Pizza Chatbot Project Report

1. Overview

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This project is a voice- and text-driven pizza ordering chatbot built using a local language model (Mistral-Nemo-Instruct-2407) running with llama.cpp. It allows users to place orders using natural language through either typing or speaking. The backend is built using FastAPI, and includes components for real-time voice control, intent classification (ML + rule-based), dialog management, and prompt generation.

Technologies Used:

- Python, FastAPI
- Llama.cpp with Mistral-Nemo-Instruct-2407
- Whisper for speech-to-text
- Porcupine for wake-word detection
- scikit-learn for ML classification

-React, html, javascript

Following prompt has been used:You are an AI assistant for a pizza delivery service.
Here is the menu:
Pizzas: {', '.join(menu['pizzas'])}
Toppings: {', '.join(menu['toppings'])}
Extras: {', '.join(menu['extras'])}

Current Order: {order}
Customer said: "{user_input}"

Based on this, either extract pizza order details, delivery address, allergies, or ask follow-up questions to complete the order.
Always respond concisely and helpfully

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2. Technical Components

- Intent Classification: A hybrid system using TF-IDF + Random Forest (trained on labeled phrases) along with rule-based checks against the menu ensures accurate interpretation of user messages.

- Dialog Manager: Maintains state and structured order data (pizzas, toppings, extras, notes, address). Updates are triggered based on identified intent and LLM response.

- LLM Agent: Mistral-Nemo-Instruct model is prompted with structured order data and menu to generate relevant and context-aware replies. It also classifies intent in fallback scenarios.

- Real-Time Voice Interface: Wake word detection via Porcupine ('Jarvis') and transcription via Whisper. The bot responds using macOS speech synthesis and updates the order structure accordingly.

- FastAPI Backend: Exposes the `/message` endpoint for frontend integration and runs the voice assistant in a background thread.

-Web interface implemented as web widget for the website, interface includes input text as dialog with chatbot

Example of Final Order JSON:

```
{
  "pizzas": ["Margherita"],
  "toppings": ["Onions", "Chili"],
  "extras": ["Cola"],
  "notes": "very spicy, vegan",
  "address": "Reuterstraße 49, Berlin"
}
```