CS 466/566 – Voice Assistants
Final Project

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Designing, Building and Testing a Voice Application

Application Name : FitGuide
Use Case : Suggests exercises based on user's requirement.
Technology : Dialog Flow
API : https://api-ninjas.com/api/exercises

Step 1 - Describe the Application

These days, everyone wants to focus on their health and include exercise in their daily routine. However, many people struggle to train themselves properly due to a lack of knowledge about exercises and how to perform them. I faced this difficulty myself and, as a student, I cannot afford a personal trainer. That's why I chose to create a voice application for workout guiding.

I found an API that is well-organized and contains extensive information. My voice assistant application, FitGuide, suggests exercise names list based on the user's requirements. Users can specify muscle type (like biceps, forearms, calves), exercise type (such as powerlifting, strength, cardio), or difficulty level (beginner, intermediate, expert). Users can also ask for post or pre workout exercise suggestions as well. I used the Dialogflow application to build FitGuide using three intents. Only two intents retrieve information from the API.

Step 2 - Interaction Model

1. **GetFitByTypeAndDifficultyIntent**

   This intent suggests list of exercises based on the user's requirements. Users can specify the type of exercise, such as strength, cardio, plyometrics, or stretching. They can also choose the difficulty level, including beginner, intermediate, and expert.

   Parameters:
   trainingType: custom entity
   Difficulty: custom entity

   Sample Utterances:

   1. I'm a beginner looking to improve my cardio. What exercises should I start with?
   2. Can you recommend some stretching exercises for an intermediate level?
   3. I've been doing strength training for a while, and I need some expert level workouts.

4. What are some beginner exercises to start my work out?
5. I'm interested in trying Olympic_weightlifting. What intermediate exercises would you suggest?
6. Can you suggest some powerlifting exercises for me?
7. I want to start doing cardio. Can you suggest some exercises for me?
8. I've heard a lot about strongman training. What intermediate exercises can I try?
9. What stretching exercises would you recommend for an expert?
10. I'm new to strength training. What beginner exercises should I do?
11. I'm looking to improve my plyometrics skills. Can you give me some intermediate exercises?
12. Can you suggest some Olympic_weightlifting exercises?
13. I'm at an intermediate level in powerlifting. What exercises should I focus on?
14. What are some beginner level cardio workouts I can try?
15. I need some stretching exercises to improve my flexibility.
16. Can you recommend intermediate strength exercises for me?
17. I'm looking for plyometric workouts. What should I do?
18. What beginner strongman exercises can I start with?
19. I want to advance my Olympic_weightlifting skills. What are some expert exercises?
20. I'm an intermediate in training. What exercises can help me improve further?

2. GetFitByMuscleIntent

This intent provides information about exercises based on the user's requirements, such as the type of muscle they want to work on. The muscle groups include abdominals, abductors, adductors, biceps, calves, chest, forearms, glutes, hamstrings, lats, lower back, middle back, neck, quadriceps, traps, and triceps.

Parameters:

muscle: custom entity

Sample Utterances:

1. I want to strengthen my abdominals. What exercises do you recommend?
2. Can you suggest some exercises for my abductors?
3. I'm looking to build my adductors. What should I do?
4. What are some good biceps exercises for me?
5. How can I work on my calves? Any exercise suggestions?
6. Can you provide some exercises for chest muscles?
7. I'm trying to strengthen my forearms. What exercises can I try?
8. What exercises are best for glutes?
9. Can you recommend exercises for my hamstrings?

10. I'm focusing on my lats. What exercises should I do?
11. What are some good lower back exercises?
12. Can you suggest exercises for my middle back?
13. How can I strengthen my neck muscles? Any recommendations?
14. What exercises should I do to build my quadriceps?
15. I'm looking for exercises to strengthen my traps. What do you suggest?
16. What are some effective triceps exercises?
17. I want to tone my abdominals. Any exercise ideas?
18. Can you give me some good exercises for working out my calves?
19. I'm focusing on my chest muscles. What exercises can I do?
20. What exercises can help me build stronger forearms?

