ADTA 5770: Generative AI with Large Language Models

Thuan L Nguyen, PhD

Final Project

1. Overview

The final project covers all the topics discussed during the course. The materials posted in any format for the class activities should be considered and used for the project. Additionally, the student can use any other source of information that they can gather.

IMPORTANT NOTES:
--) Students should present their work for each section using text and images.
--) The sources can be from class lectures, assignments, and more, or other sources
--) One picture is worth 1000 words. However, an image with text explaining what it is and what it is for is considered complete and much more convincing.
--) Images can include the screenshots the student has taken while working on the classwork.

IMPORTANT NOTES:
--) When discussing a topic or answering a question, the student must provide adequate explanation and supporting details to their presentation.

IMPORTANT NOTES:
*--) If MS Docx is the document format required for submission, the student must submit the contents as MS Docx files, **not** submit PDF documents.*
--) However, before submitting, the student should make a backup copy of the documents by converting them into PDF files that could be used for re-submission if the submitted file was corrupted.

2. Final Project: Assignment Format

The final project is assigned as a team assignment, which means that all the group's student members will collaborate while working on it.

However, each student must **write** and **submit** their report **independently**. In other words, a student works on the assignment with the team but **writes** and **submit**s the report as if he/she had worked independently.

3. Final Project: Overview

Each group is assumed to be an AI system development team in a business organization. With the explosion of popularity and widespread use of generative AI in real-world management and business activities, the corporation's leaders want the team to develop a generative AI system that the company employees can use to perform content searches, ask questions, and get answers about the contents of the organization's proprietary documents.

The team will adopt Google Cloud Platform (GCP): Vertex AI services as the primary system Integrated Development Environment (IDE) to design, build, and test the system throughout the project, including but not limited to cloud storage, vector embeddings generation, vector databases management, and advanced vector search technologies. For development, the group will use Python for coding with Google Collaboratory (Colab) as the coding IDE. The group also plans to use popular generative AI techniques, including but not limited to Retrieval Augmented Generation (RAG), Sentence Transformers, and tools provided by generative AI platforms like LangChain and Hugging Face.

The team plans to use Gemini 2.0 flash and the latest versions of both Python and LangChain in the system development process.

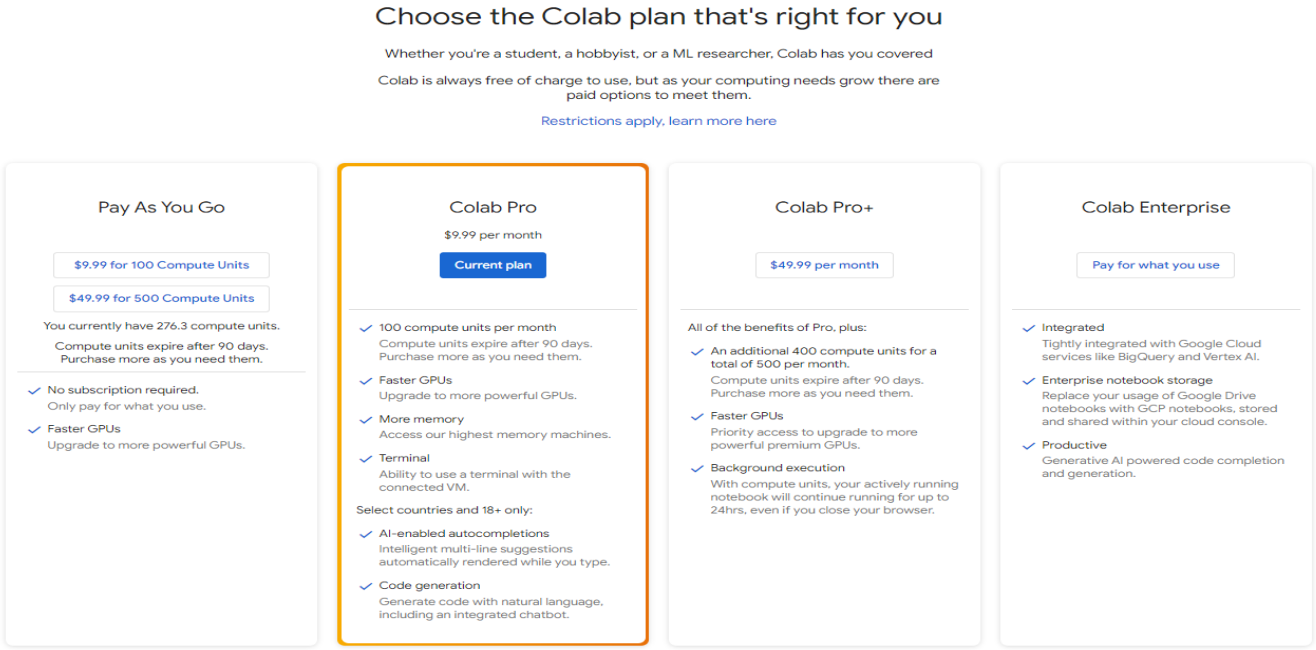
4. PART I: Create a Google Colab Account

