

Andrea 11:28
Hey! I'm Andrea. could you please help me with a task called **Image Transcription**?

Andrea 11:28
I think you want to see the task instructions, right?

11:28
Yes, I want to see the task instructions.

Andrea 11:28
Look at the image and determine what **letters** the image contains, and then write the letters (in the same order) as they appear in the image.

Andrea 11:28
Good. I think you now understand how to complete tasks. Shall we move on?

11:28
Let's do it!

TickTalkTurk: Conversational Crowdsourcing Made Easy

Sihang Qiu

Delft University of Technology, Netherlands
s.qiu-1@tudelft.nl

Ujwal Gadiraju

Delft University of Technology, Netherlands
u.k.gadiraju@tudelft.nl

Alessandro Bozzon

Delft University of Technology, Netherlands
a.bozzon@tudelft.nl

ABSTRACT

This demo presents TickTalkTurk, a tool that can assist task requesters in quickly deploying crowdsourcing tasks in a customizable conversational worker interface. The conversational worker interface can convey task instructions, deploy microtasks, and gather worker input in a dialogue-based workflow. The interface is implemented as a Web-based application, which makes it compatible with popular crowdsourcing platforms. The tool we developed is demonstrated through two microtask crowdsourcing examples with different task types. Results reveal that our conversational worker interface is capable of better engaging workers and analyzing workers performance.

CCS CONCEPTS

• Information systems → Chat; Crowdsourcing; • Human-centered computing → Empirical studies in HCI.

KEYWORDS

Conversational interface; chatbot; conversational agent; microtask crowdsourcing.

INTRODUCTION

Advances in microtask crowdsourcing have enabled the possibility of accomplishing complex tasks by relying on crowd workers. Tasks such as image annotation, sentiment analysis, and speech transcription can be easily accomplished on the online crowdsourcing marketplaces. During this process, the crowdsourcing platform is responsible for worker selection, microtask generation, microtask

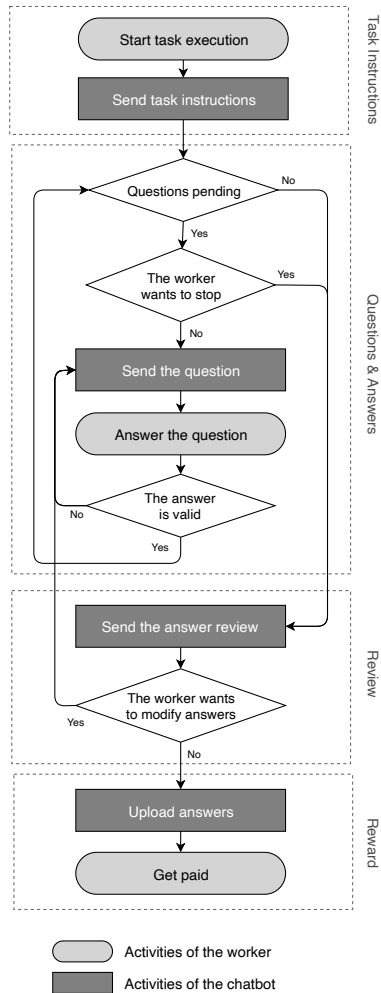


Figure 1: The workflow of the conversational agent for microtask crowdsourcing.

assignment and answer aggregation, while online workers interact with a crowdsourcing system to accept and execute a microtask using a *worker interface*.

A notable feature of the interaction between crowdsourcing platforms and workers in the majority of prior work, is the use of traditional web-based GUIs to communicate with workers, transmit instructions and gather responses thereafter. In our recently introduced notion of *conversational microtask crowdsourcing*, a conversational agent interfaces online workers with the crowdsourcing platform, facilitating task execution and task completion [1, 4].

In this demo, we present a tool for quickly deploying crowdsourcing tasks in a customizable conversational interface, named TickTalkTurk. We will first introduce the logic and workflow of the conversational agent, and then explain the design of the worker interface. We finally use two use cases to highlight the utility of the conversational interface.

This demo is presented for the system described in our previous work [3]. The code is available online for the benefit of the community (<https://github.com/qiusihang/ticktalkturk>).

