

Conversational Information Seeking: Theory and Application

 #TheCISTutorial

Part 1: Introduction and Applications



About #TheCISTutorial

- A full day tutorial (six hours)
- Target audience:
 - Researchers who work on conversational information seeking and related areas
 - Students who want to know more about this topic
- Prerequisites:
 - Familiarity with general IR concepts (indexing, querying, evaluation)
 - Basic understanding of machine learning and deep learning concepts and familiarity with key algorithms

Who Are We?



Jeff Dalton
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The CIS Book!

- A draft is available at
<https://arxiv.org/pdf/2201.08808.pdf>

Foundations and Trends in
Information Retrieval
(to appear)

Conversational Information Seeking

Hamed Zamani, Johanne Trippas, Jeff Dalton,
and Filip Radlinski



Winners of the Alexa Prize TaskBot Challenge



Do Now!

- Get started with a Google Cloud Platform instance for the hands-on part of the system.

<https://github.com/grill-lab/CIS-Tutorial-SIGIR2022>

Morning Schedule

Time	Topic	Presenter	Associated Material
9:00 – 9:45	Introduction, Applications, and Historical Context	Zamani	CIS Ch 1-2 & Appendix A
9:45 – 10:15	Conversational Interfaces and Result Presentation	Trippas	CIS Ch 3
10:15 – 10:30	Evaluating CIS Systems	Radlinski (remote)	CIS Ch 7
10:30 – 11	COFFEE BREAK		
11 – 11:30	Evaluating CIS Systems (cont'd)	Radlinski (remote)	CIS Ch 7
11:30 – 12	Understanding Conversational Interactions	Dalton	CIS Ch 4
12 – 12:30	Conversational Response Ranking and Generation	Dalton	CIS Ch 5
12:30 – 13:30	LUNCH		

Afternoon Schedule

Time	Topic	Presenter	Associated Material
13:30 - 14	Mixed-Initiative Interactions	Zamani	CIS Ch 6
14 – 15	Hands-on with iCAsT and OpenGRILL	Fischer, Owoicho, Rosseto	OpenGRILL, TaskMAD & iCAsT
15 – 15:30	COFFEE BREAK		
15:30 – 16:45	Hands-on with iCAsT and OpenGRILL (Cont'd)	Fischer, Owoicho, Rosseto	OpenGRILL, TaskMAD & iCAsT
16:45 - 17	Conclusion and Future Direction	Trippas	CIS Ch 8

Why Conversational Information Seeking?



