

Chatbot Report

By

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System Description

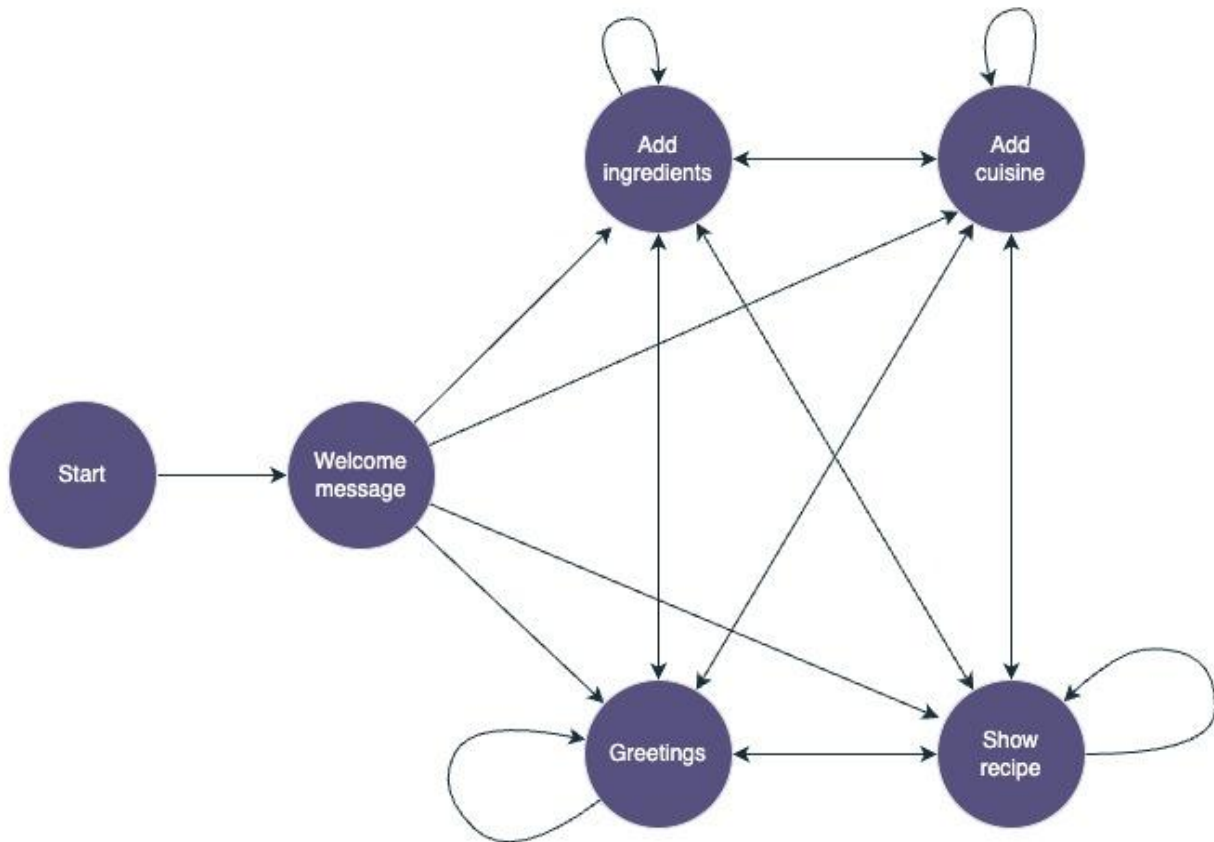
The Chatbot created for this assignment helps users who are looking for recipe recommendations. The chatbot is named 'Foodie'. Foodie aims to give recipe suggestions based on ingredients users have in their pantries or fridge. Users can also mention what cuisine they are in the mood for cooking. Foodie is pretty flexible, if it detects the user has provided food ingredients or cuisine, or even if the user doesn't have anything on their mind and would like to be surprised.

Technical Details

1. The Foodie bot is implemented using Python. There are no frameworks used to create the chatbot. The UI is built with simple HTML and Bootstrap CSS that gives a clean dialog box styles and images. As the user sends a request, the query is sent to our chatbot backend via AJAX calls. GET endpoint called '/chat' is used to get responses from our bot backend.
2. Before our bot is ready to chat, we need to do preprocessing of the ingredients and cuisines. In the preprocessing of the ingredients and the cuisines, WordNetLemmatizer is used for lemmatization and this preprocessed data is stored in the pickle files.
3. A recommendation engine is created from the recipe data to predict the recipe based on ingredients and cuisine.
4. For quick processing and response time, responses are stored in pickle files. These files are classified based on different cuisines.
5. To extract and save user context details like names, the natural language processing library spaCy is used.
6. For cleaning and lemmatization of user inputs 'nltk' package is used. This helps with greeting detection, cleaning, and looking for words that the bot is concerned with.

