

Report on the International Workshop on Natural Language Processing for Recommendations (NLP4REC 2020) Workshop held at WSDM 2020

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Abstract

This paper summarizes the outcomes of the International Workshop on Natural Language Processing for Recommendations (NLP4REC 2020), held in Houston, USA, on February 7, 2020, during WSDM 2020. The purpose of this workshop was to explore the potential research topics and industrial applications in leveraging natural language processing techniques to tackle the challenges in constructing more intelligent recommender systems. Specific topics included, but were not limited to knowledge-aware recommendation, explainable recommendation, conversational recommendation, and sequential recommendation.

1 Introduction

NLP4REC 2020 was a half-day workshop held at the 13th International Conference on Web Search and Data Mining (WSDM 2020). A major goal of the workshop was to stimulate discussions on the challenges and opportunities in employing natural language processing (NLP) techniques to address problems in recommender systems, such as lack of explainability and reproducibility, cold start issues, and privacy issues.

NLP4REC 2020 was held at WSDM 2020. WSDM (pronounced “wisdom”) is a conference that is focused on both academic and industrial research in the areas of search and data mining. It is one of the premier conferences for researchers who work on information retrieval. WSDM 2020 was held in Houston, Texas, from February 3–7, 2020.

The recommendation task, one of the major topics in WSDM, aims to retrieve the relevant information based on user-item interaction behaviors. Though it has been studied for decades, off-the-shelf recommendation frameworks are still far from meeting customer satisfaction in complex practical systems. As rich user-generated data is involved, recently, many efforts have been devoted to leveraging NLP technologies to improve the performance of recommender systems.

NLP4REC 2020 provided the opportunity for researchers and practitioners who are interested in exploring NLP for recommendations, to learn and communicate. Nineteen participants from different organizations and institutions attended the workshop. The specific topics discussed during the workshop include connections between NLP and recommender systems, knowledge-aware recommendation, explainable recommendation, conversational recommendation, sequential recommendation, reproducibility of recommendation frameworks, and future directions.

2 Workshop Theme and Topics

Previous similar workshops have focused on either recommender systems only or interdisciplinary research with a particular task of natural language processing. Examples include similar workshops that have been held on RecSys, SIGIR and WSDM, i.e., KaRS,¹ RECOVER,² EARS,³ and CARS-BDA.⁴ NLP4REC 2020 was a forum for discussions about the challenges in applying NLP technologies to real recommendation applications as well as the theories behind them.

The main theme was to establish a bridge for communication between industrial researchers and academic researchers, and provide an opportunity for people to exchange ideas, and discuss future directions.

The topics of interest were focused on the applications of NLP technologies in the following recommendation scenarios.

Knowledge-aware recommendation. The knowledge-aware recommendation has been shown to be an effective way to alleviate the cold start issue, which is a common one in most recommender systems due to the sparsity of user-item interactions. The idea is to incorporate free text or structured knowledge, e.g., user profiles, item profiles, knowledge graph, so as to minimize dependence on interaction data. In particular, recent studies that apply deep learning architectures on graph-structured data have achieved remarkable performance in many tasks, including recommender systems [Zhu et al., 2019, Chen et al., 2019].

Explainable recommendation. The explainable recommendation aims to improve transparency and persuasiveness of recommender systems by providing explanations to users or developers, which helps them to understand why certain items are recommended [Zhang and Chen, 2018]. Much progress has been made to improve recommendation explainability by paying atten-

¹<https://recsys.acm.org/recsys18/kars/>

²<https://recsys.acm.org/recsys18/recover/>

³<http://www.sigir.org/sigir2019/program/workshops/ears/>

⁴<http://wise-conferences.org/CARS-BDA/CARS-BDA.html>

tion to certain user/item attributes [Yang et al., 2019]. Recently, there have been some studies on generating natural language explanations [Lin et al., 2019].

