# Utilizing Chatbots to Assist people Living with Alzheimer's or Related Dementias, and Their Caregivers Using Geographic Information System (GIS) Services

DREU Final Report
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## Abstract

People living with Alzheimer's or related dementias and their caregivers experience feelings of depression, and isolation due to lack of support and barriers to accessing services. There is a particular urgency to address issues of Alzheimer's and related dementias (AD/RD) in Alabama, where there is an expected 17% increase in cases of AD/RD over the next six years. Many of the patient/caregiver populations in Alabama are geographically isolated, vulnerable, and unaware of local support services and resources. Our approach is to create a chatbot using geographic information system (GIS) services to disseminate local resource information.

## 1. Introduction

Little is known about how useful AI chatbots are with helping Alzheimer's and related dementias patients, as well as their caregivers. Our research seeks to promote public engagement with technology, improve health, well-being, and access to quality care for people with Alzheimer's and related dementias. A virtual chatbot was developed using an open-source machine learning framework called Rasa to automate targeted text conversations. The chatbot requires a backend database of resources that are sourced in a variety of ways that must be maintained. Using java programming language, we built a database that requires geographic information system (GIS) services to ensure that the data is location specific. NLU training data to stores structured information about the user messages [6].

## 2. Related Work

Our main question during while conducting the research was: Are chatbots effective for disseminating information to AD/RD impacted communities? To address this question, we researched way in which that chatbots can be useful. There are some researchers who stress the importance of chatbots by mentioning how useful they are in many other contexts like in customer service to automate tasks and improve the user experience [3]. In that example, a customer service chatbot may focus on creating a human-chatbot interaction. Which can be very helpful when trying to build a relationship with the user.

This research considers another approach where we inform the user that they are interacting with a bot. Our chatbot gives the user information search interactions focused on the assistant providing information without necessarily sharing a personal relationship with the user [1]. For users who prefer a human-like conversation we took a similar approach at other researchers and designed a variety of pattern answers to make the bot agile, not too stereotyped and boring [5].

## 3. Conversation Design

While developing training data, we sourced various Alabama Area Agency on Aging Senior Resource Directories for current local resource data. To map out the chatbot conversations we created a conversational flowchart with many conditional response variations. After running several tests, the chatbot responses were either broad or incorrect responses. The intent prediction confidence level ranged from 0.0 to 0.27 for most of the incorrect responses. More rules and stories were implemented in order to create target conversations.

However, the new targeted conversations became less influenced by the user's input. To fix this we considered creating slots to store specific information within the conversations. This helped to influence the conversations but it did not fully correct the low intent prediction levels. As we continued to map the conversations within the flowchart, we designed two paths to communicate with chatbot. A short-targeted path for users who know what resources they are seeking, and a long path for users to explore many resources.

During this time, the user experience was considered and aspects of accessibility, usability, and inclusion was included in this research. Many point-and-click methods were employed to simplify user interaction while also, restricting user openness to avoid user frustrations [4]. To increase inclusion southern idioms were integrated into the training data.

Utilizing various Alabama Area Agency on Aging Senior Resource Directories, we created categories for the buttons. Using .YML files developed 90 intents, 900 examples, 18 rules, 100 stories, 8 entities, 9 slots, 92 buttons, 97 utterances, 9 actions, as our training data. Various text files were created to store the Alabama counties, cities, and zip codes. After debugging, and running test were able to the improve the intent prediction confidence level from 0.19 to 1.0 with each button.

As of now, the chatbot relies on the backend database to retrieve current local resource data using Java. Using geographic information system (GIS) services, we have created a map that allows the user to either hover over with their mouse or click a drop-down menu to find their Alabama county. The user can provide consent so have their IP address identified to locate their Alabama county as well. The chatbot is functional and the user can type or use the point-and-click methods to find local resources.

## 4. Conclusions and Future Work

Our chatbot provides support and services to Alzheimer's and related dementias (AD/RD) impacted communities in Alabama. Using Rasa Framework, we developed a chatbot that allows the user access to information about local resources based on their Alabama county. The user can schedule services or seek a referral to their local Area Agency on Aging. In the future we plan to improve the chatbot user interface by adding more accessibility features and allowing the user to access local resources based on their city or zip code. Our goal is to feature the chatbot on the University of Alabama Caregiver Connect website along with our map to help locate local resources in Alabama. Conducting surveys, interviews, and focus groups with a variety of stakeholders is our next step to assess the effectiveness of the chatbot. Furthermore, our research

needs to safeguard ethics and privacy for the Alzheimer's and related dementias (AD/RD) impacted communities using this chatbot [2].

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