Mobility21

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Accessibility with GetGoing

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FINAL RESEARCH REPORT

DISCLAIMER

1.Introduction

1.1 Description of the problem and approach

When an individual wants to travel locally, they commonly rely on Google to get information about how to get where they are going. They can find out how to get around on foot, by car, by bicycle or with public transportation (wayfinding). But Google has limitations. Google does not map the interior of bulidings and so cannot tell users what to do after they get to the building they need to enter. It cannot tell them which door to enter when there are several, which halls and elevators to take, etc. It also cannot help people with disabilities such as low vision or using a wheelchair. For them, funding the right entrance to a building, for example, consists of finding where there are no barriers, uneven sidewalks, etc. This year Accessibility with GetGoing has undertaken to pick up where Google leaves off, making it easier for people to get to chosen destinations.

Our approach has been to choose one location that represents the difficulties encountered in wayfinding and to completely cover it. We chose UPMC Presbyterian Hospital Campus. This location can be characterized by having several buildings, several entrances to each building, elevators and stairs, many hallways and the end goal being represented by a name (Dr. Smith's office) a number (Suite 604 in building A) or a landmark (Innovative Eye Associates).

We have been working with two partners, pathVu and UPMC, on information for disabled individuals and hospital wayfinding, respectively.

2. Methodology

This year, we have employed many different techniques to arrive at a working deployed GetGoing wayfinding system for UPMC Presbyterian Hospital.

- We incorporated the pathVu routing API to provide walking directions outdoors with awareness of barriers(our partner, pathVu, supplies this type of information for downtown Pittsburgh and the Oakland area).
- Since pathVu's routing API was originally designed for mobile apps with a graphic user interface, we converted structured API output into natural language representations by creating templates and extracting corresponding information,
- We have delivered more natural voice instructions by injecting prosody and chunking information
- We have provided additional walking instruction details such as street crossing and destination orientation.
- We have integrated the Google Geocoding API with our system in order to convert addresses to/from geographic coordinates for improved position accuracy.
- We have resolved acronymized and abbreviated street and intersections names for more comprehensible location confirmation.
- We have created functions that provide routes in alternate modes, such as for visually impaired users.
- We have integrated pathVu and the Google API in our system so that the system can switch between different transit modes, providing more flexible routes based on user needs
- We set up a remote Flask server to speed up route lookup.
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3. Findings – the new GetGoing system for wayfinding

At the end of the project we deployed GetGoing. It is accessible via a phone number. Our research group has tested the system and some modifications and bug fixes were carried out after the tests. The pandemic

situation prevented us from doing any testing with real users as COVID guidelines vary and many people have hesitated to travel, even locally, and to come in to doctors' appointments. In order to have a working system, we did the following;

- We connected with the UPMC Disabilities Resource Center to discuss our plan for GetGoing's indoor map to cover the UPMC Presbyterian campus. We got a lot of walking directions from several information desk employees and translated that into a format that can be used by GetGoing
- We created a new database in the GetGoing system to for expert route lookup
- We collected navigation instructions to/from various offices and facilities in UPMC Presbyterian campus that are publicly available on various websites
- We collected maps around the UPMC Presbyterian campus, covering Oakland area, campus outdoor, and walkways/bridges connecting buildings and transformed information gleaned from then into a format that can be used by GetGoing. This implies encoding graphical maps into text representations for more efficient computation
- We collected and processed practitioner/office name and location information within the UPMC network
- We collected parking information around the UPMC Presbyterian campus from miscellaneous online resources, including parking directions listed by different doctor's offices/suites and maps provided by UPMC
- We annotated the outdoor maps to build an updated parking dataset for all buildings on the UPMC Presbyterian campus
- We added a parking assistance feature to GetGoing. Users can now ask the system for both valet and self park information near their destination
- We updated walking directions so the system can now provide more accurate and optimal walking directions from nearby bus stations to UPMC facilities
- We collected physician information from UPMC's Find a Doctor website, including physician names, specialty, office location, and phone number
- We created a phonetic fuzzy matching system between query names resulting from Google's speech recognition and candidate names in the physician's directory. The system's backend can then search for a physician's information based on the user's request
- We added a physician name lookup feature to GetGoing so that users can get a doctor's office information by telling the system the name of the person they are looking for
- We added an additional natural language processing model to perform more robust named entity recognition on person names.
- We set up deployment servers for a more scalable system. Thus multiple calls can be answered at the same time.

3.1 Publications and Presentations:
- Towards Automatic Route Description Unification In Spoken Dialog Systems 8th IEEE Spoken Language Technology Workshop (SLT 2021)
- Smart Mobility Connection on February 19, "GetGoing and Better Mobility for All".

3.2 Data

Due to the pandemic, we were not able to collect data as we had hoped. We do have test data that we have collected over time. While this data does not come from real users, we believe that our tests reflect the types of trips that real users would want GetGoing to inform them about. The system was up and running at the very end of the grant and the resulting data was gathered at that time and in the weeks following the end of the grant. The data is available at: https://github.com/DialRC/GetGoingData.

3.3 Results

The work described in this document has led to the GetGoing system for wayfinding at UPMC Presbyterian Hospital ((412) 259-5311). The code for GetGoing will be made available for further use and testing by professional Masters students we will hire in Fall semester 2021.

4. Conclusions and recommendations

We have created a wayfinding system that can be used where Google leaves off to get people through a complex campus of buildings. Of all of the UPMC hospitals we chose Presbyterian because there are several buildings, a very large number of doctors (so getting the names right would be challenging), many different types of services and a hilly setting where finding the right entrance to a building is not evident. The resulting GetGoing code can be used for wayfinding in many situations, not just hospitals, but train stations, airports, etc.

We hope that others will take the code and expand it to these other applications.

GetGoing URL:
https://www.cs.cmu.edu/~yulanf/getgoing/