System Dialog Tree

Foodie Dialog Flow



The chatbot provides different categories of interactions:

1. Greetings -

Chatbot gives and recognizes different greetings. If a user greets the bot, it will respond with a randomly generated appropriate greeting like 'hi' or 'goodbye'.

2. Introductions -

The chatbot flow starts with Foodie bot introducing itself and a one-liner about what services it can provide for the user. If the user mentions their name at this point or any point during the conversation, it will remember it. It will respond to the user with an appropriate greeting followed by the user name.

3. Requirement Gathering -

Requirements are gathered via multiple dialogue flows. The user can provide details about what they are looking for, the chatbot can ask the user targeted questions. One such flow would be when the user says they are looking for a recipe but doesn't provide any more details in their statement. The chatbot can ask the user if they would like to see recipes belonging to a certain cuisine or ingredients. The chatbot would randomly ask a few questions to know what the user is looking for. After some random attempts of such questions, if the user still doesn't wish to provide specifics of what they need, Foodie would go ahead and generate random recipes. Thus, enabling the user of more natural flow in the conversation.

If the bot is confused, it would always speak up and ask for clarifications.

4. Provide Instructions -

Foodie bot will summarize the results of the recipes that would have detailed recipes like the name of the dish, and ingredient list, followed by detailed steps to prepare the recipe.

Sample Dialog Interactions

1. Interaction with a user looking for recipes from specific cuisine and ingredients:

The screenshot shows a chat window titled "Foodie". On the left, the chatbot (represented by a male avatar) sends four blue messages: "Hello there!", "I am Foodie.", "I can suggest recipes", and "Ask me any cuisine that you would like to eat today or you can tell me what ingredients you have and I can suggest recipes based on them. Let's get cooking!". On the right, the user (represented by a female avatar) responds with three grey messages: "Hi. I am Radhika", "I am looking for Indian recipes", and "lentil". The chatbot's final blue message is "Alright! before I share some mouthwatering recipes, any ingredients that you would like to cook with?".

Foodie



Added ingredients: lentil

Here are few suggestions:

1. Title: Lentils and Rice with Fried Onions (Mujadarrah)

Ingredients:
6 tablespoons olive oil
1 large white onion
sliced into rings
1 1/3 cups uncooked green lentils
3/4 cup uncooked long-grain white rice
salt and pepper to taste
1/4 cup plain yogurt or sour cream (optional)

Instruction:
Heat the olive oil in a large skillet over medium heat. Stir in the onions, and cook about 10 minutes, until browned. Remove from heat, and set aside.
Place lentils in a medium saucepan with enough lightly salted water to cover. Bring to a boil, reduce heat, and simmer about 15 minutes.
Stir rice and enough water to cover into the saucepan with the lentils. Season with salt and pepper. Cover saucepan, and continue to simmer 15 to 20 minutes, until rice and lentils are tender.
Mix half the onions into the lentil mixture. Top with yogurt or sour cream and remaining onions to serve.

2. Title: Spicy Indian Dahl

Ingredients:
1 cup red lentils
2 tablespoons ginger root
minced
1 teaspoon mustard seed
2 tablespoons chopped fresh cilantro
4 tomatoes



Foodie

1 cup water
salt to taste

Instruction:
Cook the lentils by boiling or pressure cooking until lentils are soft. (Pressure cooking is faster.)
In a skillet heat the oil and add mustard seeds. When mustard seeds begin to flutter, add onions, ginger, jalapeno peppers, and garlic. Saute until the onions and garlic are golden brown. Add coriander and cumin. Add chopped tomatoes. Saute the mixture well until tomatoes are well cooked.
Add water. Boil 6 minutes. Add cooked lentils, stirring well. Add salt to taste, stirring well. Add finely chopped cilantro and remove from heat. Serve hot.

3. Title: Easy Lentils Side Dish

Ingredients:
1 cup lentils
2 cups water
1 potato
peeled and cubed
1 red bell pepper
chopped
1 onion
chopped
2 tablespoons minced garlic
1/2 teaspoon salt
1/2 teaspoon ground black pepper
1/4 cup chopped fresh cilantro
1/4 cup chopped green onion

Instruction:
Combine lentils and water in a saucepan over medium heat; bring to a boil and cook about 20 minutes.
Stir potato, red bell pepper, onion, garlic, salt, and pepper into the lentils; continue cooking until the potato and lentils are tender and cooked through, about 15 minutes more.
Garnish with cilantro and green onion to serve.



