Cross-Site Prediction on Social Influence for Cold-Start Users in Online Social Networks

Qingyuan Gong$^{1,2}$, Yang Chen$^{1,2}$, Xinlei He$^{1,2}$, Yu Xiao$^3$, Pan Hui$^{4,5}$, Xin Wang$^{1,2}$, Xiaoming Fu$^6$

$^1$School of Computer Science, Fudan University, China
$^2$Shanghai Key Lab of Intelligent Information Processing, Fudan University, China
$^3$Department of Communications and Networking, Aalto University, Finland
$^4$Department of Computer Science, University of Helsinki, Finland
$^5$CSE Department, Hong Kong University of Science and Technology, Hong Kong
$^6$Institute of Computer Science, University of Göttingen, Germany

\{gongqingyuan, chenyang, xlhe17, xinw\}@fudan.edu.cn
yu.xiao@aalto.fi, panhui@cse.ust.hk, fu@cs.uni-goettingen.de

ABSTRACT
Online social networks (OSNs) have become a commodity in our daily life. As an important concept in sociology and viral marketing, the study of social influence has received a lot of attentions in academia. Most of the existing proposals work well on dominant OSNs, such as Twitter, since these sites are mature and many users have generated a large amount of data for the calculation of social influence. Unfortunately, cold-start users on emerging OSNs generate much less activity data, which makes it challenging to identify potential influential users among them. In this work, we propose a practical solution to predict whether a cold-start user will become an influential user on an emerging OSN, by opportunistically leveraging the user’s information on dominant OSNs. A supervised machine learning-based approach is adopted, transferring the knowledge of both the descriptive information and dynamic activities on dominant OSNs to emerging OSNs. Descriptive features are extracted from the public data on a user’s homepage. In particular, to extract useful information from the fine-grained dynamic activities which cannot be represented by the statistical indices, we use deep learning technologies to deal with the sequential activity data. Using the real data of millions of users collected from Twitter (a dominant OSN) and Medium (an emerging OSN), we evaluate the performance of our proposed framework to predict prospective influential users. Our system achieves a high prediction performance based on different social influence definitions.

CCS CONCEPTS
- Information systems → Social networks.

KEYWORDS
Social Influence, Cold-Start Users, Cross-Site Linking

Permission to make digital or hard copies of part or all of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for third-party components of this work must be honored. For all other uses, contact the owner/author(s).

WWW ’22 Companion, April 25–29, 2022, Virtual Event, Lyon, France.
© 2022 Copyright held by the owner/author(s).
https://doi.org/10.1145/3487553.3524187