

Using ChatGPT as a mediating agent in a collaboration task

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1 Description

The goal of this project is to design and implement a chatbot system that can mediate a plethora collaboration tasks. This chatbot system will be powered through ChatGPT to leverage its incredible reasoning and problem-solving capabilities. In CREST, we finish our paper by stating the following:

We also envision extending and generalizing the capabilities of CREST-bot. Currently, CREST-bot is heavily templated for a specific set of use cases that were motivated by our formative conversations and literature review. By using conversational large language models like ChatGPT, however, we can prompt CRESTbot to produce messages in the style of one of the seven mediator roles and in response to the current group state in terms of search preferences, active contracts, and so on to help further agreement in a more flexible and less scripted fashion.

As such, a natural next step in this work is to ideate a project that can replicate, but hopefully improve, the success we found with our templated CREST-bot interventions. The following are the seven mediator roles CREST-bot's interventions embody:

1. Problem explorer
2. Legitimizer
3. Resource expander
4. Leader
5. Communication opener
6. Facilitator and Trainer
7. Agent of reality

We can study each one of these interventions and their effects in driving the collaboration task toward agreement.

2 Implementation

A stand-alone web-based application with the chatbot acting as the main point of interaction. Users can set the parameters of the collaboration task (topic, number of people participating), and each user can describe their initial preferences. The bot can then engage in individual communication with each user regarding their preferences, using the others' preferences as

context (for example, "I see that you want to eat steak for dinner. Would you consider having a salad with the steak because most other people in the team want greens?"). Users can make changes to their initial preferences. After these changes occur, the bot reveals everyone's preferences. An interesting design opportunity here is deciding when to display individual bot messages to the user and bot messages to the team as the task progresses.

The advantage of a stand-alone web application is its ease of distribution to participants.

In the chat-based application, there must be an "item" over which users negotiate. This item can be a URL, and we should automatically detect it whenever users share a URL in the chat, considering it as a candidate item for the final decision.

Instead of developing an entire chatbot application, a quicker alternative could be to create a SlackBot or a DiscordBot, similar to previous works that have studied conversational collaborative search in the past [2, 1].

Technically, this chatbot must be interfaced with the ChatGPT API and a search engine (Google or Bing), if we go with the conversational collaborative search approach.

3 User Study Design

Inspired by C-DQ papers [3], we recruit individuals and offer them a monetary bonus for inviting their friends to participate. This approach ensures that participants already have a pre-existing relationship with each other, thereby emulating scenarios that were challenging to capture in our avatar study in CREST.

We can select a specific team scenario in which they need to use our interface to collaborate. If participants provide us with a real-life scenario and can provide evidence that the scenario is genuine (for example, a group of friends actually going to a restaurant and showing us proof of their visit), we will grant them a bonus.

We can study teams of people doing one of the following activities. For simplicity's sake, it's best if we control the activity in this paper too:

1. Class assignments, division of labor
2. Restaurant picking
3. Choose a vacation destination

We provide users with a comprehensive description of the task and ask them to come up with a final decision.

For example, in the class assignment scenario, you have a group final project that involves a coding prototype, a presentation, and a paper report. How would you divide the tasks among everyone?

In the restaurant-picking scenario, you have to choose between Abd Wahab or Hankook. This one is kind of fun because if users agree to a restaurant using our bot, we can actually compensate them with dinner at said restaurant.

To measure users' interaction with the bot, we frame its interventions in a message + action structure. We compare this with a control group that does not have the bot available. It might be worth conducting this comparison before starting the actual collaboration to identify the main pain points people face when working in chat-based environments.

Azza: : These are all excellent scenarios that are amenable to study/compensation exception for vacation destination. Perhaps in that class would be something like where to hang out: movies, theme park, etc. However limiting options e.g. choose either Abdel Wahab vs Hankook already eliminates choice and the autonomy in a way that makes participants less likely to even

care and they would be happy regardless with a free dinner. Same for other hang out destination. As for division of labor the stakes are higher but in a way there is often a sense of skill that drives how a group behaves. The most skilled programmer codes, the best salesperson presents, etc. If the goal is to test the efficacy of the bot mediator, you need actual conflicts/mediations.

I have also found several papers that focus on mediating parent-children relationships [10], romantic relationships [7, 12, 11]. If we go any of these routes, we won't have to do the technical effort of integrating ChatGPT with a search engine and instead just do the prompt-engineering effort necessary to best mediate these types of relationships.

Azza: : well ChatGPT would still need an awareness of the possible solution space (I'm guess that is what you mean by integrating with search?) especially if it takes on the role of resource expander or even agent of reality where it may need to better present options. My worry with mediating relationships is that it takes us away from collaborative work and possibly a space where there is quite a bit of literature around AI-based therapy etc. So we lose a novelty edge. That said, we do need to skim that literature area to get a good sense of it and how it can inspire our work.

Azza: : Pushing back for more brainstorming on your side. You are still trying to look at a holistic full task evaluation. However, being a good mediator isn't necessarily about outcome, it is about the process itself and whether the mediator reacted appropriately or not. Can you flip the study design? What if instead of evaluating how good something is with end-users, You evaluate how good the mediator bot was from a mediation/mediator perspective? Can you break it down into specifics that can be easier to study/measure? There is some fun literature that looks for example at conflicts on Reddits' "Am I right" or something like that and then tries to learn how to be a good judge based on what people wrote in the comments, etc. Dig up those papers (it might be easier to work backwards from the Reddit page and then find papers that use it as a dataset). Then examine their study design. What can you learn in terms of study design there?

Azza: : Also another push back on study design: what if you try to evaluate comparatively. So we have a language bot, prompted with roles and data, but then we have static do-it-yourself features like "house rules, contracts, rebudget, etc" that are triggered in predefined way. Which is better? At a more deeper level, what if there was no bot (rule-based or ChatGPT-based), and just diy features?

4 Miscellaneous

Avula et al. just published an honorable-mention paper to CSCW 2022 where they conducted a study on a WizardOfOz conversational search agent in Slack. In their study, they primarily focused on three search bot conditions (operated by a librarian) as follows:

1. No Initiative (BotInfo): In this condition, the Wizard played the role of a searchbot that could only respond to information requests by providing search results.
2. Only Dialog-level Initiative (BotDialog): Specifically, in this condition, the Wizard had the ability to ask one or more clarification questions in response to an information request.
3. Both Dialog- and Task-level Initiative (BothDialogAndTask): In this condition, the Wizard had the capability to take both dialog and task-level initiative. This means it could propose items to the users as pre-emptive recommendations and engage in clarifying dialog.

I still need to read the entirety of the paper, but it seems to me that the bulk of their work is mostly done to study the aforementioned conditions. They also were the ones that

integrated a search bot into Slack back when I was doing my capstone [1]. I can see them doing a collaborative search bot with ChatGPT soon!

Azza: : Keep an eye on them. I think we still maintain the distinction of search + agreement and we need to maintain that edge.

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