THOMPSON RIVERS UNIVERSITY

COMP 3710: Applied Artificial Intelligence

Final Project: Gustobot Italian Chatbot

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Problem Definition

Exploring the world of Italian cuisine can be both exciting and intimidating. Many individuals eager to enhance their Italian culinary experience face these challenges:

- **Menu confusion**: The sheer variety of Italian dishes, ingredients, and regional specialties can be overwhelming.
- **Limited knowledge:** Lack of familiarity with classic Italian dishes, ingredients, and wine pairings hinders exploration.
- **Decision paralysis:** Difficulty choosing dishes that align with personal tastes from a potentially extensive menu.
- **Restaurant information:** Finding basic information about the restaurant's location, hours, and ambiance can be time-consuming.

Problem Solution

GustoBot is designed to streamline the Italian dining experience, acting as a friendly and knowledgeable guide. Its core features address the common challenges faced by diners:

- **Menu exploration:** Provides clear menu descriptions and helps users discover dishes aligned with their preferences.
- **Cuisine education:** Offers insights into Italian ingredients, dishes, and wine pairings, empowering informed choices.
- **Personalized recommendations:** Suggests dishes based on a user's expressed tastes and interests.
- **Restaurant details:** Readily shares essential restaurant information, including location, hours of operation, and contact details.
- **Event inquiries**: Assists with exploring potential event or party arrangements at the restaurant.

Inputs & Outputs to and from Chat Bot

- Inputs**:** Primarily text-based. Includes user preferences, inquiries about menu items, restaurant information requests, and feedback.
- Outputs:
- Informative text about menu items, ingredients, and the restaurant.
- Dish recommendations tailored to a user's interests.
- Guidance on Italian wine pairings.
- Reservation assistance (collecting basic details).
- Location images for the restaurant.

Sample Use-Cases

1 **Dish Discovery:**

- Input: "I love spicy food and pasta."
- Output: Recommendations for spicy pasta dishes (e.g., Penne Arrabiata), with descriptions.

2 **Wine Pairing:**

- Input: "What wine goes well with lasagna?"
- Output: Suggestions of suitable wines (e.g., Chianti, Barbera), potentially with brief descriptions of their flavour profiles.

3 **Restaurant Info:**

- Input: "Where are you located?"
- Output: Restaurant address, a map image/link, and hours of operation.

4.Exploring Ingredients:

- Input: "What dishes have truffles?"
- Output: A list of truffle-based dishes with links to descriptions, if available.

Flow of System

Greeting: GustoBot offers a warm welcome, introducing itself as the user's Italian dining assistant.

User Input: The user initiates a conversation by typing a query, preference, or request.

Keyword Analysis: GustoBot identifies keywords in the input to determine the user's intent.

Response Generation: Based on intent, GustoBot accesses its knowledge of the restaurant menu, Italian cuisine, and information to provide a helpful response.

Follow-Up: GustoBot may prompt for more information to refine recommendations or complete tasks like handling reservations.

PEAS Classification

Performance Measure The success of GustoBot can be measured in terms of:	**Environment: GustoBot operates within a digital conversational environment.**	**Actuators: GustoBot's primary means of influencing the environment are:**	**Sensors: GustoBot's "senses" are limited but include:**
User Satisfaction: Positive feedback, ease of use, and the perceived helpfulness of the bot. **Task Completion:** The ability to provide accurate menu information, handle basic reservations inquiries, and guide users through	**Discord Server:** Interactions occur within the text channels of a Discord server designated for the restaurant. **Menu Data:** Its knowledge base is primarily the information contained within the menu. Json file.	**•Text Responses:** GustoBot's main 'actions' are providing textual information, recommendations, and asking users for clarifying details. **Displaying the Menu:** The bot can directly display the restaurant menu within the text	**Text Input:** Its primary perception is through the text messages users type within the Discord chat. **•Basic Keyword Detection:** GustoBot can identify keywords within user input to determine intent to a

exploring the cuisine. **Efficiency:** How quickly and responsively it provides relevant information to users.	**Users:** The 'environment' includes potential restaurant patrons engaging with the bot for various purposes.	channel. •**Image Sharing:** It has the ability to share an image of the restaurant location.	limited degree

