**Conversational Agent with Tool Use and Reasoning**

**Overview**

This project implements a conversational agent capable of using external tools, performing calculations, and applying reasoning techniques such as Chain of Thought (CoT) and ReAct (Reasoning + Acting). The agent integrates with APIs to fetch weather information and evaluate mathematical expressions.

**Features**

* Retrieves current weather and forecasts using WeatherAPI.
* Evaluates mathematical expressions.
* Simulates web searches for predefined topics.
* Implements reasoning techniques:
  + **Basic Agent:** Answers queries without advanced reasoning.
  + **Chain of Thought (CoT):** Breaks down complex queries step by step.
  + **ReAct:** Uses structured reasoning to retrieve and process information.

**Setup Instructions**

**1. Clone the Repository**

git clone https://github.com/yourusername/Conversational-Agent-Lab4.git

cd Conversational-Agent-Lab4

**2. Install Dependencies**

Ensure you have Python installed, then run:

pip install openai requests python-dotenv

**3. Configure API Keys**

Create a .env file in the project directory with the following content:

API\_KEY=your\_openai\_api\_key

WEATHER\_API\_KEY=your\_weather\_api\_key

BASE\_URL=https://api.openai.com/v1

LLM\_MODEL=gpt-4

Replace your\_openai\_api\_key and your\_weather\_api\_key with your actual API keys.

**4. Run the Chatbot**

python chatbot.py

**Example Conversations**

**Basic Agent**

You: What's the weather in London?

Assistant: The weather in London is sunny, 15°C.

**Chain of Thought Agent**

You: What's 25 + 30?

Assistant: Let's break this down step by step. 25 plus 30 equals 55.

**ReAct Agent**

You: What is the temperature difference between London and New York?

Assistant: Let me first get the weather for London... (fetches data)

Assistant: Now I'll get the weather for New York... (fetches data)

Assistant: The temperature difference is 10°C.

**Analysis of Reasoning Strategies**

* **Basic Agent:** Provides direct answers without detailed reasoning.
* **Chain of Thought:** Enhances complex problem-solving by breaking down the reasoning process.
* **ReAct:** Uses an iterative process of thought, action, and reflection to provide accurate answers.

**Challenges Faced & Fixes**

* **API Authentication Errors:** Resolved by correctly loading environment variables.
* **Incorrect JSON Parsing:** Adjusted API response handling to prevent format issues.
* **'str' object has no attribute 'choices' Error:** Fixed by properly accessing response data from OpenAI API.

**Submission Details**

Ensure the repository is public or add course instructors as collaborators. Submit the repository URL via the course portal:

<https://github.com/YoussefAbohendia/Conversational_agent.git>