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Generative AI and Learing: Using Retrieval-Augmented Generation (RAG) for C++ Tutoring

The objective of our project is the design and implementation of an AI-based tutor app that addresses introductory-level C++ programming questions. By using a Retrieval-Augmented Generation (RAG) approach to providing targeted feedback, our goal is to develop a basic, but effective AI framework that facilitates learning. Instead of relying on a pre-stored database of answers, the system will dynamically generate context-specific responses by interfacing with a local Llama3 AI model through Ollama’s local REST API.

The backend, implemented in C++, will serve as the engine of the application. It will process incoming questions from users, communicate with the Llama3 model via the REST API, and ensure that the answers generated are both concise and relevant. This design minimizes the risk of oversaturated or generic responses, providing students with clear and direct explanations tailored to their queries.

The front end will be implemented using JavaScript. The functionality will be custom-built, while the graphic design from a previous project will be used. This interface will allow students to easily input their questions and view immediate feedback, which ultimately enhances the learning experience. Combined with the backend, this will create a user-friendly, responsive web application.

Overall, the project aims to create a scalable tutoring tool that not only improves students’ understanding of C++ programming concepts, but also serves as a proof-of-concept for integrating advanced local AI capabilities into educational platforms. The desired outcome is to foster an engaging, adaptive, and accessible learning environment that can be extended to additional subjects in the future.

NOTES:

* Title
* C++ web compiler???? – Probably Not (Khanmigo/cs50)
* Specify chapter 1 of CSC 108 in paper (not abstract)
* Write a hooky title
* Combine first two paragraphs (Save them for the paper)
* Slightly less info in first two paragraphs
* Rephrase last paragraph to be more specific (don’t need to serve as proof-of-concept)
* What is the project going to accomplish? (last paragraph)