags, and microblogs.

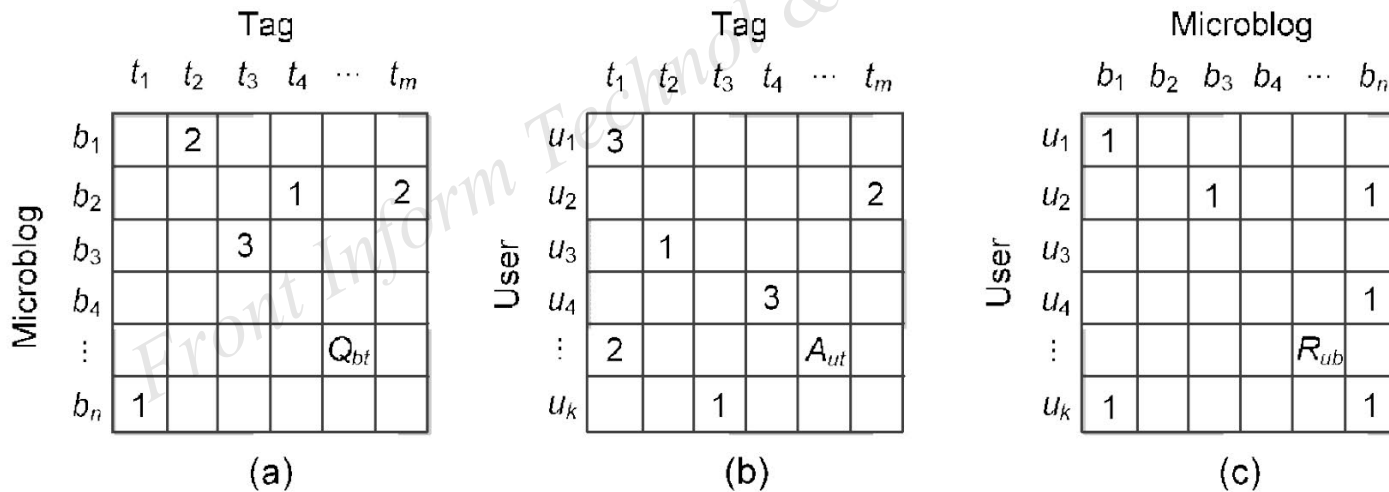


Fig. 2 The microblog-tag matrix  $Q$  (a), user-tag matrix  $A$  (b), and user-microblog matrix  $R$  (c)

# Experiment 1: overall accuracy of recommendation

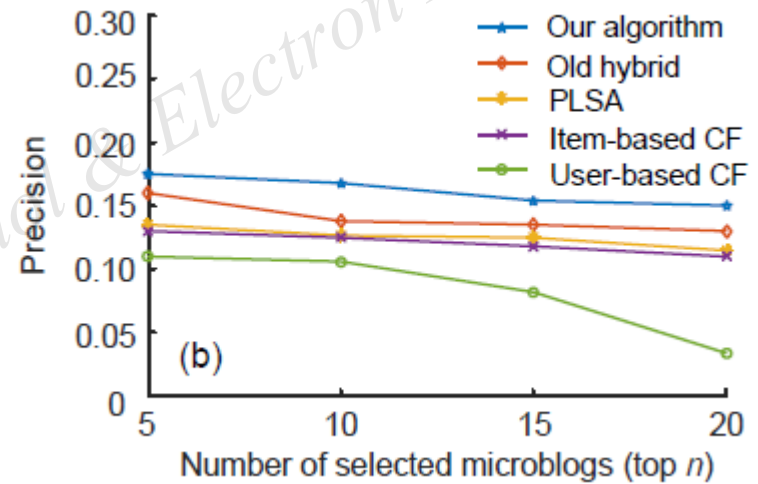
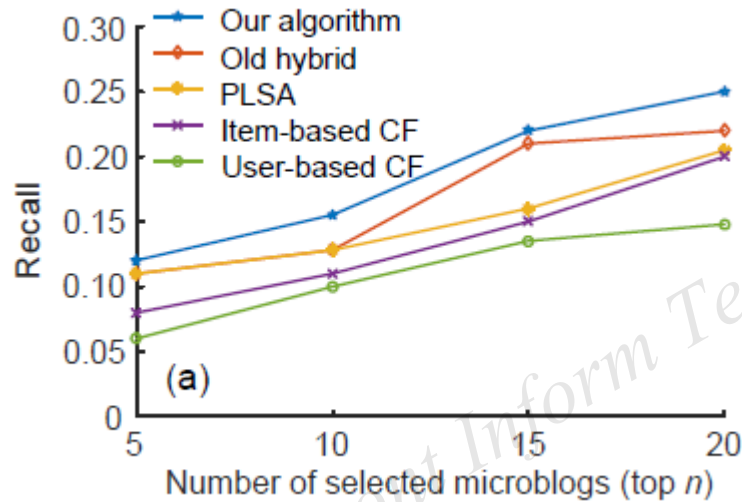


