DAPA: The WSDM 2019 Workshop on Deep mAtching in Practical Applications

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ABSTRACT

Matching between two information objects is the core of many different information retrieval (IR) applications including Web search, question answering, and recommendation. Recently, deep learning methods have yielded immense success in speech recognition, computer vision, and natural language processing, significantly advancing state-of-the-art of these areas. In the IR community, deep learning has also attracted much attention, and researchers have proposed a large number of deep matching models to tackle the matching problem for different IR applications. Despite the fact that deep matching models have gained significant progress in these areas, there are still many challenges to be addressed when applying these models to real IR scenarios. In this workshop, we focus on the applicability of deep matching models to practical applications. We aim to discuss the issues of applying deep matching models to production systems, as well as to shed some light on the fundamental characteristics of different matching tasks in IR.

website: https://wsdm2019-dapa.github.io/index.html

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1 MOTIVATION FOR THE WORKSHOP AND APPROPRIATENESS TO WSDM

In recent years, deep learning has aroused great interest among researches in multiple computer science communities. Specifically, it has been successfully applied to many matching problems in Information Retrieval (IR), such as document retrieval[3], question answering[5], and product recommendation[6]. Models like DSSM [2], DRMM [1], and Duet [4] not only achieve state-of-the-art performance on multiple matching tasks, but also provide new insights for many core IR problems.

Despite the extensive studies on deep matching models, most existing research in this direction focuses on the design of model architectures in a laboratory environment, and the evaluation of offline performance based on standard datasets separated or sampled from real systems. How these deep matching models work in practice, especially on large-scale production traffic where data quality and cleanness are not guaranteed, remains mostly unknown. Example questions include but not limited to:

- How to efficiently apply a deep matching model to an existing matching system with respect to both time complexity and system complexity?
- How to learn a deep matching model from data with imbalanced or complicated distributions?
- How to train and evaluate a deep matching model with noisy or biased data?
- How to analyze the benefits and risk of a deep matching model in a specific matching application?
- How to understand the fundamental differences of different matching tasks, including document retrieval, query answering, and recommendation?

The answers to those questions may not only facilitate the implementation of deep matching model in practical applications, but also gain a better understanding of the underlying theory of deep matching models.

2 THEME AND PURPOSE OF THE WORKSHOP

DAPA 2019 will be a forum for discussion about the challenges in applying deep matching models in real IR scenarios as well as the theory behind the models and applications. Our purpose is to establish a bridge for communication between industrial researchers and academic researchers, and provide an opportunity for people to present new work and early results, and discuss the main challenges in designing and applying deep matching models in practice.

Specifically, as much of the progress in deep learning for matching is based on academic researchers, the DAPA 2019 workshop will be a gathering of industrial and academic researchers working on deep learning for IR to pursue two main themes:

- How to apply deep matching models in real Web applications both effectively and efficiently?
- How to understand the theoretical advantages or disadvantages of deep matching models in different matching tasks?

Specific issues that emerge here include but not limited to:

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(1) **Efficiency**: Improving the efficiency of online inference for the deep neural network based matching models in large-scale distributed IR systems.
(2) **Generalizability**: Understanding the generalizability of deep matching models, not only on public benchmark datasets, but also on real data traffic from real production systems.
(3) **Evaluation**: Evaluating deep matching models with complicated metrics and targets (e.g., correctness, time complexity, and space complexity) in practical applications.
(4) **Interpretability**: Interpreting the results of the deep matching models, as well as understanding the underlying mechanism in the models.
(5) **Connection**: Uncovering the connection between deep matching models and classical IR approaches, the effect of different network components, and the benefits or risk they bring to production systems.
(6) **Robustness**: Testing the robustness of deep matching models with respect to noise, bias, and imbalance distributions in data collected from practical applications.
(7) **Understanding**: Understanding the fundamental differences between different matching problems (e.g., query-document matching in search, question-answer matching in QA) as well as the change of model behavior when applying deep matching techniques on them.

These are only a few of the many research questions in applying deep matching models in practical applications and understanding the theoretical advantages. WSDM is uniquely positioned to host a workshop that would motivate interesting discussion and future work for deep matching in both practical use and theoretical research.

3 FORMAT AND PLANNED ACTIVITIES AND A TENTATIVE SCHEDULE OF EVENTS

DAPA will be a highly interactive half-day workshop, featuring a mix of presentation and interaction formats, appropriate for the two main themes identified in section 3.

DAPA will feature presentations of the following types:

(1) Invited keynotes (academic and industrial)
 - Maarten De Rijke (University of Amsterdam)
 - Hang Li (Bytedance Technology)
(2) Invited talks (academic and industrial)
 - Yan Rui (Peking University)
 - Yiwei Song (Amazon)
(3) Contributed paper presentations (as posters) and demos.
(4) Invited toolkit and dataset walkthroughs and descriptions.

WorkShop Schedule

- **09:00-09:10** Opening
- **09:10-09:55** Keynote speaker 1 (Maarten De Rijke)
- **09:55-10:25** Invited talk 1 (Rui Yan)
- **10:25-10:35** Coffee break & Poster session
- **09:35-11:20** Keynote speaker 2 (Hang Li)
- **11:20-11:50** Invited talk 2 (Yiwei Song)
- **11:50-12:00** Invited toolkit and dataset walkthroughs

4 LIST OF ORGANIZERS

Yixing Fan is an assistant professor at Institute of Computing Technology, Chinese Academy of Sciences. He joined ICT in 2012, and since then has worked on a number of problems related to document ranking, text matching, and text generation.

Qingyao Ai is a fifth year Ph.D student in College of Information and Computer Sciences, University of Massachusetts Amherst. His research mainly focuses on developing intelligent retrieval systems with machine learning techniques.

Zhaochun Ren is a senior research manager in the data science lab at JD.com. Prior to joining JD.com, Zhaochun was a research associate at University College London, working with Ingemar Cox. Zhaochun obtained his PhD from the University of Amsterdam, supervised by Maarten de Rijke. Zhaochun is interested in information retrieval, social media mining and content analysis in e-commerce.

LiangJie Hong is the Head of Data Science at Etsy Inc. He drives Machine Learning and Data Science vision at Etsy and delivers cuttingedge scientific solutions for Search & Discovery, Personalization & Recommendation and Computational Advertising by utilizing a wide range of technologies including deep learning, probabilistic modeling, image understanding (computer vision), user profiling, query understanding, text mining and others.

Dawei Yin is a senior Director of Research at JD.com. He is managing the recommendation engineering team, building the uni ed recommender system of JD.com, one of the largest online retailers in China. He also founded JD.com Data Science Lab, leading the science efforts for recommendation, search, metrics and knowledge graph, etc.

Jiafeng Guo is a professor at Institute of Computing Technology, Chinese Academy of Sciences. He has worked on a number of topics related to Web search and data mining, including query representation and understanding, learning to rank, and topic modeling. His current research is focused on representation learning and deep models for IR and information filtering.

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