2. Example of users looking for recipes based on cuisine:

Foodie



Hello there!

I am Foodie.

I can suggest recipes

Ask me any cuisine that you would like to eat today or you can tell me what ingredients you have and I can suggest recipes based on them. Let's get cooking!

howdy





Hey

Please suggest some mexican recipes





Added cuisine: mexican

Sure! Any more details you would like to provide? Like certain ingredients you would like to cook with?

No, just recipe



Foodie



Here are few suggestions:

1. Title: Corn Tortillas

Ingredients:
1 3/4 cups masa harina
1 1/8 cups water

Instruction:
In a medium bowl, mix together masa harina and hot water until thoroughly combined. Turn dough onto a clean surface and knead until pliable and smooth. If dough is too sticky, add more masa harina; if it begins to dry out, sprinkle with water. Cover dough tightly with plastic wrap and allow to stand for 30 minutes.
Preheat a cast iron skillet or griddle to medium-high.
Divide dough into 15 equal-size balls. Using a tortilla press, a rolling pin, or your hands, press each ball of dough flat between two sheets of plastic wrap.
Immediately place tortilla in preheated pan and allow to cook for approximately 30 seconds, or until browned and slightly puffy. Turn tortilla over to brown on second side for approximately 30 seconds more, then transfer to a plate. Repeat process with each ball of dough. Keep tortillas covered with a towel to stay warm and moist until ready to serve.

2. Title: Pupusas de Queso (Cheese-Stuffed Tortillas)

Ingredients:
2 cups masa harina
1 cup water
1 cup queso fresco crumbled

Instruction:
Stir the masa harina and water together in a mixing bowl until smooth; knead well. Cover bowl, and let the dough rest 5 to 10 minutes.
Shape the dough into eight, 2 inch diameter balls. On a lightly floured surface, roll out each ball into 6 inch diameter round. Sprinkle 1/4 cup queso fresco over each round. Place a second tortilla over the cheese, and pinch the edges together to seal in the cheese.
Heat ungreased skillet over medium-high heat. Place one tortilla into the skillet at a time, and cook until cheese melts and tortillas are lightly browned, about 2 minutes on each side.



Type message



Appendix for the knowledge base

There are few data sources out there that provide a dataset of recipes. Foodie's knowledge base consists of the following:

1. A first dataset to train the Doc2Vec model with the set of ingredients per recipe. The dataset from the 'Recipes box' provides different components of a recipe like a recipe title, a list of ingredients with measurements along with instructions for preparation. Their dataset also provides images but for the purpose of keeping the scope limited to getting recipe instructions, we will ignore it for now.

2. The second dataset I am using is the Kaggle subscribers, the Recipe Ingredients Dataset it provides has come in very handy for training our model.

Chatbot Evaluations

Apart from the multiple test iterations I performed while developing the Foodie chatbot, I was able to get some feedback from some peers. With minimal background knowledge about the chatbot, users interacted with the bot for recipes. To further get some detailed feedback, I requested the users to leave feedback via a survey link. This survey had 4 questions out of which 3 questions were Likert-style followed by a final question which was optional and asked for random feedback.

Question set in the Survey:

1. How would you rate your recent experience?
2. How accurate were Foodie's responses?
3. How likely are you to recommend us to a friend or colleague?
4. Would you like to share any additional thoughts with us?

Survey Link:

<https://rh25qpq0a6k.typeform.com/to/siJEn6cx?typeform-source=admin.typeform.com>

Review your recent experience with Foodie

We value your opinion

Let's do it!

press Enter ↵

● Takes 15 sec



Survey Result Report:

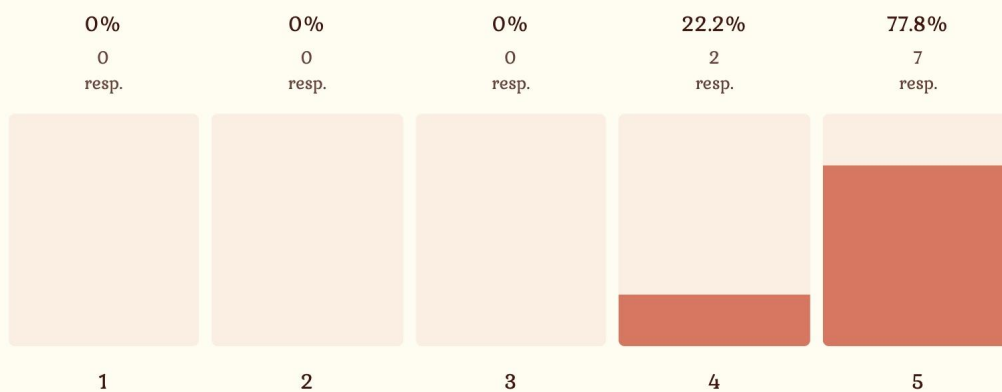
Foodie Feedback

9 responses

How would you **rate** your recent experience?

