

# ECIR 2021 Workshop Proposal

## *MICROS: Mixed-Initiative Conversational Systems*

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**Abstract.** The *Mixed-Initiative Conversational Systems* workshop (MICROS@ECIR2021) aims at investigating and collecting novel ideas and contributions in the field of Conversational Systems. We invite people working on Conversational Search and Recommendation to send us their position and research papers.

Oftentimes, the users fulfill their information need using smartphones and home assistants. This has brought a revolution in the way the users access online information, posing new challenges compared to traditional search and recommendation.

This first edition of MICROS will have a particular focus on *mixed-initiative conversational systems*. Indeed, conversational systems need to be proactive, proposing not only answers but also possible interpretations for ambiguous and vague requests. We solicit the submission of works on novel approaches, evaluation techniques, datasets, and domain specific applications of conversational systems. We welcome researchers working on both information retrieval and recommendation as the workshop wishes to be a gathering of scholars interested in these research fields who can interact and discuss on conversational systems in a focused way. We believe that MICROS is highly relevant to ECIR since conversational systems represent an important topic for research on information retrieval and recommendation, with a big impact on academia as well as industry.

**Keywords:** conversational search; mixed-initiative interaction; interactive recommendation

## 1 Introduction

The increasing popularity of personal assistant systems as well as smartphones has drawn attention to conversational systems with many application scenarios ranging from simple ones (e.g., checking the weather forecast, managing music

streaming services) to more complex ones (e.g., performing e-commerce transactions). Moreover, thanks to the recent advances in automatic speech recognition and voice generation, conversational assistants are widely used in chatbots and smart home devices, e.g., Google Home, Amazon Alexa, as well as in wearable devices and smartphones, e.g., Apple Siri, Google Now, Microsoft Cortana.

The user can seek information using conversational systems verbally and in an interactive way. In particular, the information-seeking dialogues can be categorized into two main classes: (i) search and (ii) recommendation. In a typical *conversational search* scenario, the users fulfill their information needs by simply conversing with the system as in a single- or multi-turn conversation which could evolve through different kinds of interactions. The user requests are often expressed in the form of natural language, and the interactions are meant to be simple and intuitive so that every person, even those not familiar with technology, can interact with them. Conversational search focuses on user interactions that have information seeking goals. Information Retrieval (IR) empowers dialogue systems to answer questions and to get context for assisting the users in their tasks. On the other hand, *interactive recommendation* can result in more structured conversations where the system solicits user's preference and opinion on items and specific aspects of them [5].

**Conversational System Challenges.** The spread of voice-recognition technologies together with the recent progress of Artificial Intelligence (AI) have raised the attention of the research community towards conversational systems. Since the users access online information using smartphones and home assistants vocally, the process for getting information has changed, raising novel challenges.

In conversational search, answering users' requests is not straightforward as the system must understand the request, find relevant documents, and sort them based on their relevance to return a narrowed list of results (sometimes only one). Consequently, the very top results (e.g., 1 or 2) are the most important ones as the system replies vocally and it is impossible for the user to browse the search results. Furthermore, the users' requests can be vague, ambiguous, or misleading. These requests (a.k.a. questions, queries, or utterances) are formulated in natural language, so they are prone to the ambiguity and polysemy of words, the presence of acronyms, mistakes, and grammar misuses. Recent research has shown that the system can take the initiative in such cases by asking for user's feedback. Feedback requests can be in the form of asking clarifying questions [3] or proposing keywords that disambiguate the context. Oftentimes, a complex information need cannot be resolved with a single request, rather the user formulates multiple subsequent questions that can be related to each other. In these multi-turn conversations, the current request may not be self-explanatory as the context is missing from the current question but it was implied or mentioned previously [6]. In particular, the subjects can be pronouns referring to topics mentioned in the previous requests and/or answers [4]. Plus, during the conversation, there might be slight or significant topic changes that need to be detected by the system [1, 4].

