

Jonathan Ho  
David Park  
CS 4395

# HLT Chatbot Write-up

## A recipe chatbot utilizing Dialogflow API

### Description of Recipe Chatbot

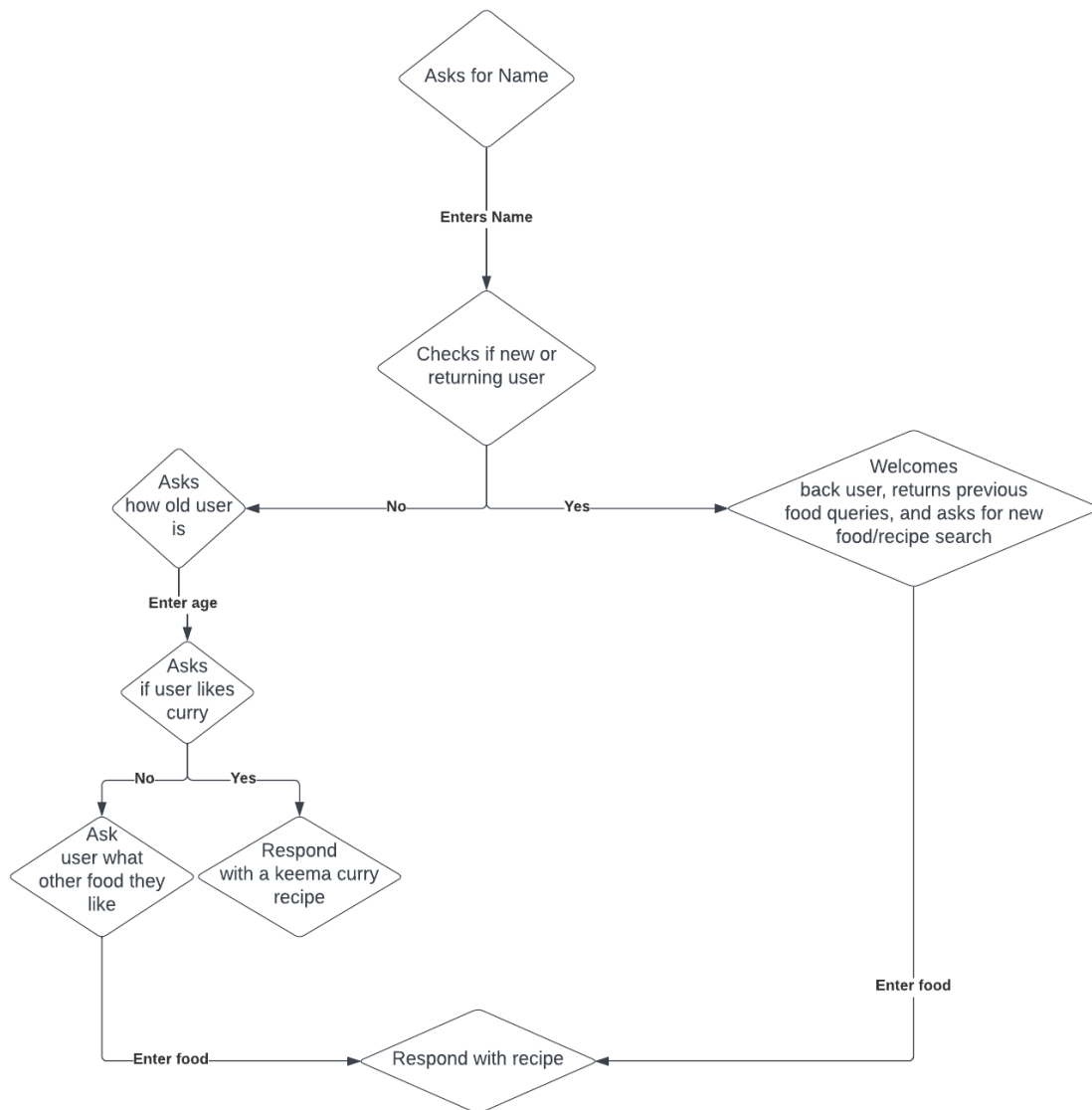
#### System Description

The Recipe Chatbot uses Google Dialogflow ES as its main component for chatbot-like features. It integrates with a UI built with Python Flask and jQuery. The custom code to handle certain responses and requests is done within the python code in Flask. To serve this custom code to Google Dialogflow ES, Ngrok is used to tunnel our localhost to the internet. The knowledge base is built off of recipes taken from Reddit, specifically the subreddit r/Recipes.

