The 1st Workshop on User Modelling in Conversational Information Retrieval (UM-CIR)

Praveen Acharya
praveen.acharya2@mail.dcu.ie
Dublin City University
Dublin, Ireland

Gareth J.F. Jones
gareth.jones@dcu.ie
Dublin City University
Dublin, Ireland

Xiao Fu
xiao.fu.20@ucl.ac.uk
University College London
London, UK

Aldo Lipani
aldo.lipani@ucl.ac.uk
University College London
London, UK

Fabio Crestani
fabio.crestani@usi.ch
Universitá della Svizzera Italiana
Lugano, Switzerland

Noriko Kando
kando@nii.ac.jp
National Institute of Informatics
Tokyo, Japan

ABSTRACT

Conversational Information Retrieval (CIR) has attracted growing research interest in recent years, particularly since the emergence of conversational agents that leverage generative AI methods. Within the information retrieval community, a substantial body of research has emerged, particularly centred around initiatives such as the TREC CAsT and iKAT tracks. These tracks have been instrumental in providing datasets that facilitate research in CIR and enable a comparative analysis of various approaches to conversational search. Most of the existing efforts within these tracks have concentrated on the interactive dialogue between the searcher and the CIR system. The task has generally overlooked the potential contribution of User modelling for effective CIR. Recognizing the importance of this dimension, the goal of the workshop is to create a collaborative framework for investigating user modelling and its evaluation in the context of CIR. We invite participants to share their insights and proposals regarding User modelling in CIR, particularly in relation to algorithm design, system personalization, and the methods through which these models can be simulated and assessed. By fostering dialogue and collaboration among researchers and practitioners, we aim to deepen our understanding of how effective User modelling might enhance conversational search experiences and lead to more refined and user-centred retrieval systems. ***Website***: https://um-cir.github.io/

CCS CONCEPTS

• **Information systems** → **Information retrieval**; **Users and interactive retrieval**; **Evaluation of retrieval results**; **Retrieval models and ranking**; *Retrieval tasks and goals*; *Personalization*; *Collaborative search*.

KEYWORDS

User Modeling, User-centered evaluation, User Knowledge, Personalization, Conversational Information Retrieval



This work is licensed under a Creative Commons Attribution International 4.0 License.

SIGIR-AP '24, December 9–12, 2024, Tokyo, Japan
© 2024 Copyright held by the owner/author(s).
ACM ISBN 979-8-4007-0724-7/24/12
https://doi.org/10.1145/3673791.3698436

ACM Reference Format:
Praveen Acharya, Gareth J.F. Jones, Xiao Fu, Aldo Lipani, Fabio Crestani, and Noriko Kando. 2024. The 1st Workshop on User Modelling in Conversational Information Retrieval (UM-CIR). In *Proceedings of the 2024 Annual International ACM SIGIR Conference on Research and Development in Information Retrieval in the Asia Pacific Region (SIGIR-AP '24), December 9–12, 2024, Tokyo, Japan.* ACM, New York, NY, USA, 3 pages. https://doi.org/10.1145/3673791.3698436

1 BACKGROUND & MOTIVATION

A Conversational Information Retrieval (CIR) system enables the entire information access interaction process to be carried out as a conversation between a *User* and a *Search agent*. Thus, a CIR system should be able to model the interactive search process to support understanding the user's query, interacting with the user to get a better understanding of the user's information need, improving the search results, and extracting and presenting search results/answers in a simple and clear way. The process driven by the conversational interface of the CIR system is highly interactive, and thus not suitable for the classic evaluation style as applied to the conventional single-shot query search paradigm. This makes the evaluation of CIR complex. The incorporation of attempts to model the user or the search process will further the process of evaluation.

Interest in conversational search has been developing for a number of years and has recently garnered further attention due to recent advancements in deep learning and the widespread adoption of conversational personal assistants. Some of the earliest work investigating IR systems as an intermediary in helping users better understand their information need dates back to [4], while more recent work includes [19]. A new approach to designing a retrieval system with the goal of understanding users' information needs has been described in [6] that envisions strategies to facilitate this. More recently, [18] studied conversational approaches to information retrieval and proposed a set of characteristics they deemed a conversational IR system should have.