3. WarmUpAndCoolDownExerciseIntent

The Warmup and Cool Down Exercise Intent provides users with a list of recommended warm up(pre workout) and cool-down(post workout) exercises along with detailed instructions on how to perform them. The intent focuses on helping users safely start their workout and transition from their workout to a resting state, promoting muscle recovery and flexibility.

Parameters:

cooldownroutine: Custom Entity
warmuproutine : Custom Entity

Sample Utterances:

1. What are some good exercises to cool down after a workout?
2. Can you suggest a post-workout routine for me?
3. How should I cool down after a run?
4. What exercises should I do to cool down?
5. Give me a post-strength training relaxation routine.
6. What are some effective exercises to wind down after a workout?
7. How do I relax my body after a workout session?
8. Can you recommend a quick cool down routine?
9. What exercises are good for winding down?
10. How long should my cool down routine be?
11. What are the best exercises to relax after working out at gym?
12. Can you provide a cool down routine for my session?
13. How do I wind down after an intense workout?
14. What stretches are best for cooling down after my workout?
15. Give me some relaxation exercises for flexibility.

16. What should I do to cool down after a HIIT session?
17. How can I effectively wind down after a long run?
18. Can you suggest a post-workout routine for an evening session?
19. What are easy cool-down exercises I can do at home?
20. How do I properly wind down after a workout session?
21. What are some good warm up exercises before a workout?
22. Can you suggest a warm up routine for me?
23. How should I warm up before running?
24. What stretches should I do to warm up?
25. Give me a warm up routine for strength training.
26. What are some effective pre workout exercises for beginners?
27. How do I start my pre workout session?
28. Can you recommend a quick warm up routine?
29. What exercises are good for warming up?
30. I want to start my warm up. Can you help me with some exercises ?

Step 3 – Fulfillment

- **Logic for GetFitByTypeAndDifficultyIntent:**

  I used an external API to retrieve information for my sample utterances. It basically uses entities such as training type and difficulty. Using these two parameters I will send a request using the url below.

  https://api.api-ninjas.com/v1/exercises?type=${type}&difficulty=${difficulty}

  - Retrieves the user's request and extracts the parameters from the input.
  - This URL requires an API_Key which is associated with my account. I generated an API_Key to fetch data from the API.
  - Construct a query to the external API to fetch the exercise list using the received parameters (training type or difficulty).
  - Send a request to the external API with the constructed query, including the necessary authentication headers (API Key).
  - Receive the response from the API and check if it contains data. Checks if the response has data or not.
    - If the response does not contain data, inform the user to provide the required details.
    - If the response contains data:
      - If only the training type is provided, frame the output based on the given training type.
      - If only the difficulty level is provided, frame the output according to the given parameter.

- If both the training type and difficulty level are provided, frame the output using both parameters.
- If no data is found based on the user's request, inform the user that no exercises were found matching the exercise type and difficulty level requirements.
- If there is an error fetching data based on the user's request, display an error message and ask the user to try again by providing valid details.

2. Logic for GetFitByMuscleIntent:

I used an external API to retrieve information for this intent. It basically uses only one entity i.e., muscle. I used below URL which has this parameter.
https://api.api-ninjas.com/v1/exercises?muscle=${muscle}

- I generated an API_Key for this URL to fetch the information for this intent.
- First, it retrieves parameters from the user's request and frames a query to the external API using the given parameter (muscle).
- Sends the request to the external API, adding the appropriate header (API_Key).
- Receives a response from the API and checks if the response contains data.
- If not, then inform the user to enter the required details.
- If the response has data, then print the framed output for the given user's request.
- If no exercises are found using the given parameters, inform the user that no exercises were found based on your muscle type requirement.
- If there is an error while fetching data, display an error message to the user and ask to enter the appropriate details.