Recent advances in automatic speech recognition



Popularity of devices with limited bandwidth interfaces

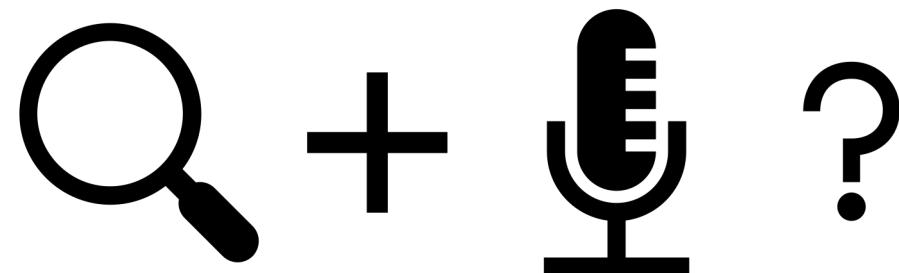


Recent advances in neural models

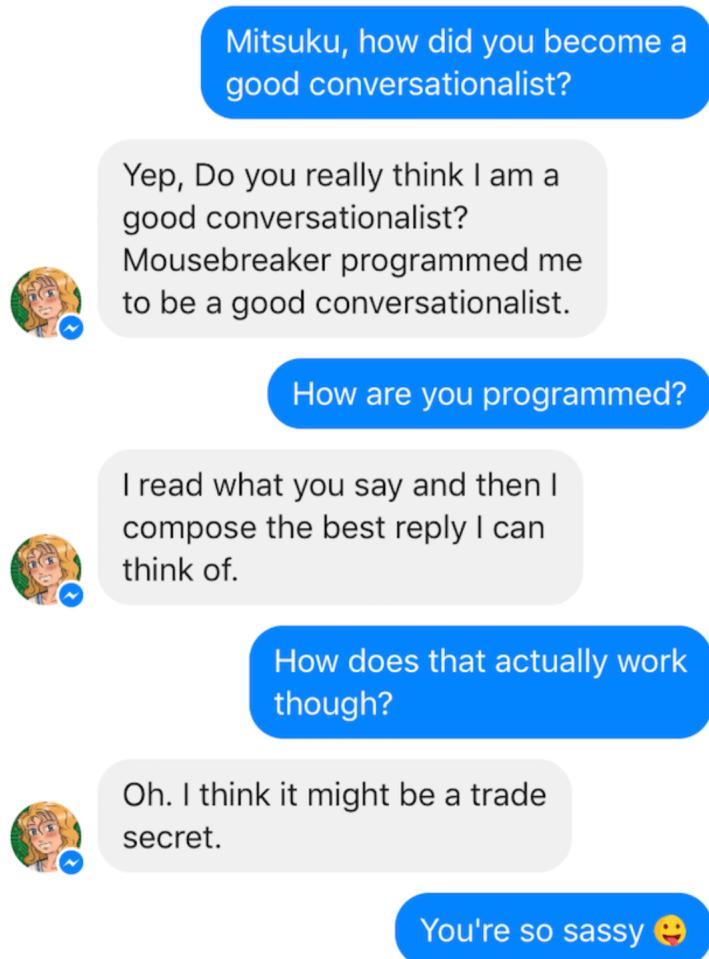


Information access is an important service.

What is conversational information seeking?



Is This Conversational Search?



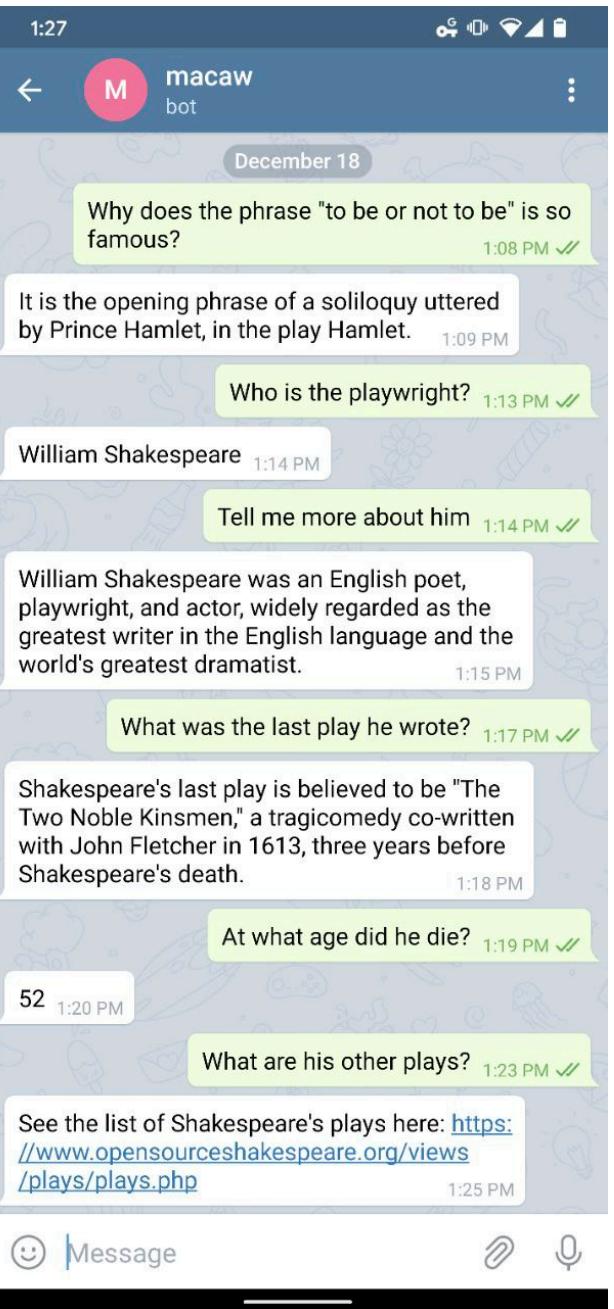


Image credit: <https://bit.ly/3uBqPj2>

Existing Definitions of Conversation

- oral exchange of sentiments, observations, opinions, or ideas
 - The Merriam-Webster Dictionary
- a joint activity in which two or more participants use linguistic forms and nonverbal signals to communicate interactively
 - From “Conversation and dialogue” by Brennan (2012)
- researchers in dialogue systems consider a more pragmatic definition by identifying a few attributes in human conversations. These attributes include turn, speech acts, grounding, dialogue structure, initiative, inference, and implicature [Jurajsky and Martin, 2021].