Broader exploration of CIR within the information retrieval research community has been enabled by the Text REtrieval Conference (TREC) with a Conversational Assistance Track (CAsT)[1] which provided conversational search tasks with the requisite datasets to enable research addressing them [10]. The CAsT track ran for

[1] https://www.treccast.ai/

four consecutive years with the datasets incrementally becoming more challenging and more natural in terms of dialogue with the goal of a natural conversation with mixed-initiative [7–9, 16]. In 2023, CAsT was replaced by the Interactive Knowledge Assistance Track (iKAT)[2]. This track builds on the previous CAsT track providing a test collection for evaluating conversational assistants [2] with an emphasis on personalization based on the user's unique characteristics and requirements [3].

These initiatives aim to facilitate research on modelling the dialogue state in a 'multi-turn conversation for improved passage ranking' and effectively engaging users in multi-turn dialogues, enabling them to retrieve information in a more interactive and intuitive manner. Most of the research in these tracks focuses on tracking how a dialogue evolves between two parties in terms of topic shifts and relevance to previous turns. Research work has sought to address this by understanding queries in a conversational setting and developing techniques such as query reformulation where the language dependency of utterances on previous turns is resolved to expand and disambiguate utterances and extract the appropriate context from the conversational dialogue [12, 13] to using pre-trained language model to re-write queries [11, 20]. Other approaches include using dense retrieval without performing the query reformulation step [17, 21] and more recently, leveraging large language models (LLMs) to reformulate queries [14, 15] and retrieve or generate responses [1, 5]. These are all very important areas of research. However, we argue that user modelling and evaluation have not received sufficient attention in the field of CIR. In fact, there is no standardized approach to the evaluation of CIR that goes beyond the first couple of conversational turns, that relates the style of the conversation to user satisfaction, or that explores the best approaches to measure effectiveness for CIR systems. In this workshop, we aim to present and discuss the latest research work in this direction.

2 PURPOSE

The purpose of the workshop is to provide a forum for discussion on the user-centric approaches to conversational information retrieval. The main theme of the workshop is *'User Modelling'*. The workshop will explore different areas relating to user modelling ranging from personalization, conversation modelling, user simulations and evaluation of CIR systems.

3 THEMES AND TOPICS

Topics of interest for reporting and discussion at the workshop will include, but are not limited to the following;

3.1 Personalization

- New methods for modelling Users in CIR (personalization).
- Modelling User emotion.
- Mining and modelling Users.
- User knowledge representation and extraction.
- Datasets: New source, New way of collection.
- Introducing personalization.
- Focusing on specialized user groups and personalities, for example psychologically affected users.

[2]https://www.trecikat.com/

3.2 Modelling Conversation

- Alignment between current user modelling and the real user in CIR.
- Modelling user and user's behaviour.
- Conversational Knowledge extraction and representation.
- Other theoretical models and foundations of user-centric modelling of CIR.

3.3 User Simulation

- User simulation of CIR.
- Dataset for user simulation of CIR.
- Other theoretical models and foundations of user simulation of CIR.

3.4 Evaluation

- User-centered evaluation of CIR.
- User studies, User engagement.
- System-oriented evaluation of CIR.
- Simulated Evaluation of CIR.
- Metrics to measure the effectiveness of CIR.
- Data sets, Test collection, Resources.
- Other theoretical models and foundations of user-centric evaluation of CIR.

3.5 Target Audience

The workshop is aimed at academics, researchers, scientists, practitioners and industry professionals interested in conversational information retrieval focusing on the modelling of users in interactive search and related fields. It is also suitable for graduate students and early-career researchers looking to expand their knowledge and network within this area.

4 PROGRAM FORMAT

The workshop will be a half-day meeting. The outline of the programme in shown in Table 1. This will include an invited keynote speaker and presentations of the accepted submissions from the Call for Papers. We will create break-out discussion groups based on the main research topics/themes that emerge from among the contributions. Following this we will have a discussion panel examining the presented contributions from an integrated perspective. We plan to report the outcomes of the workshop in a report to be submitted the SIGIR Forum.