Environment Characteristics Table

Characteristic	**GustoBot (Yes/No)**	**Explanation**
Fully Observable	No	GustoBot doesn't have access to all aspects of the user's intent (e.g., their specific mood, hunger level) beyond what they explicitly type.
Partially Observable	Yes	The user's text input provides some insight, but full understanding of their goals and knowledge is limited.
Deterministic	Mostly Yes	The bot's responses are largely predictable based on the menu data and input keywords.
Stochastic	Slightly Yes	User input can include unexpected variations in phrasing or requests, introducing some unpredictability.
Episodic	No	Each user interaction is related to their larger goal of learning about the restaurant or potentially making a reservation.
Sequential	Yes	User queries and the bot's responses build upon each other throughout a conversation.
Static	Mostly Yes	The menu data and core bot functions change infrequently.
Dynamic	Slightly Yes	New specials, menu updates, or unexpected user requests introduce some dynamism.
Discrete	Yes	Input is textual, and the menu options are finitely defined.
Continuous	No	GustoBot doesn't deal with continuous sensor data (e.g., real-time audio or video)
Single Agent	Yes	The chatbot is a single agent interacting with the user’s input.
Multiple Agent	No	The chatbot is not designed to interact with other agents simultaneously.

Development Approach

GustoBot is built in Python, leveraging the discord.py library for its Discord integration

- **Programming Language:** Python
- **Libraries:** discord.py, NLTK (for basic natural language processing)
- **Data Storage:** Menu information is loaded from a JSON file.
- **Functionality:** The provided code primarily focuses on:

Greeting: Acknowledging users with a friendly welcome.

Keyword-Based Responses: Identifying keywords in user input to trigger tailored responses related to the menu, reservations, special offers, cuisine preferences, restaurant information, event planning, wine and beverage recommendations, and feedback collection.

- ➢ Displaying the restaurant menu
- ➢ Recommending dishes based on keywords and expressed preferences
- ➢ Handling basic reservation inquiries (collecting details)
- ➢ Sharing special offers (if any)
- ➢ Providing essential restaurant information (location, hours, contact)
- ➢ Discussing event planning possibilities
- ➢ Suggesting wine or beverage pairings
- ➢ Collecting user feedback for improvement

Basic Information Provision Provides text-based descriptions of dishes and restaurant details.

Image Sharing: Shares restaurant location images.

Bot Model Construction

- **Approach:** GustoBot employs a hybrid model combining rule-based elements with basic natural language processing (NLP) techniques. This allows it to understand user queries while maintaining a structured conversational flow.

Core Functionalities:

- **Keyword Matching:** GustoBot identifies keywords within user input to determine intent (e.g., menu exploration, restaurant info requests).
- **Menu Search:** The bot has a simple search function to match keywords against dish names and descriptions within its menu data.
- **Greeting and User Information:** GustoBot stores the user's name and uses it to personalize interactions.
- **Guided Conversation:** GustoBot prompts users for information when necessary (e.g., during reservation inquiries).

Model Setup

Libraries & Tools

- **Python:** GustoBot is built using Python, a popular language for chatbot development.
- **discord.py:** (from previous section) Used for interacting with the Discord platform.
- **NLTK:** The Natural Language Toolkit provides basic text processing capabilities.

Data

Menu. Json This JSON file serves as GustoBot's primary "database," storing a structured menu with dish names, descriptions, and pricing.

Training Data

GustoBot currently operates as a rule-based system with some basic NLP features. It's main "training" comes from:

- **Menu Data:** The contents of menu. Json determines the bot's knowledge of the restaurant's offerings.
- **Keyword Analysis:** The bot's ability to identify relevant keywords in user input drives its understanding of user requests.

Challenges and Future Improvements

- **Limited NLP Understanding:** GustoBot's current NLP capabilities are simplistic. It may struggle with complex sentence structures or variations in phrasing.
- **Scalability:** The reliance on menu. Json and basic keyword matching can make managing extensive menus or complex functionality difficult.
- **Synonym Handling:** Recognizing synonyms for food items and ingredients would significantly broaden its understanding of user queries.
- **Intent Classification:** A more robust intent classification system would allow GustoBot to better handle diverse requests (reservations, feedback, etc.) beyond menu searches.
- **Static Knowledge Base:** The menu data is currently limited to what's defined in 'menu.json'. Enhancements could be:
    - **Dynamic Updates:** Allowing restaurant staff to easily update the menu information in real-time would keep GustoBot in sync with changes or specials.
    - **Expanded Data:** Integrating information about wine pairings, ingredient details, or event spaces would make GustoBot even more informative.