3. Logic for WarmUpAndCoolDownExerciseIntent:

I didn't use external API for this intent, and I made the logic very simple. There are two entities such as cooldownroutine and warmuproutine.
- Check if the user has provided at least one entity.
- If yes, check if the provided entity is cooldownroutine.
- If it is cooldownroutine, print the cooldown exercise from the list created for the cooldownroutine entity.
- Check if the provided entity is warmuproutine.
- If it is warmuproutine, print the warmup exercise from the list created for the warmuproutine entity.
- If the user didn't provide any of the entities, ask the user to recheck all the provided details.

Step 4 – Persona

I attached the conversational diagram png file to the submission zip file.

Step 5 - User Testing

Part 1 - Description of Usability Testers:

I selected two of my batch mates, Mahathi and Ajay, who are computer science graduate students and very good at academics. They consistently gave valuable feedback on my previous projects. We three friends regularly provide feedback on each other's work, and their insights and requirements have greatly helped me focus on future improvements for my application.

Part 2 - Usability Testing:

Task	Time to complete	User 1 done?	User 1 Time	User 2 done?	User 2 Time
Task 1. I'm a beginner looking to improve my cardio. What exercises should I start with?	**6 sec**	**Yes**	**5 sec**	**Yes**	**4 sec**
Task 2. Can you suggest some powerlifting exercises for me?	**5 sec**	**Yes**	**5 sec**	**Yes**	**6 sec**
Task 3. What are some good lower back exercises?	**7 sec**	**Yes**	**5 sec**	**Yes**	**6 sec**
Task 4. What should I do to cool down after a HIIT session?	**5 sec**	**Yes**	**5 sec**	**Yes**	**4 sec**
Task 5. Can you recommend a quick warm up routine?	**6 sec**	**Yes**	**5 sec**	**Yes**	**6 sec**

Part 3 – Likert Scale Testing:

User 1:

Question	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. The voice application is easy to use.					X
2. The responses provided by the voice application are clear and understandable.					**X**
3. The voice application provides accurate information about the exercises.				**X**	
4. The voice application responds to my requests promptly.					**X**

Statement					
5. The voice application handles errors or misunderstandings effectively.					X
6. Voice assistant was Confusing.	X				
7. I would recommend this voice application to others looking for workout guidance.					X
8. The exercises provided by the voice application are complete and easy to follow.					X
9. I enjoyed using FitGuide to search required exercises.					X
10. I am satisfied with my overall experience using the voice application.					X

Part 4 - Open-ended questions:

Question 1. What aspects of the voice application do you find most useful or enjoyable, and why?

Answer. I find the personalized exercise recommendations very useful because they save me time. The clear and detailed instructions also make it easy to follow along.

Question 2. Were there any features or functions of the voice application that you found confusing or difficult to use? Please explain.
Answer. I really enjoyed testing this application and I didn't find anything difficult or confusing while using this application.

Question 3. Can you describe any specific improvements or additional features you would like to see in the voice application to enhance your overall experience?

Answer. I think you did a great job incorporating everything according to the user's perspective. My only suggestion would be to include the instructions so users can understand them more accurately.

User 2:

Question	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. The voice application is easy to use.					X
2. The responses provided by the voice application are clear and understandable.					**X**
3. The voice application provides accurate information about the exercises.					**X**
4. The voice application responds to my requests promptly.					**X**
5. The voice application handles errors or misunderstandings effectively.					**X**
6. Voice assistant was Confusing.		**X**			
7. I would recommend this voice application to others looking for workout guidance.					**X**
8. The exercises provided by the voice application are complete and easy to follow.					**X**
9. I enjoyed using FitGuide to search required exercises.				**X**	
10. I am satisfied with my overall experience using the voice application.					**X**

Part 4 - Open-ended questions:

Question 1. What aspects of the voice application do you find most useful or enjoyable, and why?