Table 1: Tentative Schedule

Time	Activity
13:00 - 13:10	Opening
13:10 - 14:00	Keynote Speech and Question Answer
14:00 - 14:30	Accepted papers
14:30 - 14:45	**Coffee Break**
14:45 - 15:15	Accepted papers
15:15 - 16:15	Break-out Discussions
16:15 - 17:30	Panel Discussion and Closing Remarks

5 PROGRAMME COMMITTEE

We thank the following people for reviewing papers submissions to the workshop:

- Johannes Trippas, RMIT University, Australia
- Wai Lam, The Chinese University of Hong Kong, China
- Ingo Frommholz, University of Wolverhampton, UK
- Xi Wang, University of Sheffield, UK
- Abhishek Kaushik, Dundalk Institute of Technology, Ireland

6 ORGANIZERS

Praveen Acharya is a PhD candidate in the School of Computing at Dublin City University, Ireland advised by Prof. Gareth J.F. Jones. His research is in Conversational Information Retrieval with focus on effective modelling and exploitation of search and user context.
Gareth J.F. Jones is a Professor in the School of Computing and a Principal Investigator in the ADAPT Centre at Dublin City University, Ireland. His research focuses on topics in information retrieval and search, including multimedia, multilingual and interactive applications. He was General Co-Chair for ACM SIGIR 2013 and CLEF 2017 and of Interspeech 2023, He was co-founder of the MediaEval multimedia evaluation benchmark and has contributed to the organization of a number of tasks at the NTCIR, CLEF, TREC and TRECVid benchmarks.
Xiao Fu is a PhD candidate at University College London (UCL), supervised by Dr. Aldo Lipani. His research is centred on Conversational Information Retrieval (CIR), with a particular focus on the evaluation and simulation of user interactions within CIR systems.
Aldo Lipani is a Professor (Associate) in Machine Learning at the University College London (UCL). He is a member of the SpaceTimeLab and the Web Intelligence Group. Under Dr Lipani's leadership, his research group is dedicated to studying Large Language Models and their effective integration into Conversational Systems. He has conducted further studies at renowned institutions, including the National Institute of Standards and Technologies (NIST), Microsoft Research Cambridge, University of Glasgow, University of Amsterdam, and National Institute of Informatics (NII) in Tokyo.
Fabio Crestani is a full professor at Universitá della Svizzera Italiana, Lugano, Switzerland. His main areas of research are Information Retrieval, Text Mining, and Digital Libraries. He has authored a book, co-edited 14, and published over 250 publications in these areas of research. He was Editor-in-Chief of Information Processing and Management (Elsevier) from 2008 to 2015 and is still a member of the editorial board of a few journals.
Noriko Kando is a full professor at the National Institute Of Informatics, Japan. She initiated NTCIR in late 1997, an evaluation of information-access technologies using various types of documents in East Asian languages and English, and has been a designer of various tasks and general co-chair of NTCIR. She was inducted into the SIGIR Academy in 2021.

ACKNOWLEDGMENTS

This work was conducted with the financial support of the Science Foundation Ireland Centre for Research Training in Artificial Intelligence under Grant No. 18/CRT/6223 and partially as part of the SFI ADAPT Centre at DCU (Grant No. 13/RC/2106_P2) (www.adaptcentre.ie), Swiss Federal Institute of Technology (ETH) Leading House Asia Project on "Evaluation of Empathic Conversational Search for Depression Assessment and Support", Swiss National Science Foundation (SNSF) Grant "Personality and Conversational Information Access" and National Institute of Informatics Internship programme.