Enhancements:

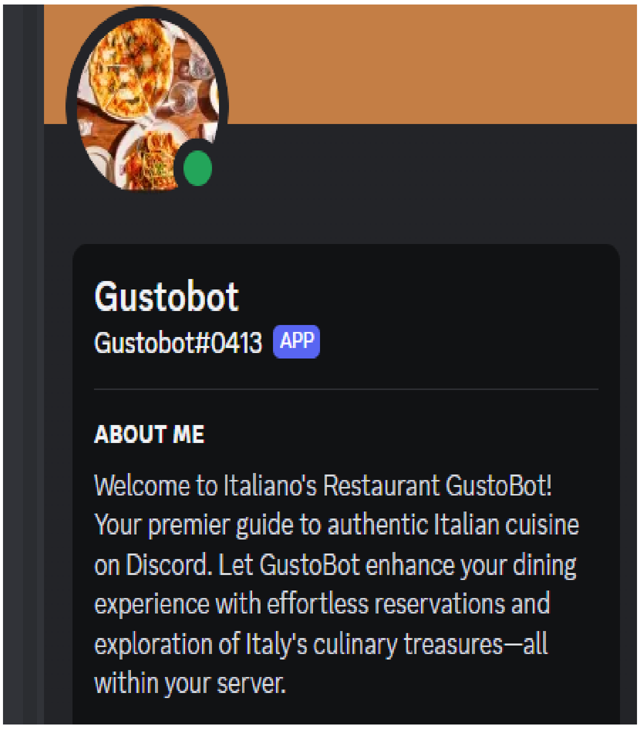
- **Expanded NLP:** Incorporating more sophisticated NLP techniques would improve GustoBot's understanding of natural language, allowing for more nuanced conversations.
- **Modular Design:** Breaking down the bot's functionality into well-defined modules would make the code easier to maintain as it expands.
- **Database Integration:** Connecting GustoBot to a database would improve data management and enable features like order placement or managing reservations more effectively.

- **Intent Recognition:** Implementing a more robust intent recognition system would make GustoBot less reliant on specific keywords and better at handling diverse user requests.
- **Machine Learning:** Introducing machine learning elements could enable features like personalized recommendations based on past interactions or order history.

Key Takeaways

- GustoBot's environment straddles some boundaries due to the nature of human-bot text interaction.
- The majority of its environment is considered predictable and discrete, aligning with its primary function of providing information from a structured dataset.

Screenshots:

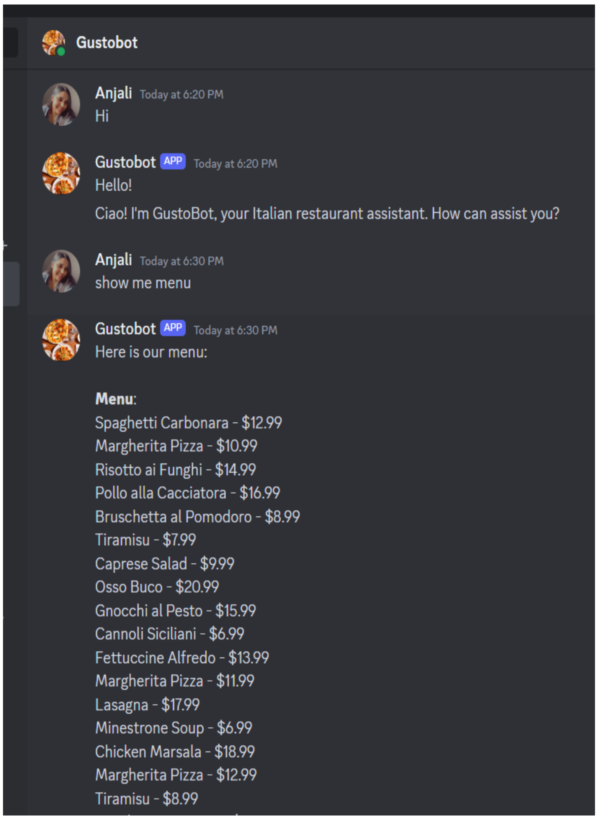


Gustobot

Gustobot#0413 APP

ABOUT ME

Welcome to Italiano's Restaurant GustoBot! Your premier guide to authentic Italian cuisine on Discord. Let GustoBot enhance your dining experience with effortless reservations and exploration of Italy's culinary treasures—all within your server.