TO-DO: Individual students

- Each student must create a free account with Alphabet/Google Collaboratory.

TO-DO: Groups

- Each group must create a paid PRO account with Alphabet/Google Collaboratory.



5. PART II: Project Proposal (10 Points)

5.1 Overview

To prepare for the semester project, each group needs to submit a project proposal in which they clearly describe what the group aims to accomplish with the project, including the title, the abstract, and **most importantly**, the **domain expertise field** chosen by the group.

IMPORTANT NOTES:
--) Each group designs, implements, and tests a Q&A Search system, using Generative AI technologies.
--) The group aims to deploy the system for generative AI applications applied to a particular real-world business or industry sector, such as engineering, sciences, healthcare, business, education, to name a few.

- For engineering, the group must specify an engineering area, such as software engineering, chemical engineering, mechanical engineering, etc.
- For business, the group must specify an engineering area, such as accounting, finance, supply chain, etc.
- And so on, …

TO-DO:

- Write a **project proposal** (at least 2 pages – font size: 12 – single space – no images)

SUBMISSION REQUIREMENTS PART II:

The student must submit the project proposal by email sent to the instructor (Thuan.Nguyen@unt.edu)

The email subject: "ADTA 5770: Final Project Proposal - Submission"

Due date & time: 11:00 PM – Wednesday 02/12/2025

6. PART III: Knowledge Base (10 Points)

6.1 Overview

To prepare for the semester project, each group must collect 100 PDFs used as the knowledge base of the Q&A Search system. The document contents must be closely relevant to the domain expertise field chosen by the group.

Each group has a UNT OneDrive folder assigned by the instructor (via email) to store the knowledge-based documents.

TO-DO:

- Collect 100 PDFs related to the domain expertise field that the group focuses on
- Access the assigned OneDrive folder

SUBMISSION REQUIREMENTS PART III:

The group must submit the 100-PDF knowledge base by uploading all the documents to the assigned OneDrive folder.

Then, the group leader must inform the instructor about the submission by email sent to the instructor (Thuan.Nguyen@unt.edu)

The email subject: "ADTA 5770: Final Project Knowledge Base – Group <n> Submission"

Due date & time: 11:00 PM – Sunday 02/16/2025

7. PART IV: Generative AI A&Q-Search System: Planning, Requirements, Data

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8. PART V: Generative AI A&Q-Search System: System Analysis

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9. PART VI: Generative AI A&Q-Search System: System Design

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10. PART VII: Generative AI Q&A-Search System: System Set-Up

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11. PART VIII: Generative AI Q&A-Search System: System Development

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12. PART IX: Generative AI Q&A-Search System: System Testing

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13. PART X: Generative AI Q&A-Search System: System Clean-Up

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14. PART XI: Final Project: Design Review and Midway Presentation

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15. PART XII: Final Project: Final Presentation

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16. HOWTO Submit

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