

Recommendation Technologies for Multimedia Content

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ABSTRACT

This article presents the proposal for a half-day tutorial at ACM ICMR 2018. Recommendation systems play a vital role in online information systems and are a major monetization tool for user-oriented platforms. In recent years, there has been increasing research interest in recommendation technologies in the information retrieval and data mining community, and significant progress has been made owing to the fast development of deep learning. However, in the multimedia community, there has been relatively less attention paid to the development of multimedia recommendation technologies.

In this tutorial, we summarize existing research efforts on multimedia recommendation. We first provide an overview on fundamental techniques and recent advances on personalized recommendation for general items. We then summarize existing developments on recommendation technologies for multimedia content. Lastly, we present insight into the challenges and future directions in this emerging and promising area.

CCS CONCEPTS

•Information systems →Multimedia information systems; Collaborative filtering; Information retrieval; Recommender systems;

KEYWORDS

Multimedia Recommendation, Multimedia Recommender Systems, Personalization, Deep Learning

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1 INTRODUCTION

Multimedia content is dominating the current Web. In popular social media platforms such as FaceBook, Twitter, and Instagram, there are over millions of multimedia items being created by users on a daily basis. As a byproduct, users are heavily overloaded by the rich content, and it is of great significance to recommend items

of interest to users to help them quickly sift through the massive and highly dynamic content.

To address the information overload issue, various recommendation techniques have been developed in the past decade. An effective recommendation system not only can help customers to find the items of interest more easily, but also can increase the traffic and profit for service providers. For example, the ad recommendation system is the major monetization tool for many user-oriented platforms, such as E-commerce and social media websites [6].

In the literature, collaborative filtering is the most popular technique for personalized recommendation [10, 18]. Specifically, most recommendation papers have been focused on the general domain of movies and E-commerce products by leveraging user behaviors only. Since these methods largely ignore the information of the item side, they would be suboptimal for recommending multimedia items, which have rich content information by nature.

Providing quality recommendation service for multimedia content is much more challenging, due to the difficulties in understanding the rich semantics of multimedia content. While traditional multimedia recommendation systems have primarily leveraged shallow features such as SIFT and color histograms [15], the fast developments of deep learning techniques in recent years provide new opportunities to improve multimedia recommendation systems [2, 7, 8, 12]. Furthermore, the revolution brought by deep learning on recommendation technologies [4, 9, 10] makes it possible to fuse deep recommendation models with deep multimedia content modeling, which can further improve the performance of multimedia recommendation [1, 3]. In this tutorial, we plan to summarize the research along this direction and to provide an impetus for further research on the important topic of multimedia recommendation.

2 TUTORIAL OUTLINE

The outline of the proposed tutorial is as follows.

- (1) Motivation of the recommendation task (10 mins).
- (2) Basics and fundamental technologies for personalized recommendation (50 mins).
- (3) Multimedia recommendation systems (80 mins).
- (4) Discussions and future directions (10 mins).

The tutorial slides will be shared online before the tutorial day.

3 RELATED TUTORIALS

Several wonderful tutorials were given at related conferences, including but are not limited to:

- Mei et al. Internet Multimedia Advertising: Techniques and Technologies. MM 2011 [11].
- Shen et al. Multimedia Recommendation. MM 2012 [15].
- Shen et al. Multimedia Recommendation: Technology and

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Techniques. SIGIR 2013 [16].

- Shen et al. Towards Next Generation Multimedia Recommendation Systems. [14].
- Yu et al. Emerging Topics on Personalized and Localized Multimedia Information Systems. MM 2014 [17].
- Cui et al. Social Multimedia Computing. MM 2014 [5].
- Sang et al. User-centric Cross-OSN Multimedia Computing. MM 2015 [13].

This tutorial is significantly different from the previous tutorials in the sense that 1) it focuses on recommendation technologies for multimedia items, and 2) it provides state-of-the-art review on multimedia recommendation systems.

4 TUTORS' BIOGRAPHY

Dr. Xiangnan He is a senior research fellow with School of Computing, National University of Singapore (NUS). He received his Ph.D. in Computer Science from NUS. His research interests span recommender systems, information retrieval, and multi-media processing. He has over 30 publications appeared in several top conferences such as SIGIR, WWW, MM, CIKM, and IJCAI, and journals including TKDE, TOIS, and TMM. His work on recommender systems has received the Best Paper Award Honorable Mention of ACM SIGIR 2016. Moreover, he has served as the PC member for the prestigious conferences including SIGIR, WWW, MM, KDD, WSDM, CIKM, IJCAI, AAAI, and ACL, and the regular reviewer for prestigious journals including TKDE, TOIS, TKDD, TMM etc.

Dr. Hanwang Zhang is an Assistant Professor at Nanyang Technological University, Singapore. He was a research scientist at the Department of Computer Science, Columbia University, USA and a senior research fellow at the School of Computing, National University of Singapore, Singapore. He has received the B.Eng (Hons.) degree in computer science from Zhejiang University, Hangzhou, China, in 2009, and the Ph.D. degree in computer science from the National University of Singapore in 2014. His research interest includes computer vision, multimedia, and social media. Dr. Zhang is the recipient of the Best Demo runner-up award in ACM MM 2012, the Best Student Paper award in ACM MM 2013, and the Best Paper Honorable Mention in ACM SIGIR 2016. He is also the winner of Best Ph.D. Thesis Award of School of Computing, National University of Singapore, 2014.

Dr. Tat-Seng Chua is the KITHCT Chair Professor at the School of Computing, National University of Singapore. He holds a PhD from the University of Leeds, UK. He was the Acting and Founding Dean of the School from 1998-2000. Dr Chua's main research interest is in multimedia information retrieval and social media analytics. In particular, his research focuses on the extraction, retrieval and question-answering (QA) of text and rich media arising from the Web and multiple social networks. He is the co-Director of NExT, a joint Center between NUS and Tsinghua University to develop technologies for live social media search. Dr Chua is the 2015 winner of the prestigious ACM SIGMM award for Outstanding Technical Contributions to Multimedia Computing, Communications and Applications. He is the Chair of steering committee of ACM International Conference on Multimedia Retrieval (ICMR) and Multimedia Modeling (MMM) conference series. Dr Chua is also

the General Co-Chair of ACM Multimedia 2005, ACM CIVR (now ACM ICMR) 2005, ACM SIGIR 2008, and ACM Web Science 2015. He serves in the editorial boards of four international journals. Dr. Chua is the co-Founder of two technology startup companies in Singapore.

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