Anjali Today at 6:20 PM
Hi

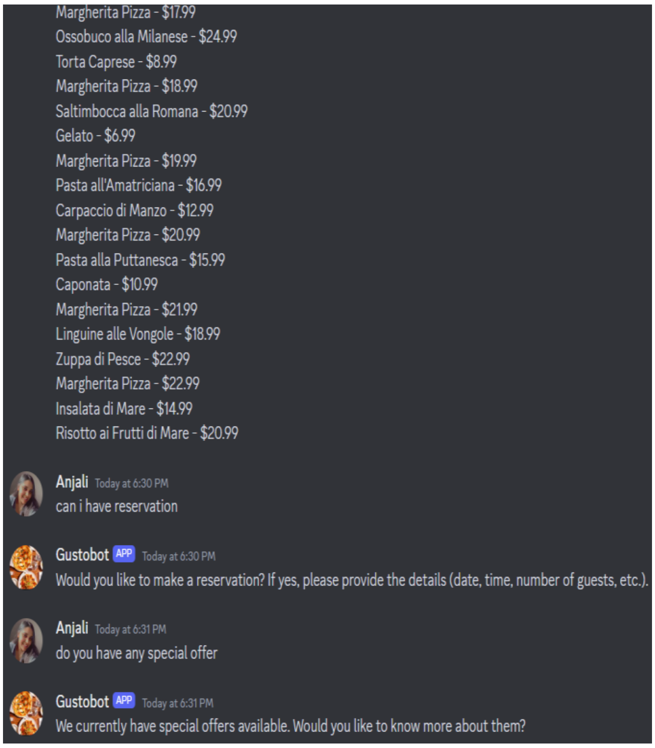
Gustobot APP Today at 6:20 PM
Hello!

Ciao! I'm GustoBot, your Italian restaurant assistant. How can assist you?

Anjali Today at 6:30 PM
show me menu

Gustobot APP Today at 6:30 PM
Here is our menu:

Menu:
Spaghetti Carbonara - $12.99
Margherita Pizza - $10.99
Risotto ai Funghi - $14.99
Pollo alla Cacciatora - $16.99
Bruschetta al Pomodoro - $8.99
Tiramisu - $7.99
Caprese Salad - $9.99
Osso Buco - $20.99
Gnocchi al Pesto - $15.99
Cannoli Siciliani - $6.99
Fettuccine Alfredo - $13.99
Margherita Pizza - $11.99
Lasagna - $17.99
Minestrone Soup - $6.99
Chicken Marsala - $18.99
Margherita Pizza - $12.99
Tiramisu - $8.99

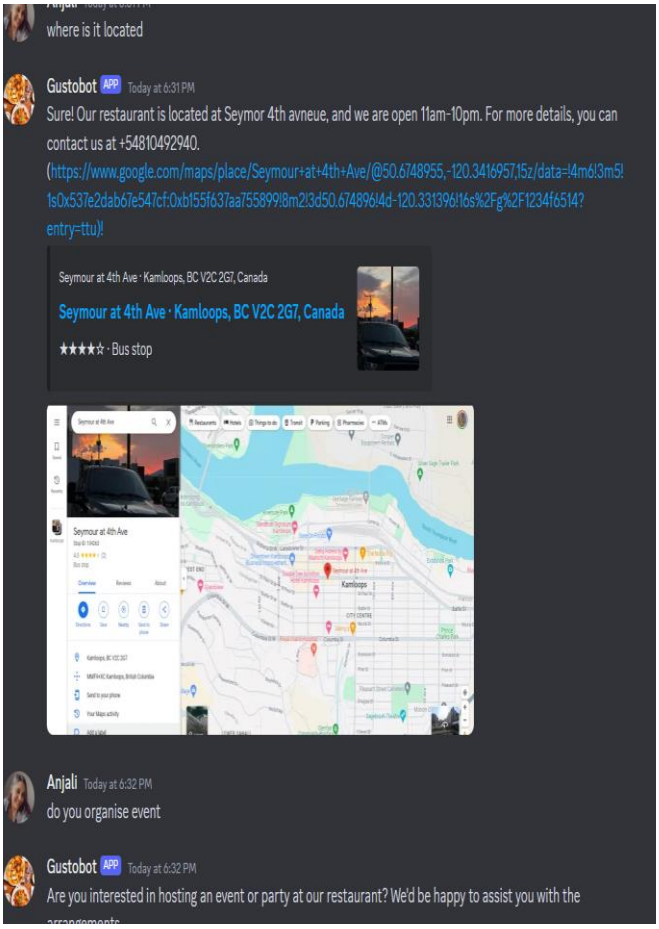

Margherita Pizza - $17.99
Ossobuco alla Milanese - $24.99
Torta Caprese - $8.99
Margherita Pizza - $18.99
Saltimbocca alla Romana - $20.99
Gelato - $6.99
Margherita Pizza - $19.99
Pasta all'Amatriciana - $16.99
Carpaccio di Manzo - $12.99
Margherita Pizza - $20.99
Pasta alla Puttanesca - $15.99
Caponata - $10.99
Margherita Pizza - $21.99
Linguine alle Vongole - $18.99
Zuppa di Pesce - $22.99
Margherita Pizza - $22.99
Insalata di Mare - $14.99
Risotto ai Frutti di Mare - $20.99