CONVERSATIONAL AGENT DESIGN

The traditional web-based user interface of a crowdsourcing task typically comprises of two main parts: task instructions and microtasks. Workers are asked to first read instructions and then execute microtasks accordingly. To realize interaction comparable to web-based interfaces, a text-based conversational agent is designed following four main steps: i) task instructions, ii) questions and answers, iii) review, and iv) reward, as shown in Figure 1.

Task instructions. Simulating the essence of natural conversation, the conversational agent begins the conversation with greetings, and then presents task instructions (optional), as can be seen in Figure 2 (a), via a dialogue with the workers. The goal of this step is to let workers familiarize themselves with the conversational agent and help them understand how to complete the microtasks.

Questions & Answers. The conversational agent asks questions (each question corresponds to a microtask) to workers, and workers can provide responses to microtasks by either typing answers or using customized UI elements (such as buttons).

Review. On the traditional web interface, a worker can easily go back to a question and edit its answer. To realize this affordance in the conversational interface, workers are provided with the opportunity to edit their answers if needed (by typing “edit answer” to enable the answer modification), before submitting the microtasks.

Reward. After reviewing the answers, workers enter the final stage where they can submit their answers and claim their rewards.

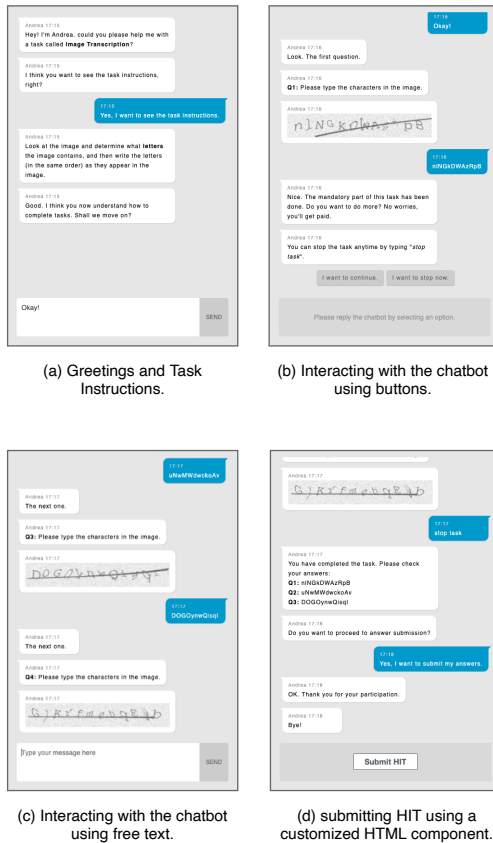


Figure 2: Two interaction types of the conversational interface.

TEXT-BASED CONVERSATIONAL INTERFACE

Popular crowdsourcing platforms (such as Amazon Mechanical Turk and Appen) offer web interfaces based on standard technology like HTML, CSS and Javascript. To avoid the need for installing a messaging application – for instance, Telegram, or Whatsapp, where conversational agents are usually deployed, we designed and implemented the conversational interface in HTML/CSS/Javascript, thus enabling easy integration with existing platforms and access to the available crowd workers.

The conversational interface supports any data source that is supported by HTML5, including text, image, audio, and video. Therefore, most common task types such image classification, sentiment analysis, information finding, object recognition, and speech transcription can all be implemented. Our design provides workers with two default means to answer microtasks, as shown in Figure 2 (b) and (c). Workers can either type in the textarea or click a button to send their responses. Furthermore, for some tasks that need special functions, UI elements from traditional web pages (e.g. customized buttons, slide bars, drawing tools, etc.) can also be easily ported into conversational interfaces, as shown in Figure 2 (d). In addition, the conversational interface can record all the activities of the worker (including all keypress events with timestamps) for further analysis if needed.

DEMO HIGHLIGHTS

Improving User Engagement

We deployed batches of different types of crowdsourcing tasks – information finding, sentiment analysis, CAPTCHA recognition, and image classification tasks – on the traditional web interface and three conversational interfaces having different conversational styles (i.e. the agent converses with the worker in different styles).

We conducted experiments to investigate the effect of conversational interfaces on the output quality, compared to the traditional web interfaces. We used two means – worker retention in the batches of microtasks (the number of completed microtasks) and self-reported scores on the short-form user engagement scale [2] – to measure worker engagement. We used the NASA-TLX instrument (<https://humansystems.arc.nasa.gov/groups/TLX/>) to measure cognitive load after workers complete the tasks.

