
Proposal: Fall Student Project on Context-Aware Multi-Agent AI

Project Title

"Extending and Evaluating a Multi-Agent Framework for Domain-Specific Tasks"

Objectives

1. Implement and replicate the baseline system: setup Qdrant, Redis embedding-based vector stores, configure multiple agents via LangChain and Faiss.
2. Customize the framework for a specific domain (e.g. customer service simulation).
3. Extend agent architecture by introducing new agent roles (e.g., fact-checker, synthesizer, planner).
4. Develop evaluation metrics: task success, coherence, inter-agent consistency, retrieval relevance.
5. Conduct experiments comparing homogeneous vs heterogeneous agent setups (e.g. mixing different LLMs). Use results from prior Field sessions to inform design.
6. Document findings and open-source code, ideally as a reproducible tutorial.

Team and Roles

- **Project Lead**: overseeing architecture definition, experimental design.
- **Engineering Subgroup**: handling API integrations, coding of agents, memory and vector store pipelines.
- **Evaluation Subgroup**: designing experiments, collecting metrics, statistical comparison.
- **Technical Writer / Documentarian**: maintaining clean documentation and publishing results.

Timeline (approx. 12 weeks)

Weeks	Milestones
1–2	Replicate baseline architecture per tutorial
3–4	Select domain and assemble content corpus
5–6	Implement new specialized agent roles
7–8	Develop evaluation methodology and baseline runs

Weeks	Milestones
9–10	Run variations: different agent mixes, retrieval strategies
11	Analyze results, iterate on architecture
12	Final write-up and presentation

Deliverables

- Reproduced baseline system code using LangChain, LangGraph and other Agentic frameworks
- Domain-specific corpus and knowledge base.
- Extended architecture with at least two new agent roles.
- Performance evaluation results (quantitative and qualitative).
- Project report summarizing methodology, results, and recommendations.
- Open-source repository with tutorial-style documentation.

This project would provide students with hands-on experience in building, customizing, and evaluating an advanced multi-agent AI system based on cutting-edge open embeddings and LLM technologies.