Remo: Generating Interactive Tutorials by Demonstration for Online Tasks

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ABSTRACT
People with limited digital literacy struggle to keep up with our increasing dependence on websites for everyday tasks like paying bills or booking flight tickets online. They often get in-person assistance from their friends and family but such help may not always be possible. Remote assistance from peers such as phone calls, or written instructions via email or text messages can be useful. However, remote methods of assistance may lead to communication issues between the helper and the help-seeker, due to a lack of shared visual context; a helper cannot see the help-seeker's screen. Moreover, help-seekers are often unacquainted with the terminology associated with web navigation. In order to bridge the gap between in-person support and remote help, we develop Remo, a web browser extension, which will allow helpers to create interactive tutorials by demonstration. These tutorials will be embedded within a web page and will make use of visual cues to direct users to specific parts of the page. Remo aims to provide opportunities for people with limited digital literacy to complete online tasks by following the step-by-step and task specific tutorials generated by their peers. Using Remo, we anticipate that the target population will be able to get personalized assistance, similar to in-person support, and eventually learn how to complete broader online tasks independently.

Author Keywords
remote assistance; interactive tutorials; digital literacy

CCS Concepts
•**Human-centered computing** → **Interactive systems and tools;** •**Information systems** → *Web applications;*

MOTIVATION
The existence of the Internet has greatly enhanced our lives. Not only is it a source of knowledge, but it also allows people to access essential services like banking and shopping. While the internet affords people a multitude of conveniences and is seemingly ubiquitous, it has not been designed in a way that is inclusive to all [8].

When certain users struggle to use the Internet, they resort to remote or in-person help for basic web tasks [5]. In-person assistance may not always be available for a help-seeker and their peers often choose to help them remotely. However, remote assistance can be challenging. Not being able to view the context within which the individual is asking for assistance makes it difficult for helpers to understand what the individual is trying to convey and vice versa. A lot of helpers resort to communicating using technical terms, or jargon, which are difficult for individuals with limited digital literacy to understand. Additionally, it is difficult for the helpers to take out time in order to assist someone remotely at the same time. All of these issues of remote help point towards the need for an easier and asynchronous alternative, for the helper as well as the recipient. Video tutorials are potentially one solution to this, but these are fast-paced and hard to follow for those not well-acquainted with navigating through the web [10]. Additionally, these tutorials are not situated within the web page itself, making it inconvenient for users to switch back and forth between the task and the tutorial [10].

To address these challenges, we have developed Remo, a recording tool that allows users to generate interactive tutorials of basic web tasks that can be used by those who struggle to navigate the web. Remo is developed by extending Ringer [1] which aims to record and replay user interactions with a web page, developed for the purpose of automating a web task.

Remo applies the method of *generating interactive tutorials by demonstration*. Previous works allow users to generate macros with a record and replay function [6, 7]. Other works allow users to augment web pages with notes and screenshots containing visual cues in order to generate step-by-step tutorials for specific tasks [11]. The design of Remo draws ideas from these works to create within-context tutorials that have proven to be effective for novice users [2, 3, 9]. Rather than using screenshots or the replay of browsing activity to help users accomplish a task, Remo overlays the actual web pages for help-seekers with visual cues and allows them to follow the step-by-step, interactive tutorials generated by helpers' demonstrations. Remo is layered on top of the existing UI of a web page, similar to LemonAid [4].

Our hypothesis is that such tutorials will make it easier for the helper to give assistance at their own convenience, by simply recording their browsing activity while carrying out a certain web task. Additionally, help-seekers will be able to complete web tasks with relative ease by following tutorials embedded

within the web page.

FORMATIVE ASSESSMENT

We conducted a needfinding user survey with 84 participants to figure out the problems helpers encounter while offering in-person or remote help. Once participants filled out the survey, we performed thematic analysis on the participants' responses. Through this thematic analysis, we narrowed down the fundamental issues that helpers face while offering in-person or remote assistance to others.