Definition 1. Conversation

Conversation is **interactive communication** for **exchanging information** between two or more participants (i.e., humans or machines) that involves **a sequence of interactions**. While **natural language** is considered as prerequisite for conversational interactions, conversations can also exhibit **other types of interaction with different characteristics and modalities** (e.g., click, touch, and gestures).

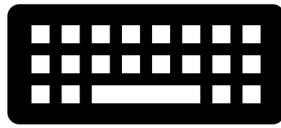
A conversation can be either synchronous, asynchronous, or a combination of both.

Definition 2. Information Seeking Conversation

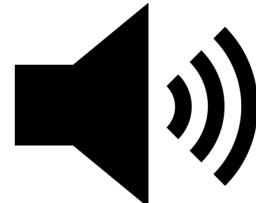
Information seeking conversation is a **conversation (cf. Def. 1)** in which the goal of information exchange is **satisfying the information needs of one or more participants.**

Interaction Modality

Input Modalities



Output Modalities



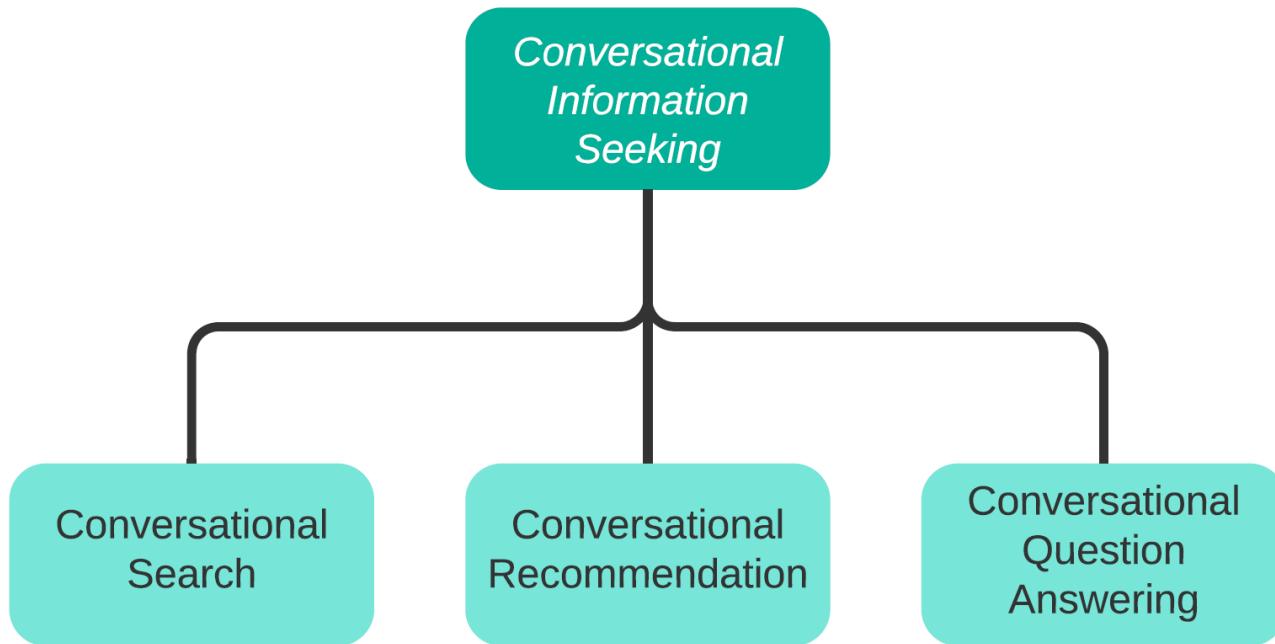
System Requirements of CIS Systems

- the system should be **stateful** and handle **multi-turn interactions**
- the system should present the results **concisely and fluently with a high comprehensibility** to cognitively engage users.
- the system should **pro-actively participate** in the conversation through **mixed-initiative interactions**.
- The interaction history as well as user-specific and contextual information can be adopted to provide **personalized and context-aware access to information**.