Fig. 5 Recalls (a) and precisions (b) with varying numbers of selected microblogs (top  $n$ ) under different algorithms

# Experiment 2: temporal accuracy of recommendation

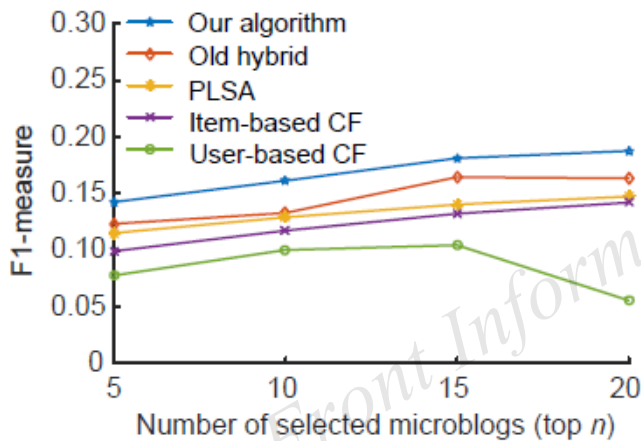


Fig. 6 F1 measures with varying numbers of selected microblogs (top  $n$ ) under different algorithms

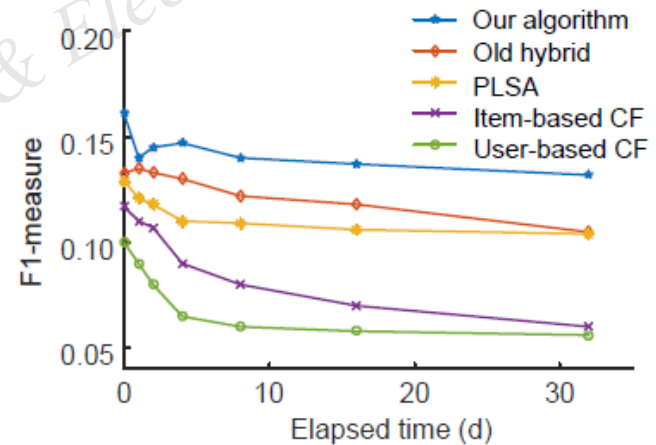
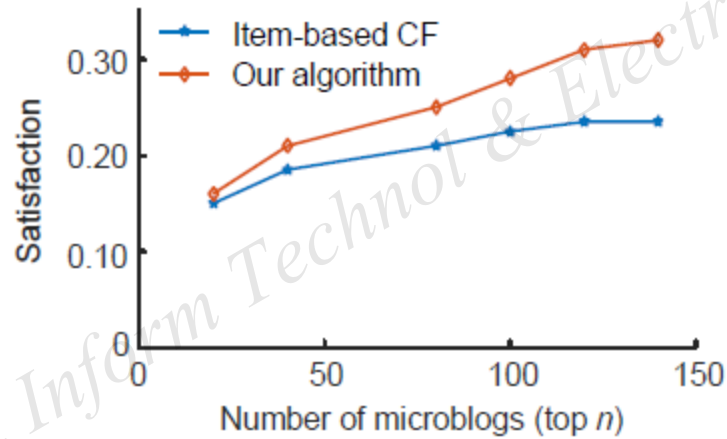


Fig. 7 F1 measures with varying elapsed time under different algorithms

# Experiment 3: cold-start recommendation



**Fig. 8** Satisfaction rates of item-based CF algorithm and our algorithm

# Conclusions

- We have proposed a CF recommendation algorithm based on a temporal interest evolution model and social tag prediction. The interest evolution model was used to optimize the scores of tags for each microblog. Community discovery and maximization of social tag voting were implemented to predict the tag candidates for a target user. The joint probabilities of microblogs for users were computed with the help of these tag candidates.
- Experiments using datasets from the microblog of Sina Weibo showed that our algorithm achieved good recall and precision in terms of both overall and temporal performances. A questionnaire survey proved user satisfaction with recommendation results when the cold-start problem occurred.