Regarding conversational recommendation, the system can interact with the user asking for user’s opinion about some items [5]. Preference elicitation introduces numerous challenges, and one of the them is modeling users’ preference upon receiving their feedback. Also, selecting the next question in a conversation to optimize the information gain and, at the same time, to avoid any bias in the user’s feedback. Indeed, any decision taken by the system can potentially lead to some sort of bias and it is of high importance to avoid this.

We envision that mixed-initiative interactions of conversational systems may represent an important development in conversational search and recommendation. As a matter of fact, the interactions between user and system should go beyond the usual “*user asks, system responds*” paradigm since conversational systems may need to interact with the users (e.g., clarifying the request, proposing possible interpretations, inferring user’s opinions or interests).

## 2 Scope and Motivation

We believe that many practitioners, developers, and researchers in Information Retrieval (IR), Recommendation Systems (RecSys), Natural Language Processing (NLP), Artificial Intelligence (AI), and related application areas will find an opportunity to discuss their latest developments and new directions of research in the area of search- and recommendation-oriented conversational systems.

This is the first edition of the MICROS workshop, specifically targeting the IR and the RecSys communities. Plus, a particular focus of the workshop will be on mixed-initiative interactions that may help conversational systems to improve the user’s information-seeking experience.

In the last years, other workshops have been related to conversational assistants. For example, the *Search-Oriented Conversational AI (SCAI)* workshop is held in conjunction with IJCAI, ENMLP conferences which target more AI aspects, rather than IR and RecSys. Other workshops are *Conversational Approaches to Information Retrieval (CAIR)* and *Workshop on Conversational Interaction Systems (WCIS)* being organized in conjunction with CHIIR and SIGIR, respectively. They mostly focus on the system interactions and interfaces in the conversational context and conversational agents. These previous workshops confirm that conversational systems represent a very hot topic, raising several challenges and discussions in different research communities. However, compared to other workshops, MICROS will aim to be inclusive toward various aspects related to the research on conversational information access. It will target IR as well as RecSys communities and will pursue mixed-initiative interactions for conversational systems, which is a recent and still unexplored topic in the field.

Advanced, flexible and mixed-initiative interactions are very important in conversational systems as they allow to identify the correct intent behind user’s requests. Especially for those requests that are too generic, ambiguous, and may lack explicit subjects or context. In cases where the system lacks enough confidence in identifying the topic of interest, a better option would be to take the

initiative of the conversation, asking users to provide more information about their needs. This could be through transferring the domain knowledge and informing the user about possible misinterpretations of their queries. Moreover, such forms of interactions could be adopted to improve user experience in exploratory search. As an example, the user may ask for “Give me information about Java” and the system can ask back “Do you mean Java programming language, island or coffee?” Based on the user’s answer, the system can narrow down the search to one specific and unambiguous topic.

## 2.1 Main Topics

The MICROS@ECIR2021 will accept papers proposing novel ideas and solutions for conversational systems. We solicit works on both IR and RecSys, but novel approaches for conversational information seeking that are based on NLP and AI are also welcome.

A special interest would be for techniques that support complex and multi-turn user-machine dialogues for information access and retrieval, and multi-modal interfaces for interacting with such systems.

The workshop topics include but are not limited to:

1. Applications of conversational search and recommendation systems
  - Large-scale retrieval candidate responses (e.g., documents, passages) in conversational search
  - Conversational and question-based recommendation systems
  - Tracking information-need evolution during the conversation (e.g., context changes)
  - Processing and rewriting of natural language conversational queries
  - Relevance feedback in conversational search
2. Mixed-initiative interaction systems, such as clarification and preference elicitation in conversational systems
  - Dialogue schema for conversational search
  - Conversational navigation of search results
  - Conversation history understanding and query modeling
  - Pro-active search and recommendation interactions in conversational search
3. Deep learning and reinforcement learning for conversational search
  - Conversational question answering
  - Result summarization, explanation, and presentation in conversational search
  - Balance and bias for more inclusive conversational systems
4. Multi-modal interactions for conversational interfaces (e.g., speech-only and small-screen interfaces)
  - Voice-based search engine operations
  - User intent and dialog state tracking in conversational search
  - Personalization and user models for conversational search

5. Specialized applications and use cases for conversational search (e.g., health, finance, travel)
6. Knowledge graph presentation in conversational search
7. Data creation and curation for conversational search
8. Evaluation metrics for effectiveness, engagement, satisfaction of conversational systems

### 3 Workshop Organization

**Type of the workshop.** FULL DAY. We plan to have at least one keynote talk, from 6 to 8 papers, and a panel discussion.

