

Informing the Design of Conversational IR Systems: Framework and Result Presentation

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ABSTRACT

Conversational systems allow the user to describe his information problem in natural language, which in turn allows for a better understanding of his knowledge gap (or information need). Additionally, the system can ask follow-up questions to resolve ambiguities and provide more fine-tuned answers to satisfy the information needs of the user. The use of natural language dialogues, over multiple turns, is the reason why these systems are called “conversational.” In situations like driving, cooking, or exercising, where traditional search may be difficult or erroneous, conversational systems allow hands-free and eyes-free operation, and so, the user can multitask. Such systems are also better suited for people with a visual or manual impairment or people with limited literacy skills. The following research questions guide the overall direction and objective of the research study:

RQ1: *Are the existing frameworks in information retrieval sufficient in explaining the searcher-system interaction in a voice-based environment? What are the modifications required, if any, to explain such interactions?*

Some of the early researches proposed different ways in which we can incorporate dialogues in an IR system [3, 6]. If conversation is viewed as information seeking dialogue, it can be modeled based on different speech or dialogue acts. The Conversation for Action (CfA) model [6] was later extended to develop the Conversational Roles (COR) model [4]. Both these models acknowledge that conversation is controlled by the behavior or intention of the participants. An alternate approach has been adopted by Belkin et al. [1] who conceptualize IR as interactive information seeking and propose various information seeking strategies (ISS) and example scripts to model the pattern of human-computer interaction. In recent work, the desirable properties of such a system have been highlighted by Radlinski and Craswell [2]

In our research, we investigate the nature of interactions which occur between the user and the system and the cognitive capabilities expected of such systems. We plan on analyzing different publicly available conversational search data to assess the completeness of the previously described frameworks. As most of the frameworks were developed at a time when spoken searches and conversational systems were not as popular, we expect newer patterns and stages

in user-system interactions. The first step would be to modify the existing frameworks to explain the anomalies if any. We are likely to follow a grounded theory approach to check the validity of the existing frameworks.

RQ2: *How does the mode (text, audio) of result (information) presentation influence the users’ experiences in a search task? Do the users prefer any specific modality over others for result presentation in a conversational search setting? Using an audio-only input channel, are the system responses and results presented, as perceived by the user, consistent across all the modalities?*

The limitations for audio-only search interfaces can be attributed to the transient and linear nature of speech, which requires information to be transmitted in smaller chunks (short audios or limited results) [5] to prevent overloading the users’ short-term memory. Thus, traditional text-based systems are preferred when the expected result is complex and in the form of images, graphs, and videos.

We propose an empirical laboratory-based Wizard of Oz experiment to evaluate the users’ preference of modalities when using conversational search systems. While the user will play the role of the seeker, an expert searcher will assume the role of the Wizard. The experiment will be a within-subjects design, in which the users will perform different search tasks using the three different systems – a baseline system, and two experimental systems. There will be a total of four tasks. We aim to collect different types of data during our study, like the users’ background and demographic information, the details of the search session, and the pre-test and post-task questionnaire, the user-intermediary interaction details, and the exit interview to assess the users’ search experience. Our observations will inform future designs and help to create a better understanding of such systems.

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