9 out of 9 answered

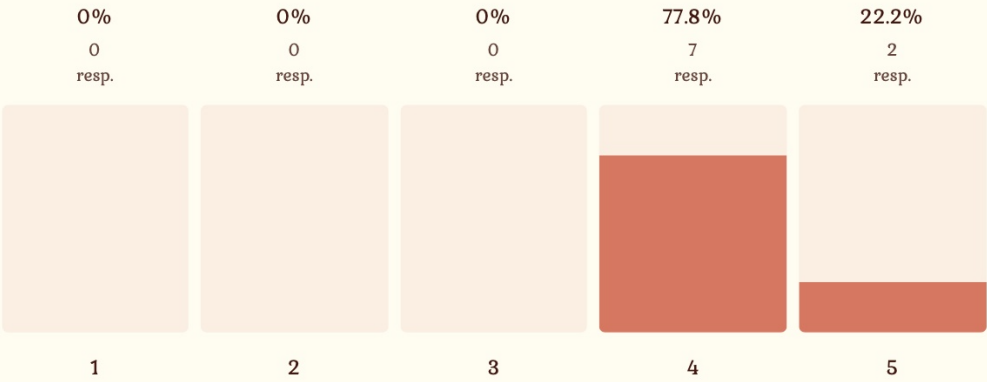
4.8 Average rating



How **accurate** were Foodie's responses?

9 out of 9 answered

4.2 Average rating

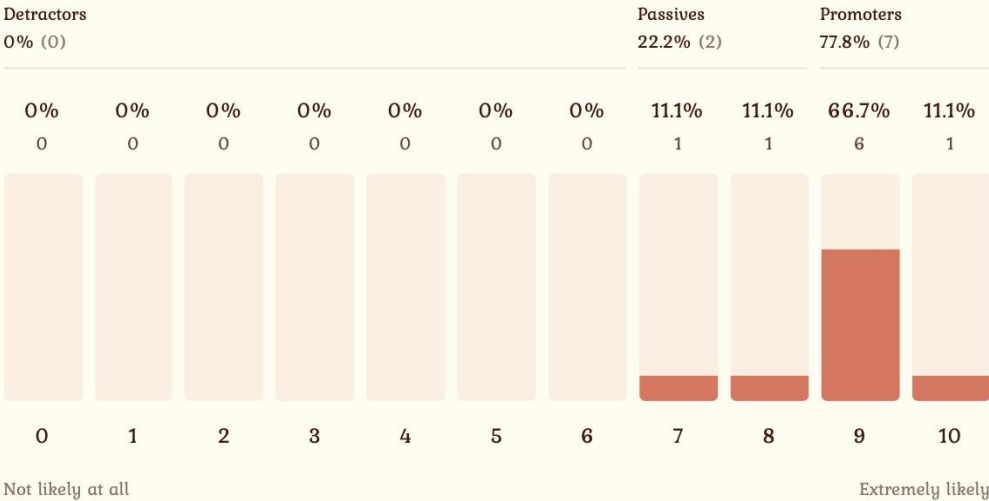


How likely are you to **recommend us** to a friend or colleague?

9 out of 9 answered

Net Promoter Score® (?)

78



 4 Would you like to share any additional thoughts with us?

3 out of 10 people answered this question

When returning multiple recipes, sometimes Foodie gives one or two random recipes. Needs some tuning for accuracy.

4 hours ago

Quick responses. Like the app, will use again.

6 hours ago



4

Would you like to share any additional thoughts with us?

3 out of 10 people answered this question

6 hours ago

I was looking for Indian recipes with rice and cumin and Foodie gave some good recipes. It understood what I was looking for in just one sentence. Lovely!

8 hours ago

The following can be inferred from the above survey results:

- Feedback demonstrates chatbot results are quick and is able to understand what the user is looking for.
- Users typed naturally as if they were communicating with a person.
- When the Foodie app finds multiple recipes, sometimes it has difficulty finding accurate results. We can work on this by further fine-tuning and training the chatbot's learning capabilities.