Definition 3. Conversational Information Seeking System

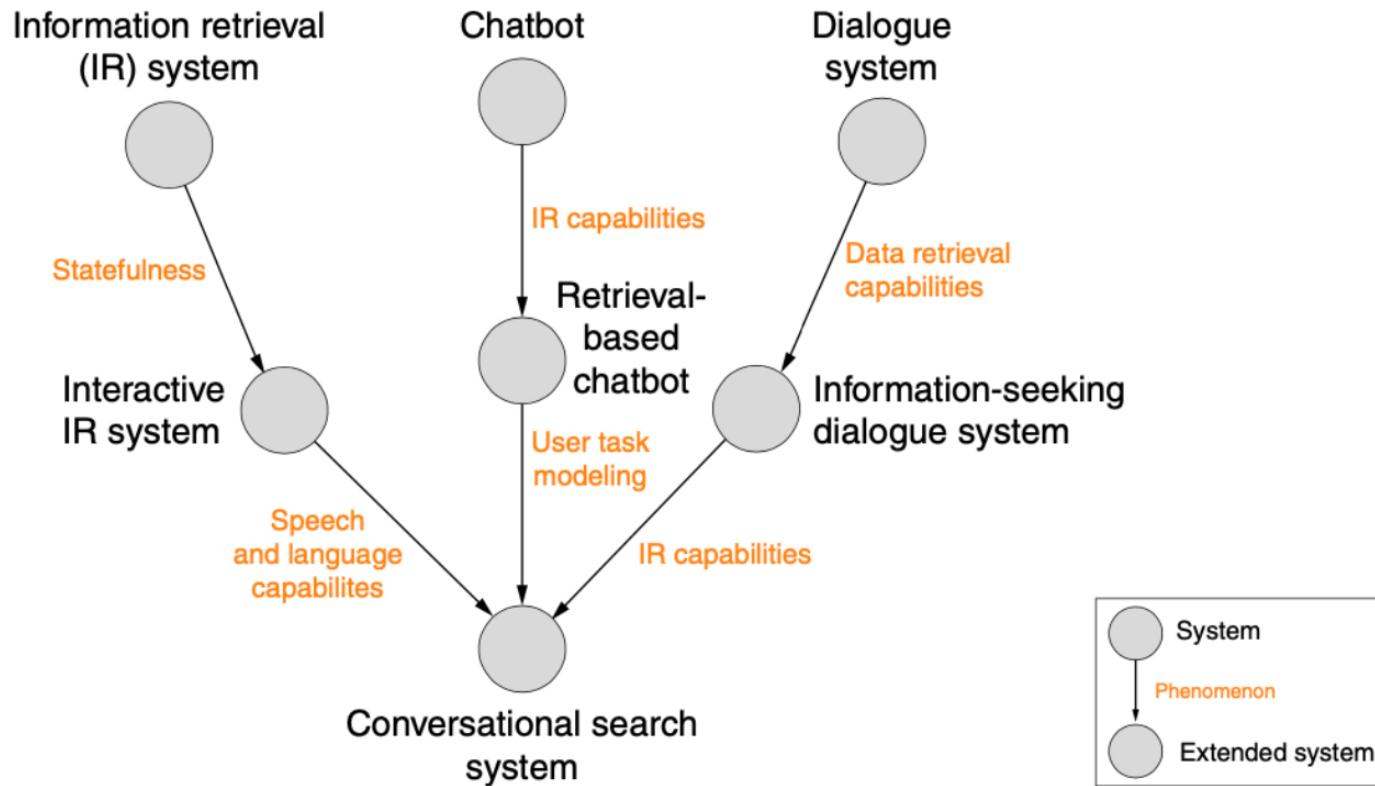
A *Conversational Information Seeking (CIS) system* is a system that satisfies the information needs of one or more users by engaging in **information seeking conversations** (cf. Def. 2). CIS responses are expected to be **concise**, **fluent**, **stateful**, **mixed-initiative**, **context-aware**, and **personalized**.

