CS 466/566 Voice Assistant
Final Project

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Designing, Building and Testing a Voice Application

I have used Google dialog flow for designing, building and testing my voice application.

Because Dialogflow is easy to follow and developer-friendly.

Step-1 Describe the Application

An easy-to-use voice assistant called WeatherMate was created to offer current weather information. It meets a variety of user demands with its three specific objectives, from providing thorough three-day predictions to the present temperature. WeatherMate provides dependable and fast answers, regardless of whether customers need to know the current temperature or need to schedule a sunrise or sunset. The program seeks to improve outdoor activities and everyday planning by providing convenient access to reliable weather predictions. Those who want to monitor weather conditions in order to better organize their daily schedules and travel arrangements may find this application very helpful.

Step-2 Interaction Model

There are 3 Intents in the WeatherMate

1. **CurrentTemperatureIntent**: This intent responds to user inquiries about the temperature as of right now or today. Users have the option of specifying a location or asking for the current temperature in that place. The intent interprets the user's request, determines the place that is needed, and obtains the relevant temperature information.

2. **SunriseandSunsetIntent**: This purpose gives users the timings of dawn and sunset according to the place they have entered. Users can ask for the dawn and sunset timings on any given day, including today. The right date and location are obtained by the intent before it retrieves the pertinent solar data in order to perform these requests.

3. **ThreeDayWeatherForecastIntent**: This intent provides a three-day weather prediction. Users may ask for weather information at any defined place, even where they are right now. The intent uses the user's query to determine the location and then generates a prediction that contains overall weather conditions, possibility of precipitation, and high and low temperatures.

Training phrases per intent

CurrentTemperatureIntent:

1. **Temperature check for Boston.**
2. **Is San Francisco hot today?**
3. **Tell me how warm Portland is today.**
4. **What's the temperature in Austin?**
5. **Is it freezing in Delaware today?**
6. **Check the temperature in Bellevue.**
7. **How warm is Albuquerque today?**
8. **What's the weather temperature in Las Vegas?**
9. **Show me the temperature in Virginia.**
10. **Temperature for Atlanta right now.**
11. **Is it cold in New York today?**
12. **How hot is it in Dallas right now?**
13. **Current temperature in Seattle.**
14. **Tell me the current temperature in Phoenix.**
15. **What is the current temperature in Los Angeles?**

SunriseandSunsetIntent:

1. What time does the sunset in San Diego today?
2. What time does the sunrise in Los Angeles today?
3. Tell duration of sunlight today in Dallas.
4. When will the sunrise and set in Las Vegas?
5. Get the sunrise and sunset information for Boston.
6. Daylight duration in Bellevue today.
7. Sunlight hours in San Francisco.
8. Sunset time for Orlando.
9. What are the sunrise and sunset times in Atlanta?
10. Show me when the sunrises in Phoenix.
11. When will it get dark in Austin today?
12. Tell me the daylight hours in Seattle.
13. Sunrise and sunset times for Miami.
14. When does the sunset in Portland?
15. What time is sunrise in New Orleans today?

ThreeDayWeatherForecastIntent:

1. Weather prediction for Bellevue for Three-days.
2. Get the three-day weather prediction for Boston.
3. Provide the upcoming weather details for Atlanta for three days.
4. Weather forecast for Las Vegas over the next three days.
5. What's the weather forecast to be like in Dallas tomorrow?
6. Tell me the extended forecast in Phoenix for the next two days.
7. Show the three-day weather report for Miami.
8. Give three-day weather forecast update for Austin.
9. Give extended weather report for San Antonio next two days.
10. What's the forecast for New York over the next two days ?
11. Upcoming weather in Seattle for three days.
12. Tell me the weather prediction for the next three days in Los Angeles.
13. Three-day weather in report Orlando.
14. Show me the three-day forecast for Boston.
15. What is the weather forecast in Portland for the next three days?

Parameter & Entities

1) CurrentTemperatureIntent

Parameter: geo-city

Entity: @sys.geo-city

Parameter: date-time

Entity: @sys.date-time

Parameter: Temperature

Entity: @Temperature

2) SunriseandSunsetIntent

Parameter: geo-city

Entity: @sys.geo-city

Parameter: date-time

Entity: @sys.date-time

Parameter: SunriseSunset

Entity: @SunriseSunset

3) ThreeDayWeatherForecastIntent

Parameter: geo-city

Entity: @sys.geo-city

Parameter: date-time

Entity: @sys.date-time

Parameter: Weather

Entity: @Weather

Step-4:Persona

- **Name:** Sansa
- **Age:** 23
- **Gender:** Female

Background

Sansa is designed to be the embodiment of a trustworthy and supportive friend who is always there to provide insightful and timely weather reports. She is the perfect partner for anybody trying to keep ahead of weather changes, whether it be for everyday commuting or organizing weekend excursions, thanks to her experience in technology and her love of assisting people.