We found that the workers using conversational interfaces were generally better retained than the Web workers (workers using conversational interfaces completed significantly more microtasks compared to the traditional web interface). We found that a suitable conversational style has the potential to engage workers further in specific task types. Our work takes crucial strides towards furthering the understanding of conversational interfaces for microtasking, revealing insights into the role of conversational styles across a variety of tasks [4].

Analyzing Conversational Styles and Workers Performance

To estimate and analyze workers' conversational styles, we designed a coding scheme inspired by previous work [6, 7] and corresponding to conversational styles based on the five dimensions of linguistic devices that have been examined. Demonstrating the practical utility of the conversational style estimation, we propose methods to predict the conversational style of users using either rich conversational data, or limited conversational data.

We recruited 180 unique online crowd workers from Amazon Mechanical Turk and conducted experiments to investigate the feasibility of conversational style estimation and worker performance analysis (output quality, worker engagement, and perceived task load) for online crowdsourcing .

Our results show that we can predict the conversational style of workers a high accuracy (80%). Furthermore, our experimental findings revealed that workers with specific conversational styles have significantly higher output quality, higher user engagement and less cognitive task load while they are completing a difficult task, and have less task execution time in general. The findings have important implications on worker performance prediction and quality-aware task scheduling in microtask crowdsourcing [3].

Augmenting Long-term Memorability in Information Finding Tasks

Furthermore, we also delve into the research question: how can human memorability of information consumed in information finding tasks be improved by text-based conversational interfaces. Through our experiments, we found that conversational interfaces have the potential to augment long-term memorability (7.5% lower long-term information loss). In terms of worker performance, workers leveraging conversational interfaces input more queries but opened links less frequently compared to workers leveraging the traditional Web interfaces in the search session. In addition, we enabled the function of note-taking. The workers of conversational interfaces tend to type notes themselves, while the Web workers input significantly longer notes by copying content directly from the result pages on the search engine. Our findings have important implications for building information retrieval systems that optimizes the long-term memorability of information consumed [5].

Summary: The conversational interface used in TickTalkTurk is purely HTML based, elements used in traditional web interfaces can be easily ported into conversational interfaces. With TickTalkTurk, the overheads of designing and implementing conversational interfaces can be easily reduced. Task requesters can quickly deploy and publish their tasks on popular crowdsourcing platforms, to obtain not only high-quality outcomes but also an increase in worker engagement and a better understanding of worker performance.

ACKNOWLEDGMENTS

This work was carried out on the Dutch national e-infrastructure with the support of SURF Cooperative.

REFERENCES

- [1] Panagiotis Mavridis, Owen Huang, Sihang Qiu, Ujwal Gadiraju, and Alessandro Bozzon. 2019. Chatterbox: Conversational Interfaces for Microtask Crowdsourcing. In *Proceedings of the 27th ACM Conference on User Modeling, Adaptation and Personalization*. ACM, 243–251.
- [2] Heather L O'Brien, Paul Cairns, and Mark Hall. 2018. A practical approach to measuring user engagement with the refined user engagement scale (UES) and new UES short form. *International Journal of Human-Computer Studies* 112 (2018), 28–39.
- [3] Sihang Qiu, Ujwal Gadiraju, and Alessandro Bozzon. 2020. Estimating Conversational Styles in Conversational Microtask Crowdsourcing. *Proceedings of the ACM on Human-Computer Interaction* 4, CSCW1 (2020), 1–23.
- [4] Sihang Qiu, Ujwal Gadiraju, and Alessandro Bozzon. 2020. Improving Worker Engagement Through Conversational Microtask Crowdsourcing. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*. ACM, 1–12.
- [5] Sihang Qiu, Ujwal Gadiraju, and Alessandro Bozzon. 2020. Towards Memorable Information Retrieval. In *Proceedings of the 2020 ACM SIGIR International Conference on the Theory of Information Retrieval*. ACM.
- [6] Deborah Tannen. 1987. Conversational style. *Psycholinguistic models of production* (1987), 251–267.
- [7] Deborah Tannen. 2005. *Conversational style: Analyzing talk among friends*. Oxford University Press.