Conversational recommendation. The conversational recommendation introduces the combination of both conversation and recommendation modeling. Instead of relying merely on previous user-item interaction behaviors to capture user interests precisely, conversational recommendation provides an alternative strategy by conducting conversations with the users directly [Sun and Zhang, 2018].

Sequential recommendation. The sequential recommendation is an effective paradigm to capture the dynamics of recommender systems by modeling user-item interactions as a sequence. Since it shares the sequential characteristics with natural languages, many NLP technologies or mechanisms have been successfully applied to model various scenarios in sequential recommendations [Ren et al., 2019, Ma et al., 2019, Sun et al., 2019].

3 Workshop Contributions

Focusing on the theme of incorporating NLP techniques into recommendations, NLP4REC consisted of four parts, including two keynotes, an invited talk, and a hands-on panel.

3.1 Keynotes

Conversation in Recommendation, Opportunities and Challenges – Jian-Yun Nie, University of Montreal, Canada

Most current approaches to recommendation operate as a black box without explicit user interactions. A new form of interactive recommendation – conversational recommendation – is emerging in both industry and academia. To perform recommendations, the system needs to interact with the user, through conversation, and determine the need of the user and make good choices. In this talk, Dr. Nie discussed what a conversational recommender can do beyond traditional systems, the possible approaches to be used, as well as the challenges.

Personalized Language Modeling, from Prediction to Generation and Justification – Julian McAuley, University of California San Diego, USA

Dr. McAuley gave a historical perspective on the use of NLP for recommendation, with a particular focus on personalized language generation. Examples included models for question answering, text and recipe generation, and interpretability. By personalizing these models, we are better able to adapt to both the preferences and the linguistic nuances of individuals.

3.2 Invited talk

Learning From Users Interactions – Julia Kiseleva, Microsoft Research AI, USA

Effective optimization is essential for interactive systems to provide a satisfactory user experience. However, it is often challenging to find an objective to optimize for. In general, such objectives could be manually crafted and rarely capture complex user needs accurately. Dr. Kiseleva discussed how to infer objectives directly from observed user interactions. Such inferences can be made regardless of prior knowledge and across different types of user behavior.

3.3 Panel on natural language processing for recommender systems

Panel Moderator:

- Xiao Huang, The Hong Kong Polytechnic University, China.

Panelists:

- Jian-Yun Nie, University of Montreal, Canada.
- Julian McAuley, University of California San Diego, USA.
- Julia Kiseleva, Microsoft Research AI, USA.

Following the three talks, the panel of NLP4REC involved intensive interactions between the audience and the three speakers. Several topics around NLP for recommendations were discussed, including the development, the challenges, the state-of-the-art progress, and the future directions. Three major questions as follows were explored.

- **Q1: Are we really making much progress with recent neural recommendation approaches?** The reproducibility of state-of-the-art deep recommendation frameworks has been discussed. We arrived at a consensus that open source should be encouraged.
- **Q2: What progress has been made towards NLP4REC?** Many techniques in NLP have been employed in recommender systems. We discussed several ones, including machine translation, dialogue and interactive systems, generation, question answering, sentiment analysis, and argument mining.
- **Q3: What are the future directions and challenges on NLP4REC?** Many promising recommendation problems are attracting increasing attention, including explainable recommendation, conversational recommendation, personalized recommendation, sequential recommendation, and knowledge-aware recommendation.

4 Conclusion

The international workshop on natural language processing for recommendations has brought together researchers from both NLP and recommendation perspectives. It has explored four important research topics: knowledge-aware recommendation, explainable recommendation, conversational recommendation, and sequential recommendation. The workshop was divided into four parts, including two keynotes, an invited talk, and an interactive panel discussion. Three senior researchers were invited to present their research on conversational recommendation, personalized language modeling, and learning from user interactions, respectively. Following the three talks, a panel discussion was organized around several NLP for recommendation topics. We hope that the lectures and panel discussions at the workshop to inspire future research on this field. We also plan to continue the discussions about NLP4REC at venues like WSDM 2021 or The Web Conference 2021.

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