#### NLP Techniques

Certain NLP techniques used in the chatbot are nltk's wordnet and parsing the user responses for words that are matched with wordnet's knowledge base of food words. Given a returning user, the chatbot can check the user's previous queries and check which foods they have looked up before. NLP techniques were also utilized for the creation of the knowledge base for the chatbot. This entails web scraping with BeautifulSoup to grab the URLs of each recipe from r/Recipes. Once the URLs are compiled, the web scraper finds the comment from the original poster to get ingredients and instructions for that dish.

# Dialog Tree



# Sample Dialog Interactions

## Conversation 1:

Welcome to Recipe Bot. What is your name?

Bob

Hi Bob! How old are you?

12

Awesome that you are 12 year! Do you like curry?

yes

Here is a Keema Curry Recipe: 500g Minced Meat (Lamb) 400 ml Water 50 ml Oil 1 Onion 2 Tomatoes 3 Green Chillies 1 tsp Ginger Paste 1 tsp Garlic Paste 1 tsp Salt 1 tsp Turmeric Powder 1 tsp Chilli Powder 1 tsp Coriander Powder 1 tsp Cumin Powder 1 tsp Kashmiri Chilli 1 tbsp Dried Fenugreek Leaves 1 handful of Coriander Heat up the oil in a pan on medium heat until hot. Add the finely diced onion and cook for 4-5 minutes on medium heat until softened.

Enter message...

## Conversation 2:

Welcome to Recipe Bot. What is your name?

Yoda

Hi Yoda! How old are you?

897

Awesome that you are 897 year! Do you like curry?

no

Thats okay! What other food or ingredient do you like?

cookies

Mini Eggs Cookies Ingredients: 3/4 cup (115g) butter 1 tsp vanilla extract 3/4 cup (150g) brown sugar 1/2 cup (100g) white sugar 2 eggs 2 1/2 (300g) cups baking flour 1 1/2 (180g) cups almond flour (or sub for same amount baking flour) 3/4 tsp baking soda 3/4 tsp baking powder 2 cups (~250g) Mini Eggs Mini Eggs Cookies Instructions: Preheat oven at 350°F (180°C) In one large bowl, cream together 3/4 cup (115g) butter, 3/4 cups (150g) brown sugar, 1/2 cup (100g) white sugar, and 1 tsp vanilla (wet ingredients) Beat in 2 eggs In a separate bowl, mix together 2 1/2 cups (300g) baking flour, 1 1/2 cup (180g) almond flour, 1 tsp baking soda, and 1 tsp baking powder (dry ingredients) Slowly pour 1/4 portions of the dry ingredients into the wet ingredients, until fully combined Fold in 2 cups (~250g) Mini Eggs Line a baking tray with

Enter message...

Awesome that you are 897 year! Do you like curry?

no

Thats okay! What other food or ingredient do you like?

cookies

Mini Eggs Cookies Ingredients: 3/4 cup (115g) butter 1 tsp vanilla extract 3/4 cup (150g) brown sugar 1/2 cup (100g) white sugar 2 eggs 2 1/2 (300g) cups baking flour 1 1/2 (180g) cups almond flour (or sub for same amount baking flour) 3/4 tsp baking soda 3/4 tsp baking powder 2 cups (~250g) Mini Eggs Mini Eggs Cookies Instructions: Preheat oven at 350°F (180°C) In one large bowl, cream together 3/4 cup (115g) butter, 3/4 cups (150g) brown sugar, 1/2 cup (100g) white sugar, and 1 tsp vanilla (wet ingredients) Beat in 2 eggs In a separate bowl, mix together 2 1/2 cups (300g) baking flour, 1 1/2 cup (180g) almond flour, 1 tsp baking soda, and 1 tsp baking powder (dry ingredients) Slowly pour 1/4 portions of the dry ingredients into the wet ingredients, until fully combined Fold in 2 cups (~250g) Mini Eggs Line a baking tray with parchment paper - OR - cooking spray Take golf ball sized portions of dough, and roll them together between your palms, then evenly space each ball onto baking tray Bake the biscuits in the oven at 350°F (180°C) for 15-16 minutes Allow the biscuits to cool for a minimum of 15 minutes Enjoy!

Enter message...