Anjali Today at 6:30 PM
can i have reservation

Gustobot APP Today at 6:30 PM
Would you like to make a reservation? If yes, please provide the details (date, time, number of guests, etc.).

Anjali Today at 6:31 PM
do you have any special offer

Gustobot APP Today at 6:31 PM
We currently have special offers available. Would you like to know more about them?



where is it located

Gustobot APP Today at 6:31 PM

Sure! Our restaurant is located at Seymor 4th avneue, and we are open 11am-10pm. For more details, you can contact us at +54810492940. (https://www.google.com/maps/place/Seymour+at+4th+Ave/@50.6748955,-120.3416957,15z/data=!4m6!3m5!1s0x537e2dab67e547cf:0xb155f637aa755899!8m2!3d50.674896!4d-120.331396!16s%2Fg%2F1234f6514?entry=ttu)!

Seymour at 4th Ave · Kamloops, BC V2C 2G7, Canada

Seymour at 4th Ave · Kamloops, BC V2C 2G7, Canada

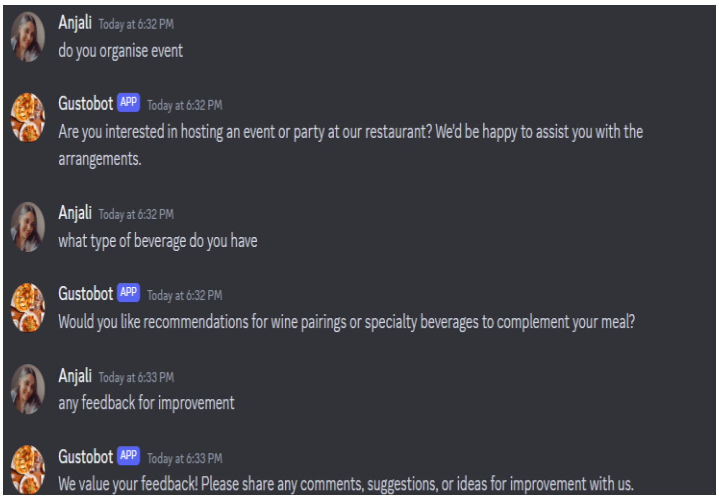
★★★★☆ · Bus stop

Anjali Today at 6:32 PM

do you organise event

Gustobot APP Today at 6:32 PM

Are you interested in hosting an event or party at our restaurant? We'd be happy to assist you with the



Anjali Today at 6:32 PM

do you organise event

Gustobot APP Today at 6:32 PM

Are you interested in hosting an event or party at our restaurant? We'd be happy to assist you with the arrangements.

Anjali Today at 6:32 PM

what type of beverage do you have

Gustobot APP Today at 6:32 PM

Would you like recommendations for wine pairings or specialty beverages to complement your meal?

Anjali Today at 6:33 PM

any feedback for improvement

Gustobot APP Today at 6:33 PM

We value your feedback! Please share any comments, suggestions, or ideas for improvement with us.

Conclusion

GustoBot, in its current iteration, serves as a helpful guide to the restaurant's menu and basic functionalities, offering a touch of personalized Italian hospitality within the Discord environment. While its knowledge base and NLP capabilities are currently limited, GustoBot demonstrates the potential for streamlining the Italian dining experience using conversational AI. Its design leverages a rule-based approach with basic natural language processing, providing menu exploration, recommendations, and restaurant information in a user-friendly way. Analysis of GustoBot's characteristics through the PEAS framework highlights its strengths within its defined scope as well as areas for potential expansion. Future improvements could focus on incorporating more robust language understanding, a wider range of restaurant information, and integrating with potential reservation systems to transform GustoBot into a truly comprehensive dining assistant. These enhancements would enhance the user experience, streamline interactions for the restaurant, and further establish GustoBot as an indispensable tool in the realm of Italian culinary exploration.

Reference:

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