REFERENCES

[1] Zahra Abbasiantaeb, Chuan Meng, David Rau, Antonis Krasakis, Hossein A Rahmani, and Mohammad Aliannejadi. 2023. LLM-based Retrieval and Generation Pipelines for TREC Interactive Knowledge Assistance Track (iKAT) 2023. TREC.
[2] Mohammad Aliannejadi, Zahra Abbasiantaeb, Shubham Chatterjee, Jeffrey Dalton, and Leif Azzopardi. 2024. TREC iKAT 2023: A Test Collection for Evaluating Conversational and Interactive Knowledge Assistants. In *Proceedings of the 47th International ACM SIGIR Conference on Research and Development in Information Retrieval*. 819–829.
[3] Mohammad Aliannejadi, Zahra Abbasiantaeb, Shubham Chatterjee, Jeffery Dalton, and Leif Azzopardi. 2024. TREC iKAT 2023: The Interactive Knowledge Assistance Track Overview. (2024).
[4] Helen M Brooks and Nicholas J Belkin. 1983. Using discourse analysis for the design of information retrieval interaction mechanisms. In *Acm sigir forum*, Vol. 17. ACM New York, NY, USA, 31–47.
[5] Shivani Choudhary, Niladri Chatterjee, and Subir Kumar Saha. [n. d.]. Information Retrieval Combined with Large Language Model: Summarization Perspective. ([n. d.]).
[6] W. B. Croft and R. H. Thompson. 1987. I3R: A New Approach to the Design of Document Retrieval Systems. *J. Am. Soc. Inf. Sci.* 38, 6 (nov 1987), 389–404.
[7] Jeffrey Dalton, Chenyan Xiong, and Jamie Callan. 2020. TREC CAsT 2019: The conversational assistance track overview. *arXiv preprint arXiv:2003.13624* (2020).
[8] Jeffrey Dalton, Chenyan Xiong, and Jamie Callan. 2021. CAsT 2020: The Conversational Assistance Track Overview. (2021).
[9] Jeffrey Dalton, Chenyan Xiong, and Jamie Callan. 2022. TREC CAsT 2021: The Conversational Assistance Track Overview. (2022).
[10] Jeffrey Dalton, Chenyan Xiong, Vaibhav Kumar, and Jamie Callan. 2020. Cast-19: A dataset for conversational information seeking. In *Proceedings of the 43rd International ACM SIGIR Conference on Research and Development in Information Retrieval*. 1985–1988.
[11] Sheng-Chieh Lin, Jheng-Hong Yang, Rodrigo Nogueira, Ming-Feng Tsai, Chuan-Ju Wang, and Jimmy Lin. 2020. Conversational question reformulation via sequence-to-sequence architectures and pretrained language models. *arXiv preprint arXiv:2004.01909* (2020).
[12] Sheng-Chieh Lin, Jheng-Hong Yang, Rodrigo Nogueira, Ming-Feng Tsai, Chuan-Ju Wang, and Jimmy J. Lin. 2021. Multi-Stage Conversational Passage Retrieval: An Approach to Fusing Term Importance Estimation and Neural Query Rewriting. *ACM Transactions on Information Systems (TOIS)* 39 (2021), 1 – 29.
[13] Ida Mele, Cristina Ioana Muntean, Franco Maria Nardini, Raffaele Perego, Nicola Tonellotto, and Ophir Frieder. 2020. Topic propagation in conversational search. In *Proceedings of the 43rd International ACM SIGIR conference on research and development in Information Retrieval*. 2057–2060.
[14] Fengran Mo, Kelong Mao, Yutao Zhu, Yihong Wu, Kaiyu Huang, and Jian-Yun Nie. 2023. ConvGQR: Generative Query Reformulation for Conversational Search. In *Proceedings of the 61st Annual Meeting of the Association for Computational Linguistics (Volume 1: Long Papers)*. 4998–5012.
[15] Fengran Mo, Bole Yi, and Jian-Yun Nie. 2024. RALI@ TREC iKAT 2023: Generative Query Reformulation for Conversational Information Seeking. (2024).
[16] Paul Owoicho, Jeff Dalton, Mohammad Aliannejadi, Leif Azzopardi, Johanne R Trippas, and Svitlana Vakulenko. 2022. TREC CAsT 2022: Going Beyond User Ask and System Retrieve with Initiative and Response Generation.. In *TREC*.
[17] Chen Qu, Liu Yang, Cen Chen, Minghui Qiu, W Bruce Croft, and Mohit Iyyer. 2020. Open-retrieval conversational question answering. In *Proceedings of the 43rd International ACM SIGIR conference on research and development in Information Retrieval*. 539–548.
[18] Filip Radlinski and Nick Craswell. 2017. A Theoretical Framework for Conversational Search. In *Proceedings of the 2017 Conference on Conference Human Information Interaction and Retrieval* (Oslo, Norway) *(CHIIR '17)*. Association for Computing Machinery, New York, NY, USA, 117–126. https://doi.org/10.1145/3020165.3020183
[19] Robert S. Taylor. 2015. Question-Negotiation and Information Seeking in Libraries. *Coll. Res. Libr.* 76 (2015), 251–267.
[20] Svitlana Vakulenko, Nikos Voskarides, Zhucheng Tu, and Shayne Longpre. 2021. A comparison of question rewriting methods for conversational passage retrieval. In *Advances in Information Retrieval: 43rd European Conference on IR Research, ECIR 2021, Virtual Event, 2021, Proceedings, Part II 43*. Springer, 418–424.
[21] Shi Yu, Zhenghao Liu, Chenyan Xiong, Tao Feng, and Zhiyuan Liu. 2021. Few-shot conversational dense retrieval. In *Proceedings of the 44th International ACM SIGIR Conference on research and development in information retrieval*. 829–838.