

Informational Friend Recommendation in Social Media

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1. BACKGROUND

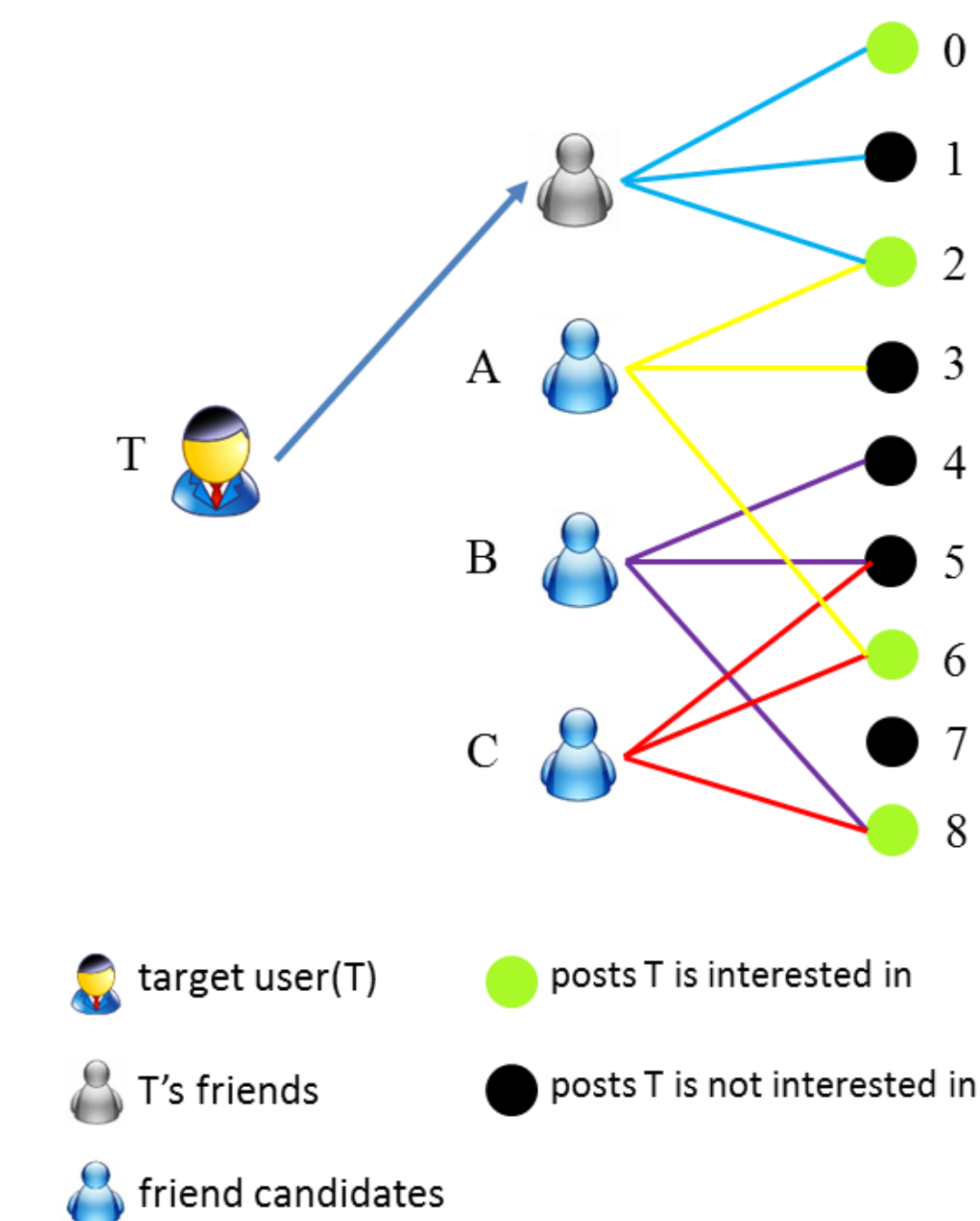
- Users rely on social media to fulfill two common needs



- Friend recommendation is a key approach to help people to fulfill the two needs
- Current friend recommendation methods are mainly based on structure information and content similarity, they **do not explicitly explore a user's unfulfilled informational need**

2. PROBLEM DEFINITION

- Informational friend recommendation:** recommend friends who can fulfill the target user's unfulfilled informational need in future



- a user's unfulfilled informational need: the posts a user may be interested in but which are unable to be obtained so far (post 6, 8)
- $C \not\preceq B$: C is more efficient than B
- $C \not\preceq A$: C is less redundant than A



3. OUR APPROACH

1 Explore a user's unfulfilled informational need

Collaborative filtering techniques are commonly used in recommendation systems to explore users' potential interests

