Concordia University

COMP 474 – Intelligent Systems

Winter 2025

Project 2: Building an Adaptive Multi-Agent Chatbot System using Ollama

This project must be done in groups. You need to work in groups of minimum 3 maximum 5 students.

Any project related questions please communicate with one of our TA's:

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If TA's are still on strike, please e-mail your questions to me directly: Nagi.Basha@Concordia.ca

Objective:

You need to design and implement a **multi-agent chatbot system** that leverages **Ollama** for intelligent conversations across multiple domains. The chatbot will adapt dynamically based on context, past interactions, and external knowledge sources.

Project Scope:

- **Multi-agent architecture:** The chatbot will consist of different agents, each responsible for a specific function. We need one agent for general questions. Another agent specifically for admission to Concordia in the Computer Science program, and a third for AI related questions.
- **Context-awareness:** The chatbot must track user history and maintain conversation flow over multiple interactions.
- **Knowledge integration:** You must integrate external APIs such as Wikipedia or whatever you see fit to enhance the chatbot's responses.
- **Multi-turn conversations:** The chatbot should maintain logical and meaningful conversations over multiple exchanges.
- **(Grad students only) Evaluation metrics:** You need to implement accuracy, coherence, and user satisfaction metrics to assess chatbot performance.

Implementation Requirements:

- **Programming language:** Python
- **Frameworks and tools that you may need to use:**
  - **Ollama** for LLM-based response generation.

    - **LangChain** for memory and prompt engineering.
    - **FastAPI** for deploying the chatbot.
    - **Vector database (e.g., FAISS or ChromaDB)** for contextual memory storage.
    - **(Grad students only):** Reinforcement learning for improving responses over time.

Expected Deliverables:

1. **Codebase** with proper documentation.
2. **Execution guide** with detailed instructions on how to run your project.
3. **Technical report** covering architecture, design decisions, and challenges.
4. **Demo video** showcasing the chatbot's functionality.
5. **(Grad students only) Performance evaluation** with benchmark comparisons.
6. **You may also be requested to give a demo.**

Challenges & Learning Outcomes:

- Understanding **multi-agent coordination** in chatbot systems.
- Applying **Ollama's capabilities** effectively.
- Implementing **context-awareness** and **retrieval-augmented generation (RAG)**.
- Evaluating **chatbot quality** using AI metrics.

Have fun 😊