**Keynote and Panel.** To give more focus on the mixed-initiative interaction challenges, we plan to have at least one keynote talk by a researcher working on this topic (e.g., Hamed Zamani). We also plan to have a panel discussion that will be lead by senior researchers (e.g., Avishek Anand, Nick Craswell, Nick Belkin). Depending on the number of participants to the panel as well as to the organization of the conference (in place, virtual, or partially virtual), we will consider the possibility to have a more interactive participation of the audience to the discussion, also we can organize different discussion subgroups so that researchers can participate to the topic they are most interested in.

**Tentative Schedule.** Regarding the time slots, we plan to give 1 hour to the keynote (including questions) and 30 minutes to each paper presentation (including questions). The panel discussion would be 1 hour long. Coffee breaks would take 20-30 minutes depending on the final program.

The workshop will be possibly scheduled as follows.

#### Morning session (3.5h)

1. Introduction (10 min)
2. Keynote talk, 45 min plus 15 min for discussion (1h in total)
3. Coffee break (20 min)
4. 3-4 paper presentations, 20 min presentations each plus 10 min for discussion (max 2h in total)

#### Afternoon session (3.5h)

1. 3-4 paper presentations, 20 min presentations each plus 10 min for discussion (max 2h in total)
2. Coffee break (20 min)
3. A panel discussion on promising lines of investigation emerged from the workshop (1h in total)
4. Concluding Remarks (10 min)

In case we have less paper presentations, we will consider another keynote talk in the afternoon.

**Resources.** We will coordinate with the organizers of ECIR 2021 to manage in place, virtual or hybrid sessions, according to requirements at the time of the conference. If the workshop will be virtual or hybrid we need a common online platform for hosting the event (e.g. Zoom virtual room). If the conference and workshops will be held in place, we will need a projector and one board as resources to deliver the workshop.

**Results.** The workshop results will be published as a summary paper in the proceeding of ECIR 2021 conference. If possible, the presented papers will be published in workshop electronic proceedings.

### 3.1 Submissions

MICROS aims at bringing together academic and industrial researchers to create a forum for research on conversational approaches. We will call for position and research papers, covering topics in Section 2.1. We intend to organize an exploratory workshop and thus, the submitted papers may also be position papers in addition to research papers.

The call for papers of the workshop will be disseminated by means of research mailing lists (e.g., ACM and IEEE major conferences mailing lists), social networks (e.g., Twitter). Also, we plan to directly contact researchers working on related topics. We foresee to receive around 12-14 submissions out of which we will select 6-8 papers for presentation, and we estimate to have about 15-20 participants. The keynote as well as the panel discussion on novel topics related to conversational systems will attract interested attendees, too.

**Submission platform and guidelines.** We plan to use of an electronic conference management system (e.g., EasyChair) managing both the paper submission and the reviewing process. All submissions will be reviewed by the PC committee chaired by the workshop organizers. Submissions must include the name and affiliations of authors, so the reviewing process will be single blind.

Papers must be submitted to EasyChair by 23:59, AoE (Anywhere on Earth) of the paper submission deadline (see below). Submitted papers should be between 4 and 6 pages long, in the Springer LNCS format.

**Tentative Dates.** The tentative dates of the workshop are:

- Deadline for workshop papers: 20 December 2020
- Notification of paper acceptance: 5 February 2021
- Deadline for final paper versions: 28 February 2021
- Workshop date: 28 March 2021

We plan to have flexible time windows so that we can coordinate with the workshop chairs. Moreover, in case an extension of the submission deadline is needed, we can easily rearrange the reviewing period. Also, we will ensure that the notification of accepted papers will be before the early-bird registration for the conference in order to allow researchers to register on time.