KNN
SVD, SVD++
Rank-SVD, Rank-SVD++

2 Rank friend candidates by informational utility

informational utility

$$\mathcal{IU}_u(u') = \frac{\sum_{i \in I_{need}(u) \cap I_{pub}(u')} \text{weight}(i)}{|I_{pub}(u')| + C}$$

$I_{need}(u)$: user u 's unfulfilled informational need
 $I_{pub}(u)$: the posts published by user u
 $\text{weight}(i)$: the weight of post i which decays with the rank position in item list obtained by CF
 C : smooth factor

informational utility with diversity

the users in a recommendation list should cover as many different aspects of informational need as possible

- modified informational utility:
$$\mathcal{IU}_u(u') = \frac{\sum_{i \in I_{need}(u) \cap I_{pub}(u')} \text{weight}(i) \alpha^{ct(i)}}{|I_{pub}(u')| + C}$$

 $ct(i)$: the time of post i being covered by current selected users
- greedy selection

weight decay

4. EXPERIMENTAL RESULTS

- Experiment setup

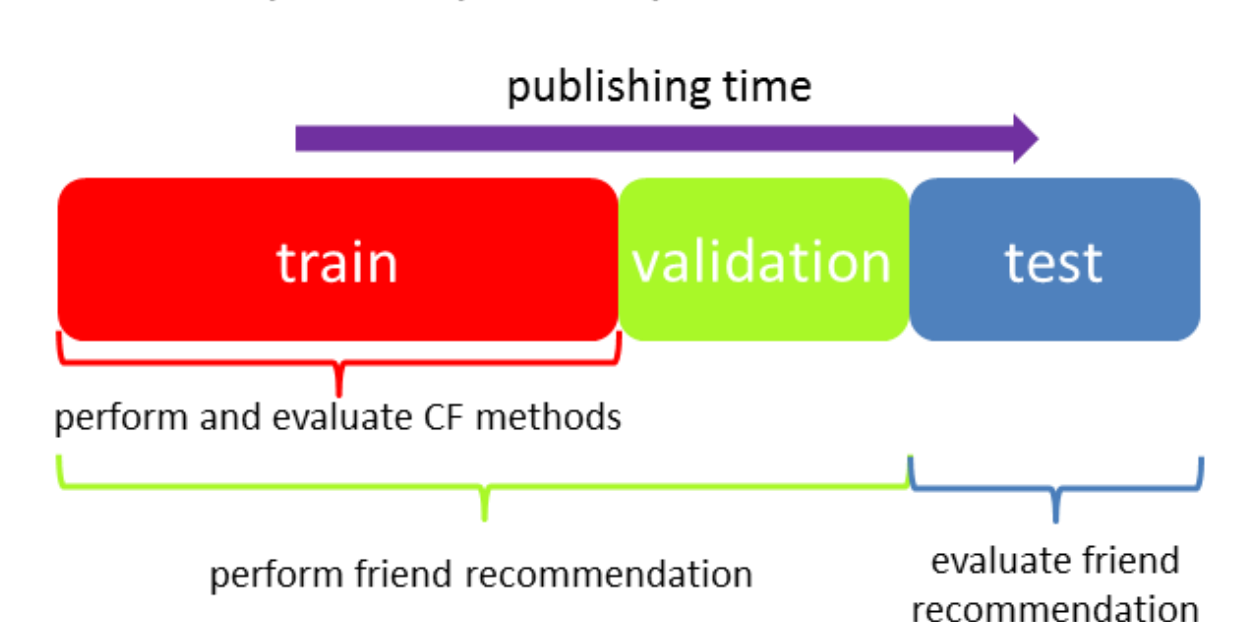
Digg dataset

Posts	3,553
Votes	3,018,197
Users	139,409
Links	1,731,658

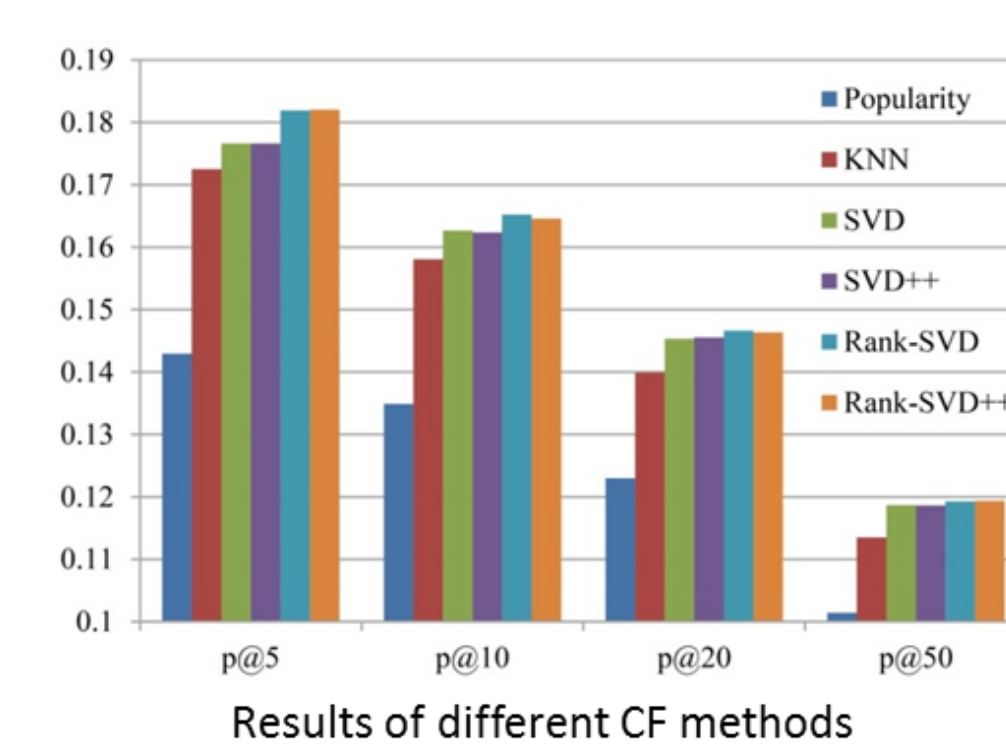
Evaluation measure for friend recommendation

$$EIG@k = \frac{1}{k} \sum_{i=1}^k \frac{|I_{need}(u) \cap I_{pub}(u_i)|}{|I_{pub}(u_i)|}$$

