Russell: Conversational AI Game Platform

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Problems & Trends

Loneliness due to isolation is a significant issue, specifically for the older adult population. It has been reported that more than 40% of seniors regularly experience loneliness and feelings of abandonment can have a negative impact on your mental health as well as physical health. Having the opportunity to partake in conversations or engage in an enjoyable activity is an unmet need for individuals who do not have someone readily available to listen to them or engage with them in a playful manner.

Validation

We validated our solution through testimony and user testing. We received positive testimony from speaking with a research professor in Human Computer Interaction, elderly family and friends, and also conducting a literature search of research studies on how technology and loneliness specifically impact the elderly demographic.

We also traveled to local retirement communities to obtain feedback on our minimum viable product, early iteration prototypes. We gathered insightful feedback regarding functionalities that would improve the user experience, as well as strong enthusiasm from residents and administrators.

Solution

From these trends and problems we observed, we propose our solution Russell: an artificial intelligence game system where senior citizens can play games with a conversational bot.

As a proof of concept for our demos, we chose the game Guess Who? since the game inherently requires back and forth conversation as a player asks their opponent questions about an unknown selected character in order to guess who it is.

Technical Overview

From a technical perspective, Russell utilizes speech to text transcription technologies, natural language processing, all integrated with a game system frontend display

The game starts with first transcribing the audio output from the user. The user's audio output is transcribed to text and fed into an NLP interface that will categorize a character trait and adjective for the Guess Who? question asked by the user.