CIS Subdomains



Conversational Search

from Dagstuhl Seminar on Conversational Search



Conversational Search

An Example from TREC CAsT Track

Title: Steroid use in US sports

Description: The history of steroid use in US sports.

Turn Conversation Utterances

- 1 What's the history of steroid use in sports in the US?
 - 2 What were Ziegler's improvements?
 - 3 Why are they banned?
 - 4 Are there visible signs?
 - 5 That sounds easy to spot. How do they get away with it?
 - 6 What is the NFL policy?
 - 7 Isn't that speed?
 - 8 What is the difference between the two policies?
 - 9 I heard it even affects card players. Didn't bridge also have a problem?
 - 10 I know what bridge is. I heard there was a drug scandal recently.
 - 11 Does the article have more about it?
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Conversational Question Answering

q₁: When was Avengers: Endgame released in Germany?

ans₁: 24 April 2019

q₂ : What was the next from Marvel?

ans₂: Spider-Man: Far from Home

q₃ : Released on?

ans₃: 04 July 2019

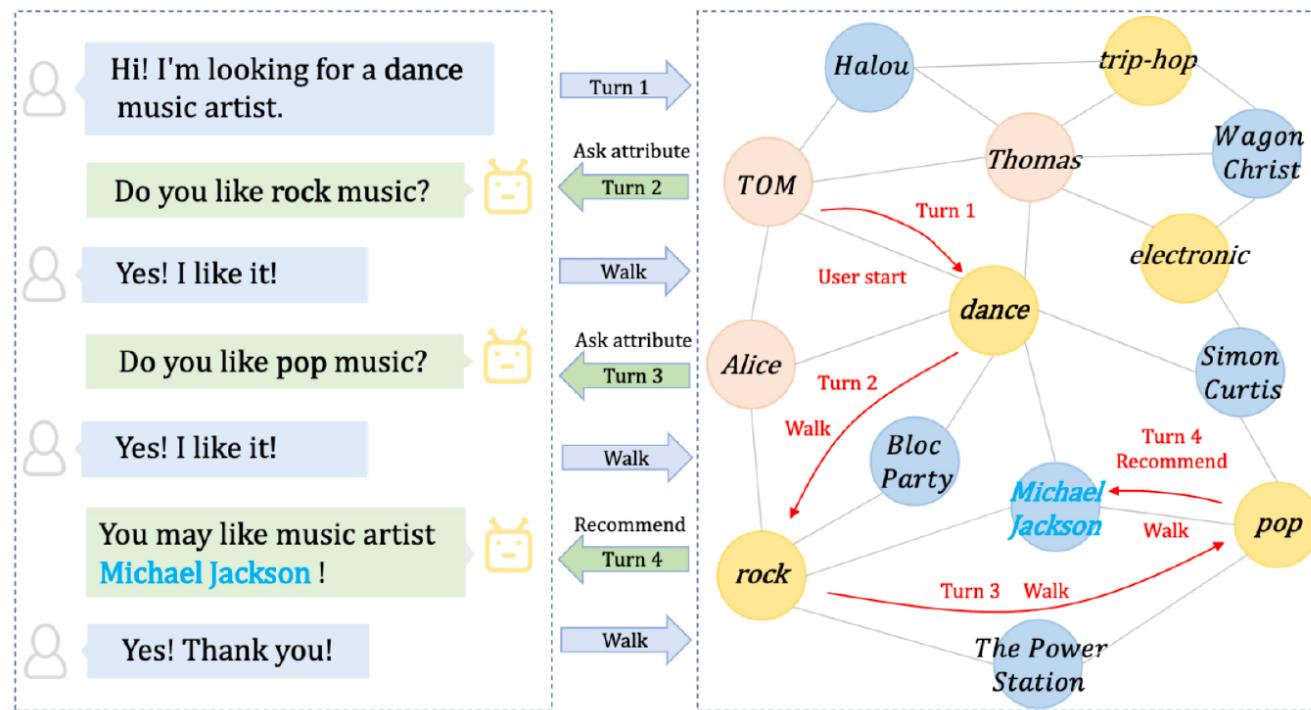
q₄: So who was Spidey?

ans₄: Tom Holland

q₅ : And his girlfriend was played by?

ans₅: Zendaya Coleman

Conversational Recommendation



Questions



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