- **In-person assistance:** With in-person assistance, participants reported finding it difficult to strike a balance between helping someone and taking over and doing the task for them. 23 participants reported that communication was a huge barrier when helping an individual accomplish a task on their own. As on participant reported, one of the main barriers they faced before accomplishing a task for someone in-person was *"Understanding what they want to accomplish (sometimes); recognizing what knowledge/skill they do/do not have or what jargon they understand"*.
- **Remote help:** With remote help, participants reported difficulties in understanding the problem without having access to an individual's computer screen. The communication barrier gets even more pronounced with remote help, as both the helper and the help-seeker have to rely on each other's words in order to understand and navigate through the web task. Differences in how well-acquainted both individuals are with internet jargon makes offering help remotely a difficult task. One participant reported, *"If the person has a very low digital literacy, it is almost impossible or at best very time consuming to guide them remotely."*

With Remo, helpers will be able to create tutorials for a web task by performing the task themselves. Since 27 participants reported that doing a task for an individual was quicker, convenient and more efficient than talking them through the task, we hypothesize that helpers will find it easier and more convenient to automatically generate tutorials using Remo by performing a web task themselves.

REMO

In Remo, we consider the following design goals:

- **Providing an interactive tutorial situated within the actual target task webpage:** Our goal is to provide users visual cues within the web page that will allow them to navigate through a web task. The cues will consist of highlighted regions, arrows and written instructions that guide users to a specific part of the web page.
- **Making the tutorial creation process more convenient than providing in-person or remote help:** Users will be able to create tutorials with relative ease. By carrying out the task themselves and using the record feature, they will be able to create tutorials. The tutorial creation process will be faster and more convenient than existing methods.
- **Generating instructions that are more understandable to a layperson:** The language used in the created tutorial will be understandable for someone who is not well-acquainted with internet jargon.

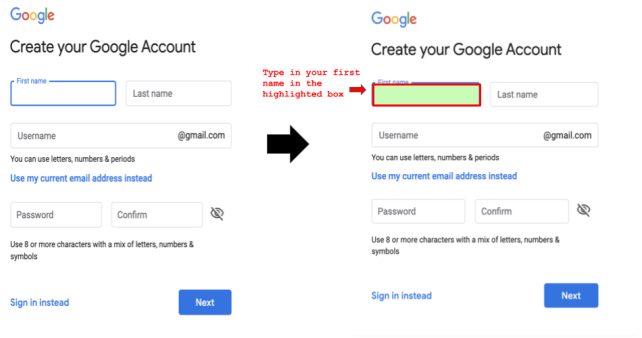

Figure 1. Remo: Highlighted regions that act as visual cues to allow users to interact with specific elements in the web page

Remo records the interaction trace of a user who demonstrates how to complete an online task. This interaction trace is analyzed and used to generate tutorials consisting of visual cues such as arrows and highlighted regions (Figure 1) to guide the user's attention to a specific part of the web page with customized instructions.

In short, Remo will be a better experience for both helpers and help-seekers compared to in-person or remote helping. Helpers will find it less time consuming to create tutorials. The help process will be asynchronous as help-seekers will be able to use the tutorial at their own convenience. The tutorial will be situated within the web page allowing help-seekers to carry out the task without context switching.

ONGOING EFFORTS

(A needfinding study for help-seekers) We plan to conduct a need finding user study in order to better understand the needs of help-seekers. This study will consist of interviews and a task where participants will be asked to navigate through a simple web task while talking out loud. The aim of this study is to give us more insight into the problems people encounter while navigating the web so that we can adjust our design goals accordingly. While we planned to conduct this study before the development, the recruitment has been a challenge due to the COVID-19 pandemic.

(Evaluation of Remo) Once our system is fully functional, we will conduct a user study to validate our hypotheses. We aim to answer the following research question through the user study.

- How does the method of generating interactive tutorial by demonstration allow helpers to provide remote assistance more conveniently and effectively compared to other alternatives (e.g.,written instructions)?
- Do help-seekers accomplish their target tasks more effectively using the interactive tutorials than the traditional method?
- Do help-seekers learn more from the interactive tutorials than from other alternatives?

In order to answer our research questions, we plan to conduct a controlled user study, which involves both helpers and help-seekers accomplishing an online task.

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