# Appendix Knowledge Base

## List of all recipes inside our knowledge base:

15 Minute Smoked Salmon

Almond Flour Blueberry Muffins

A Salmon Fillet with a Mediterranean Kick

Brown Sugar Ham Glaze

Chickpea and Pasta alla Vodka

Duck Breast with Mushrooms and Pearl Onions

Duck Dumplings

Fagioli all'Uccelletto Vegan Tuscan Beans in Tomato Sauce

Garlic Naan Bread

Highly Addictive Moroccan Almond Cigars

Irresistible Arabic Beehive Sweet Buns

Keema Curry

Mini Eggs Cookies

Miso-Glazed Asparagus

Mutton Pulao

Raspberry Chambord Liqueur Royale Cocktail

Roasted Cauliflower with Mashed Potatoes and Beetroots

Saffron Cod and Orzo with Guanciale Chili Oil and Frizzled Leeks

Simple Grilled Cheese Sandwich

Slow Roasted Lamb Shanks

Spanakorizo Greek Spinach Rice

Steamed Fish with Lime and Garlic

Thai Yellow Chicken Curry

Hard Maple Candy

Vegan Puerto Rican Rice (Arroz con Gandules)

### **Examples of Knowledge Base:**

#### **Keema Curry:**

Keema Curry Ingredients:

500g Minced Meat (Lamb)

400 ml Water

50 ml Oil

1 Onion

2 Tomatoes

3 Green Chillies

1 tsp Ginger Paste

1 tsp Garlic Paste

1 tsp Salt

1 tsp Turmeric Powder

1 tsp Chilli Powder

1 tsp Coriander Powder

1 tsp Cumin Powder

1 tsp Kashmiri Chilli

1 tbsp Dried Fenugreek Leaves

1 handful of Coriander

#### Keema Curry Instructions:

Heat up the oil in a pan on medium heat until hot.

Add the finely diced onion and cook for 4-5 minutes on medium heat until softened.

Add the ginger paste, garlic paste, and chopped green chillies then sauté for a further 1-2 minutes

Add the minced meat and break apart then cook for 6-8 minutes on medium heat – Make sure there are no lumps left over.

Add the salt, chilli powder, turmeric powder, Kashmiri chilli powder, coriander powder, and cumin powder then cook the spices for 3-4 minutes.

As the spices are cooking chop the tomatoes then add to the pan and cook for 3-4 minutes.

Add the water and cover then cook for 20 minutes on medium heat.

Finally, add the chopped coriander and dried fenugreek leaves.

Serve with fresh naan bread or rice and enjoy!



### Mini Eggs Cookies:

#### Mini Eggs Cookies Ingredients:

3/4 cup (115g) butter

1 tsp vanilla extract

3/4 cup (150g) brown sugar

1/2 cup (100g) white sugar

2 eggs

2 1/2 (300g) cups baking flour

1 1/2 (180g) cups almond flour (or sub for same amount baking flour)

3/4 tsp baking soda

3/4 tsp baking powder

2 cups (~250g) Mini Eggs

#### Mini Eggs Cookies Instructions:

Preheat oven at 350°F (180°C)

In one large bowl, cream together 3/4 cup (115g) butter, 3/4 cups (150g) brown sugar, 1/2 cup (100g) white sugar, and 1 tsp vanilla (wet ingredients)

Beat in 2 eggs

In a separate bowl, mix together 2 1/2 cups (300g) baking flour, 1 1/2 cup (180g) almond flour, 1 tsp baking soda, and 1 tsp baking powder (dry ingredients)

Slowly pour 1/4 portions of the dry ingredients into the wet ingredients, until fully combined

Fold in 2 cups (~250g) Mini Eggs

Line a baking tray with parchment paper - OR - cooking spray

Take golf ball sized portions of dough, and roll them together between your palms, then evenly space each ball onto baking tray

Bake the biscuits in the oven at 350°F (180°C) for 15-16 minutes

Allow the biscuits to cool for a minimum of 15 minutes

Enjoy!

## Appendix Sample User Models

Our user models are stored in a pickle file and are of type dict:

```
{  
    'James':  
        {  
            'name': 'James',  
            'age': '23',  
            'queries': ['23', 'no', 'garlic naan bread'],  
        }  
}
```

## Evaluations

The Recipe Chatbot was designed to produce some type of recipe with ingredients from our knowledge base to the user. Some of its strengths are that it is able to produce some type of conversation flow to guide the user to a given recipe from the knowledge base. However, given that we used Google Dialogflow ES, we could not configure how well the chatbot was able to get data from the knowledge base. The bot is able to map certain ingredients or food items to certain words in the knowledge base, but it is not very accurate and will lead to recipe responses that are not complete. To bypass this, we have tried to create a knowledge base that is compatible with the way that Dialogflow ES parses the knowledge base, but it still is not completely accurate. While accessing the user model for foods from their previous queries, there are some foreign food recipes that may not show up in the synset function from WordNet. One example would be “Garlic Naan Bread”, it would not show up in the queries since it would not be able to match a food in its dictionary of synsets.