Answer. In most fitness apps, they simply provide exercises for weight loss, but you offered a list that allows users to choose exercises based on their mood. Additionally, I appreciated that you included pre- and post-workout routines. I believe these routines are very helpful and should be a part of our daily workout routine.

Question 2. Were there any features or functions of the voice application that you found confusing or difficult to use? Please explain.

Answer. Your application is great, and I like everything about it. I found it very easy to use and follow the instructions. However, I have a suggestion: if you could include diet suggestions, it would make the application complete in my opinion.

Question 3. Can you describe any specific improvements or additional features you would like to see in the voice application to enhance your overall experience?

Answer. I really enjoyed testing your application and you developed a very useful application. I have a suggestion: you listed only the exercise names. It would be great if you provided an option for the user to choose whether they want to see the instructions. If they select yes, then display the instructions for the required exercise.

Step 6 - Review and Reflection

General Impressions: I really enjoyed developing FitGuide from scratch. It boosted my confidence, making me believe I can tackle any project. Initially, I was confused about which platform to use. I considered Alexa because I found it easy and quick during homework 2, but for larger projects, I decided Dialog flow was a better fit.

Choosing a topic for my project took a lot of time as I wanted it to be both useful and challenging. When I found this API, I was initially scared to use it, but after watching lecture videos, it became manageable. I learned a lot from this project and feel I developed a full-fledged application that turned out very well.

I faced various challenges, mainly with the API. I initially wanted to use a wide range of data related to exercise but ended up developing an intent without using an API due to limitations. Figuring out how to use the API Key took a lot of time and research. In the future, I would like to modify the intent to include more important information and maximize the use of the API. Additionally, I would like to shorten the output instructions to make them more concise.

Time: Firstly, I spent almost 12 to 13 days selecting a topic, searching for an API, writing my report, and completing my demo. Finding a well-defined API was crucial because my entire project depended on it. I decided not to continue with my food carts application because many of my

discussion mates were also developing it. I wanted to try something different that would help me and others.

After considering various topics, I chose this one. I came across different APIs but struggled to find one with enough parameters to build different intents. After extensive searching and lots of time, I finally found a suitable API. It took me 5 to 6 days to write my code and around 4 to 5 days to complete testing.

Testing was the most challenging part because it was essential to correct errors in my application. I tried various methods to identify and fix errors, aiming to turn it into a full-fledged application. Despite the difficulties, I managed to pull everything together in time and learned a lot from developing this application.

Testing: I believe testing is one of the most important steps in developing a voice application. I spent a considerable amount of time completing the testing phase and encountered many challenges, such as Dialog flow not showing exact errors in the log. I faced minor errors like renaming entities or intent names without updating them in the index.js file, making it difficult to identify issues in Dialog flow.

However, usability testing was incredibly helpful. My friends and I tested every part of the application, which allowed me to identify and rectify mistakes. This process taught me a lot about users' expectations and perspectives. While developing the sample utterances, I carefully considered how users might ask questions and interact with the application, which significantly improved the training of the application.

Additionally, open-ended questions provided valuable insights into user expectations and guided future developments. If I had more time, I would incorporate the feedback and conduct further testing with a broader group to ensure comprehensive coverage and refinement, aiming to create a perfect application.

Future Work: I think I did a great job developing the application and learned a lot throughout the process. I can add more functionalities to the intents and search for different APIs to obtain helpful data. One functionality I would like to add is a feature where users can enter their current weight, age, and gender to find out how much weight they need to lose to be fit. I would like to work on the feedback received and incorporate different logic into the intents to enhance testing. Additionally, I plan to use various methods and tools to test my application thoroughly. This will help me identify areas where I am lagging and where I can improve the application. Overall, this project really helped to improve myself as a computer science student and a great work which will enhance my academic career.

Link:
Web demo: https://bot.dialogflow.com/e369c198-64be-468d-aaba-3fa3497b7426