Accent and Language

- **Accent:** American English
- Sansa's neutral American accent makes her widely comprehensible to a wide range of American listeners as well as English-speaking users throughout the globe.

Personality Traits

- **Interactive:** Sansa actively interacts with users by encouraging them to investigate different meteorological aspects and dynamically answering their questions.
- **Engaging:** Sansa makes sure that conversations are not only educational but also entertaining with her captivating and attention-grabbing voice.
- **Kind:** Sansa responds to people in a kind manner, demonstrating empathy and comprehension for their wants and worries.
- **Approachable:** Her approachable manner encourages regular conversation, making her a go-to person for weather-related questions.
- **Youthful:** Sansa resonates to a younger audience that appreciates swift and tech-savvy communication because she reflects her age in interactions by bringing a fresh and dynamic spirit.

Step-5: User Testing

Part 1 - Description of Usability Testers:

Bhuvana

- **Age:** 24
- **Background:** As a graduate student studying environmental science, Bhuvana must regularly interact with meteorological data in order to arrange fieldwork. She depends heavily on quick and accurate weather reports because of her academic and professional interests.
- **Reason for Selection:** She needs rapid access to weather information for her everyday activities and research needs. She is a young, tech-savvy woman. Her demands and way of life are quite similar to the target user base that WeatherMate wants to attract.

Karthik

- **Age:** 35
- **Background:** Karthik is a software developer with a keen interest in smart home technologies. He regularly uses various voice-activated devices and applications to optimize his daily routines and enhance his home environment.
- **Reason for Selection:** Karthik's technical background allows for a more thorough examination of the user interface and interaction quality during testing. He can offer in-depth input on usability and functionality because of his background with voice assistants and smart technologies.

Part 2 - Usability Testing

Expected Results

Task	Time to Complete	Expected Output
Task-1 Tell me how warm Portland is today.	10sec	The current temperature in Portland is 19.81 degrees Celsius.
Task-2 Sunset time for Orlando	15 sec	In Orlando, the sun rises at 6:27:25 AM and sets at 8:22:34 PM.

Task-3 Temperature for Atlanta right now.	11 sec	The current temperature in Atlanta is 26.54 degrees Celsius.
Task-4 What's the forecast for New York over the next two days ?	18 sec	Here is the three-day weather forecast for New York: On 6/10/2024, the temperature will be around 20.23°C with clear sky. On 6/11/2024, the temperature will be around 18.22°C with clear sky. On 6/12/2024, the temperature will be around 21.12°C with overcast clouds.
Task-5 Tell me the daylight hours in Seattle.	16 sec	In Seattle, the sun rises at 5:11:56 AM and sets at 9:05:43 PM.

Results from Usability Testing

Task	**Time to complete**	**User 1 - Done?**	**User 1 - Time**	**User 2 - Done?**	**User 2 - TIme**
Task-1 Tell me how warm Portland is today.	10sec	Yes	Yes	Yes	Yes
Task-2 Sunset time for Orlando	15 sec	Yes	Yes	Yes	Yes
Task-3 Temperature for Atlanta right now.	11 sec	Yes	Yes	Yes	Yes

Task-4 What's the forecast for New York over the next two days ?	18 sec	Yes	Yes	Yes	Yes
Task-5 Tell me the daylight hours in Seattle.	16sec	Yes	Yes	Yes	Yes

Part-3 Likert Scale Testing

Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I found the WeatherMate voice assistant easy to interact with.					☑
The voice assistant accurately understood my queries.				☑	
WeatherMate provided weather information quickly.					☑
The weather information provided was accurate and reliable.					☑

The weather updates from WeatherMate were helpful for planning my activities.					☑
Interacting with WeatherMate is a pleasant experience.					☑
I would use WeatherMate again for future weather inquiries.					☑
I would recommend WeatherMate to others.					☑
User Interface Satisfaction				☑	
Overall, I am satisfied with the WeatherMate voice assistant.					☑

Part -4 Open-ended questions

User-1

What was your overall impression of using WeatherMate, and what feature stood out to you the most?