Separate posts by time



- Results of CF methods



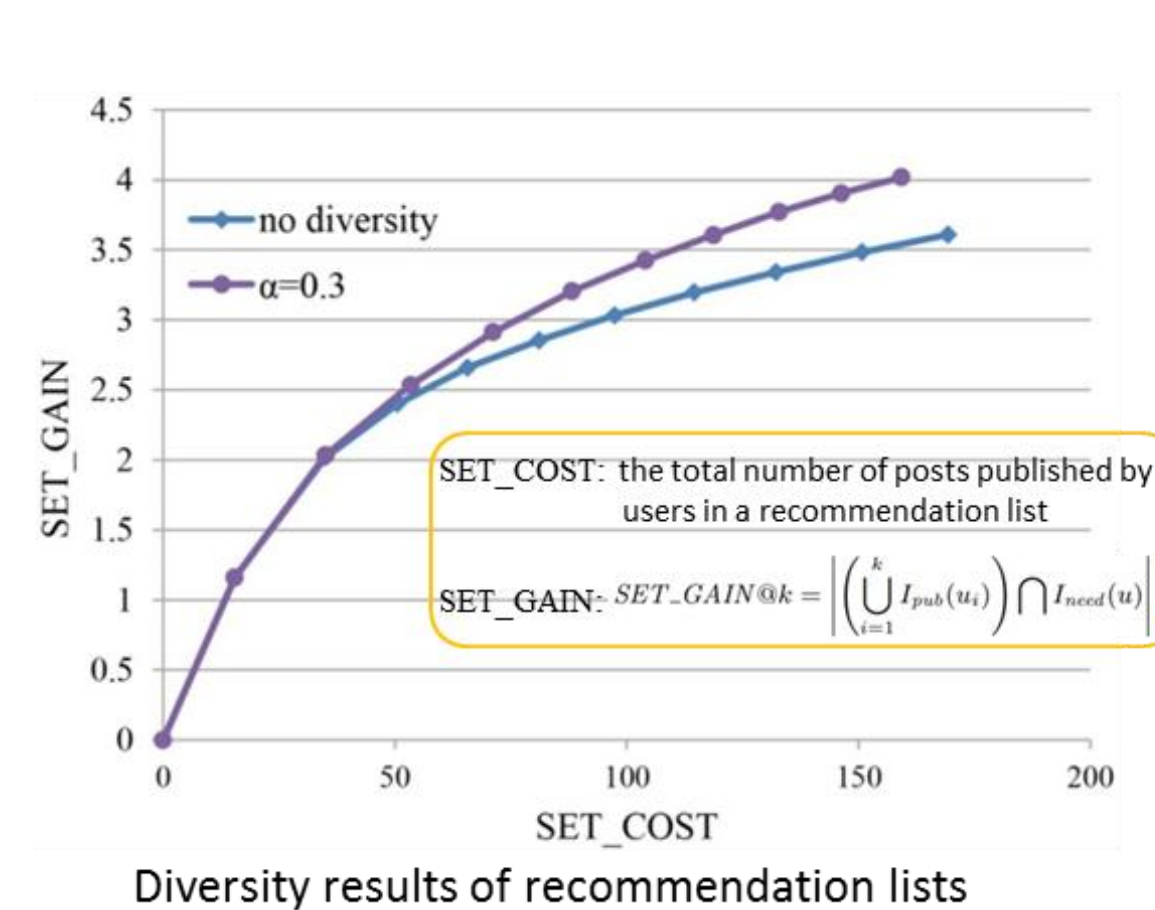
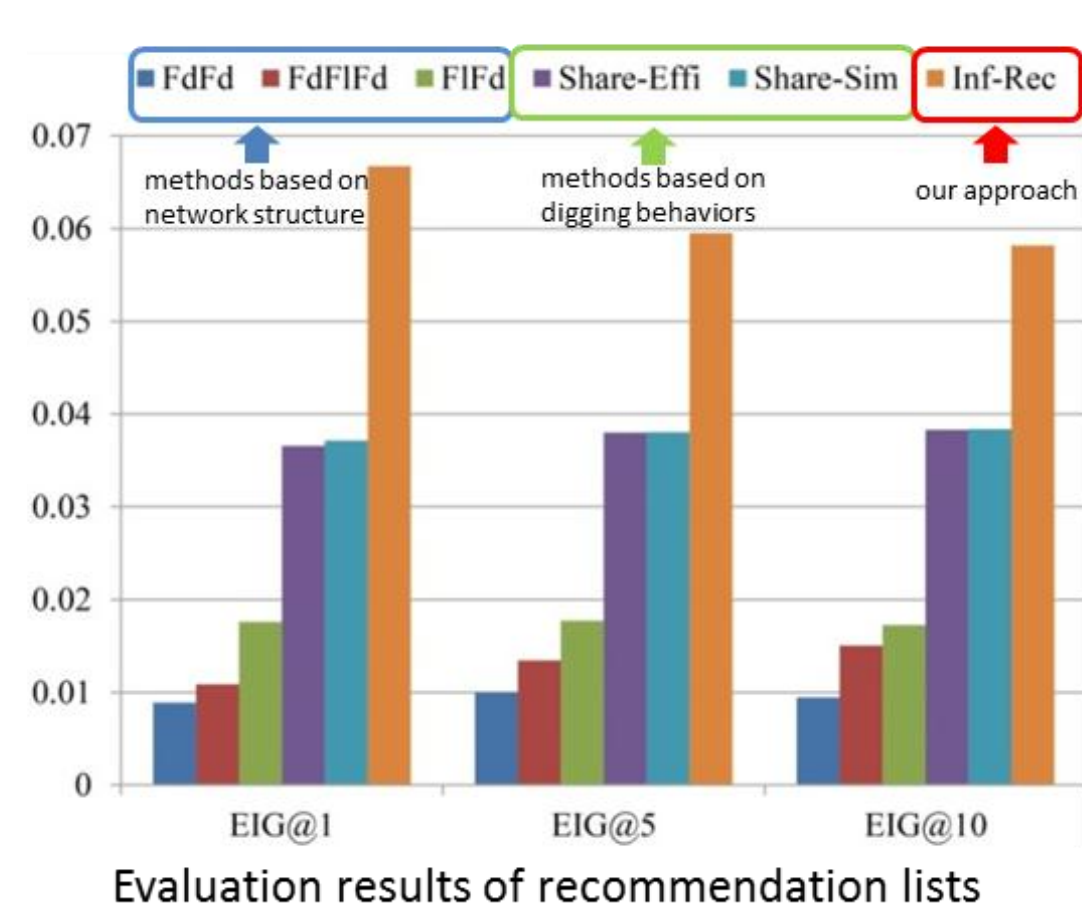
model based CF methods work better than neighborhood-based CF methods

the methods based on ranking loss are better than regression loss

we use the result of Rank-SVD in next experiments

5. EXPERIMENTAL RESULTS

- Results of recommendation lists



both methods based on network structure and user digging behaviors cannot properly address a user's unfulfilled informational need

our method fully explores a user's informational need and thus achieves better performance

by further introducing the weight decay factor, we can achieve better performance in terms of diversity

6. CONCLUSIONS

main contributions

- Propose to conduct friend recommendation according to a user's informational need
- Utilize CF to capture a user's unfulfilled informational need and propose two ranking strategies according to informational utility
- Experiments show that our method significantly outperforms the current state-of-the-art friend recommendation methods

future work

- Investigate how to conduct informational friend recommendation with a unified approach