After the NLP classification, the game system will compare the guess of trait and adjective to the mystery characters presented on the game game board and all the characters who do not possess the characteristics asked by the user will be crossed out. In addition, an audio output of of whether the mystery character has those features is also spoken aloud. The game continues until the user is finally able to guess the missing character, being congratulated that they have won the game.
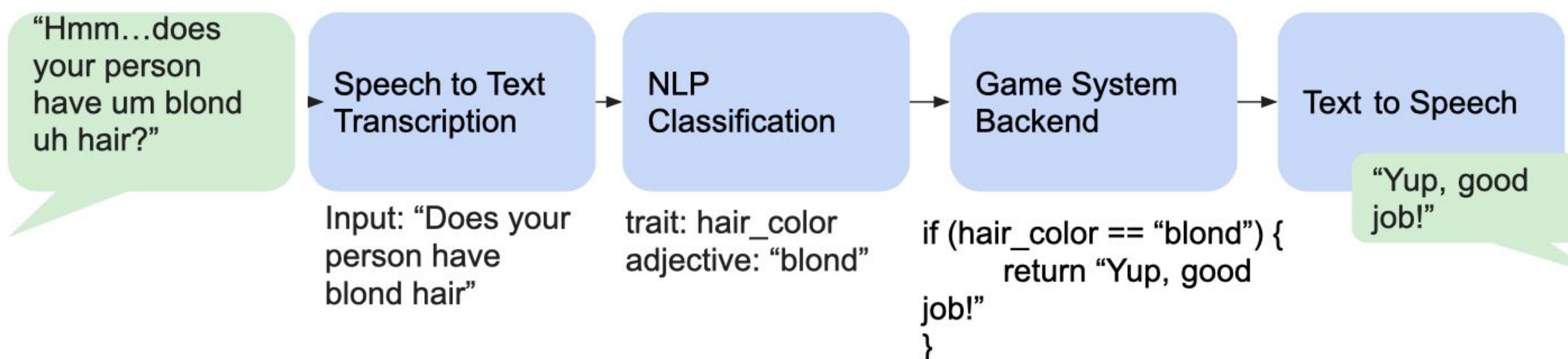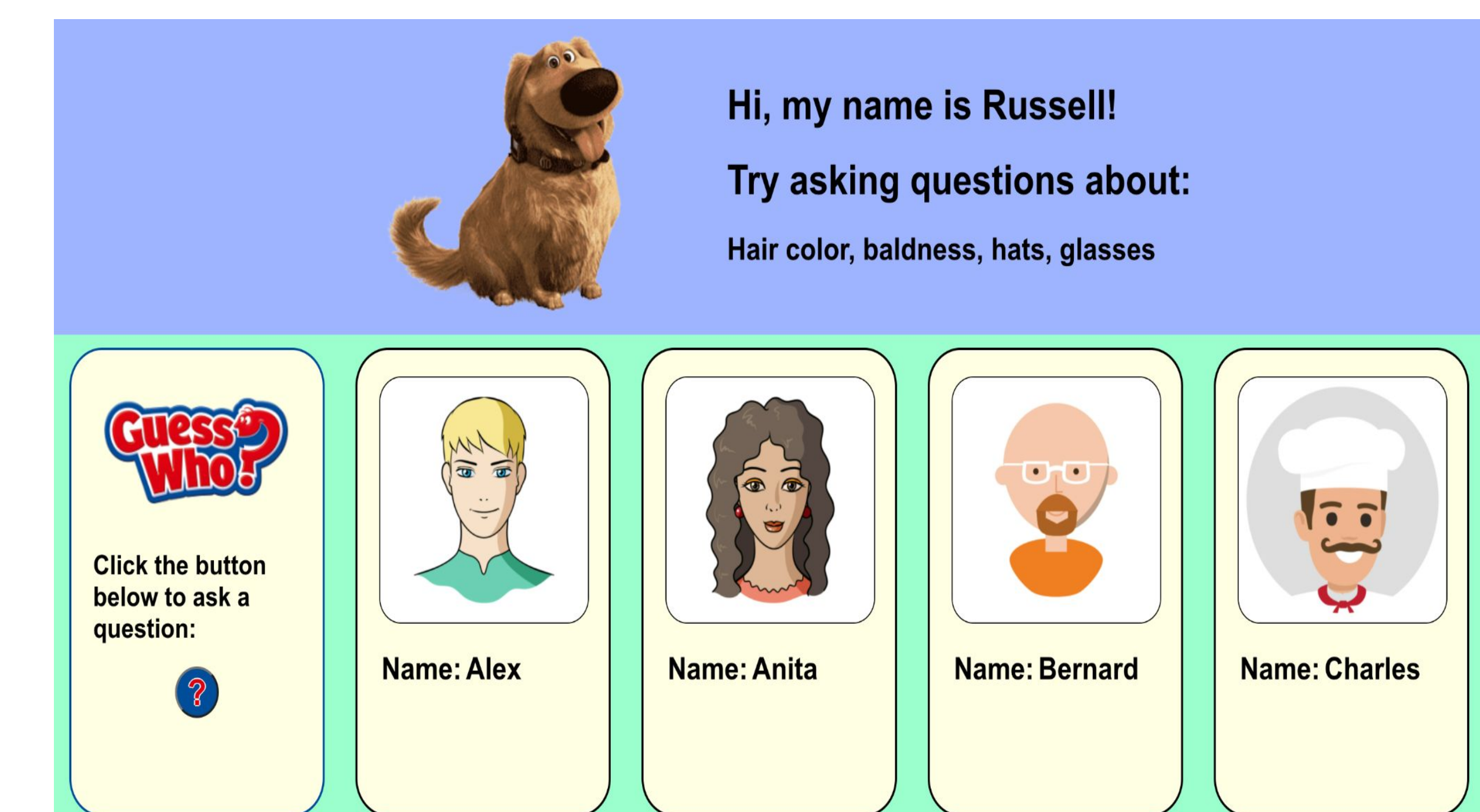
Figure 1 – User Testing

We visited Pickersgill Retirement Community in Towson to get feedback on our prototype from residents

Figure 2 – Prototype Front-end Game Display

Hi, my name is Russell!
Try asking questions about:
Hair color, baldness, hats, glasses

Guess Who?
Click the button below to ask a question:

Name: Alex   Name: Anita   Name: Bernard   Name: Charles

Next Steps

Moving forward, some technical functionalities that would improve our prototype are
1. Better color contrast in the display to assist a diversity of vision abilities of elderly users,
2. Screen reader integration where the images, text, and buttons of the display can be read out loud to users, and
3. Multiple difficulty modes of games to cater to the diversity of cognitive abilities of elderly users.

Additionally, our team has looked into expanding our prototype into a full game platform by partnering with game companies and retirement communities

Technical Workflow Diagram

"Hmm…does your person have um blond uh hair?"

Speech to Text Transcription
Input: "Does your person have blond hair"

NLP Classification
trait: hair_color
adjective: "blond"

Game System Backend
if (hair_color == "blond") {
    return "Yup, good job!"
}

Text to Speech
"Yup, good job!"