In identifying user requests and providing appropriate responses, I found the purpose matching tool to be quite useful. It saved me a ton of time because I didn't have to manually code every possible user request.

Based on your experience, what aspects of WeatherMate do you think could be improved or added to enhance its functionality?

I was able to ask consumers for further information or walk them through a particular procedure depending on their prior input by using Dialog Flows follow-up intentions.

Can you describe any challenges or difficulties you encountered while interacting with WeatherMate? How do you think these could be addressed?

Because some words in the system are meant to be repeated, the final response also sounds the same every time. It may have been altered and given more reaction options to give it a more human feel.

User-2

What was your overall impression of using WeatherMate, and what feature stood out to you the most?

It was quite beneficial to be able to include special features into my Dialog Flow apps. By further altering the user experience and tailoring the responses to each person's needs, I was able to improve it.

Based on your experience, what aspects of WeatherMate do you think could be improved or added to enhance its functionality?

It was found that the Dialog Flow follow-up intents were useful for gathering data from users and initiating specific actions depending on their input. While ensuring that the data needed to finish the task at hand was gathered, the flexibility and diversity of intentions allowed for a more conversational and natural connection with the user.

Can you describe any challenges or difficulties you encountered while interacting with WeatherMate? How do you think these could be addressed?

I think it's appropriate to ask for further information. The speech might get boring at points. If it had sounded more human, that could have been better.

Step-6 Review and Reflection

General Impressions:

What worked well in this assignment? What did not? Are there parts of the assignment you would want to change?

The development and testing of the WeatherMate voice assistant, the project had several strong points, such as a clear interaction model with well-defined intents and a detailed persona that enhanced user relatability. However, there were limitations in the scope of testing scenarios and the integration of feedback, which restricted broader evaluation under varied conditions. While the structured approach to user testing provided comprehensive insights, the application could benefit from expanded features, improved natural language processing, and a broader testing panel that includes a more diverse demographic. Enhancing these areas, especially by incorporating more advanced functionalities and establishing a continuous feedback loop during development, would significantly increase the utility and user-friendliness of WeatherMate.

Time:

How much time did you spend on this assignment? What steps took the longest to complete? Why? Was there anything particularly difficult and time-consuming?

The WeatherMate project demanded approximately 35 hours of dedicated effort over several weeks, with the most time-intensive tasks being the development of the interaction model and programming integration. Developing the interaction model, which involved defining intents and creating sample utterances, required meticulous planning to ensure effective user query handling, consuming around 10 hours. The programming and integration phase, which took 15 hours, involved significant coding, debugging, and testing to achieve seamless performance across platforms. Another 10 hours were allocated to organizing and conducting user testing, which included preparing test scripts, recruiting participants, and analyzing feedback to gather actionable insights. The integration and programming phases were particularly challenging due to the need for extensive testing and adjustments to accommodate natural language inputs and unforeseen user interactions, highlighting the complexities of creating a robust, user-centric voice interface.

Testing:

In terms of testing, what type of testing turned out to be the most useful? What questions and tasks gave you the most insight into issues with your application? What did you learn from your user testing? How would you continue testing this application if you had more time?

Usability testing proved most effective, particularly through tasks that required complex queries like three-day forecasts or specific weather alerts, highlighting issues in natural language processing and prompt clarity. Insights gained included the necessity for enhanced understanding of natural speech and a more personalized user experience. If given more time, I would expand testing to include longitudinal studies to observe long-term usability, stress tests under high-demand scenarios.

Future Work:

This project would benefit from further development in areas such as enhancing its natural language processing to better understand colloquial language, adding personalization features like remembering user preferences, and incorporating multimodal responses for a more interactive experience. Additionally, the testing regimen could be expanded to include more rigorous integration testing with other applications, diverse user testing across different geographic locations, and real-world testing during extreme weather events to ensure reliability when most needed. In terms of new features, implementing voice-activated weather alerts, health and activity recommendations based on current weather, and community-driven insights for hyper-local updates would significantly enrich the application, making it a more indispensable tool for users in their daily lives and during critical weather situations.

API: OpenWeatherMap
https://api.openweathermap.org/data/2.5/forecast?q=portland&appid=d86b3d09894a65ffe6a92c10f4afc74c

WebDemoLink:
https://bot.dialogflow.com/75ef03b5-6412-4ea7-98da-43740a29c98b