### Tentative Program Committee

- Maarten de Rijke, University of Amsterdam, NL
- Mark Sanderson, RMIT Melbourne, AU
- Evangelos Kanoulas, University of Amsterdam, NL
- Fabio Crestani, University of Lugano, CH
- Jeff Dalton, University of Glasgow, UK
- Hamed Zamani, UMass Amherst, USA
- Damiano Spina, RMIT Melbourne, AU
- Aleksandr Chuklin, Google Zürich, CH
- Johanne Trippas, University of Melbourne, AU
- Mikhail Burtsev, MIPT Moscow, RU
- Pengjie Ren, University of Amsterdam, NL
- Jie Zou, University of Amsterdam, NL
- Rishiraj Saha Roy, MPII Saarbruecken, DE
- Avishek Anand, L3S Research Center Hannover, DE
- Helia Hashemi, UMass Amherst, USA
- Kai Hui, Amazon Alexa Search, DE
- Fabrizio Silvestri, Facebook London, UK
- Diego Marcheggiani, Amazon Barcelona, ES
- Paul Thomas, Microsoft, Australia (to be confirmed)
- Qingyao Ai, University of Utah, USA (to be confirmed)
- Julia Kiseleva, Microsoft Research AI Seattle, USA (to be confirmed)
- Emine Yilmaz, University College London, UK (to be confirmed)
- Claudia Hauff, Technical University, Delft, NL (to be confirmed)
- Zhumin Chen, Shandong University, CN (to be confirmed)
- Zhiyuan Liu, Tsinghua University, CN (to be confirmed)

## 4 Organizers

- **Ida Mele** is currently a researcher at IASI-CNR in Rome (Italy). Previously, she was postdoctoral researcher at ISTI-CNR in Pisa (Italy), the University of Lugano (Switzerland), and MPII in Saarbruecken (Germany). She got her Ph.D. in Computer Engineering from Sapienza University of Rome with a Thesis on Web Usage Mining with applications to Web search and recommendation. Part her Ph.D. research was carried out during internships at Yahoo Research (Spain) and MPII. She has co-authored papers in peer-reviewed conferences, including SIGIR, ECIR, WSDM, CIKM, and in top-tier journals such as TOIS and IPM. She has also served as PC member and reviewer for international conferences and journals. Her research interests are: Web Mining, Information Retrieval, Recommendation Systems, and Social Media. Her current research focuses on conversational search and, in particular, on passage retrieval and re-ranking for multi-turn conversational searches.

- **Cristina Ioana Muntean** is a Researcher at ISTI-CNR, Pisa, Italy. Her main research interests are in Information Retrieval and Machine Learning with applications to web search and social media. She is particularly interested in passage retrieval and conversational search using neural and classic IR models. She is an active member in the SIGIR, ECIR, CIKM, and The Web Conference communities, as paper author and as part of the program committees.
- **Mohammad Aliannejadi** is a post-doctoral researcher at the University of Amsterdam (The Netherlands). His research interests include ranking, single- and mixed-initiative conversational information access, recommender systems, and metasearch. Previously, he completed his Ph.D. at the University of Lugano (Switzerland), where he worked on novel approaches of information access in conversations. He has been an active member of the community, publishing and serving as a PC member in major venues and journals such as SIGIR, CIKM, WSDM, ECIR, ACM TOIS, and IEEE TKDE. Mohammad has recently chaired the ClariQ data challenge at the SCAI workshop [2], focusing on asking clarifying questions in information-seeking conversations.
- **Nikos Voskarides** is a PhD candidate at the University of Amsterdam (The Netherlands). He is an active member of the community, publishing and serving as a PC member at major conferences such as SIGIR, ACL, EMNLP, ECIR, ACM TOIS and AKBC. His current research focuses on information retrieval for knowledge graphs and conversational search.

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