‘coursepilot’ Proposal

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Context

With innovative tools and frameworks emerging surrounding LLMs we wanted to apply some new techniques such as RAG (Retrieval Augmented Generation) to provide value to students by making learning more effective and engaging. Our idea is to embed the semantic meaning of documents, which could be student-taken notes or slides uploaded by a professor, store the documents in a vector database, and use them to provide greater context to generate a better output when the LLM is used.

Requirements

- Accelerate note taking using AI
- Provide study tools and jumpstart presentations/projects
- Help teach, without avoiding learning

Features

- Autocomplete/intellisense for notes based on slides and previous notes
- Context-aware chatbot with your notes and the slides
- Generation of follow up questions to reinforce learning after the lecture
- Templates for structured notes (maybe generating notes in certain templates from given basic notes, e.x. cornell)
- Import handwritten notes/your lecturer’s slides to extend your online notes

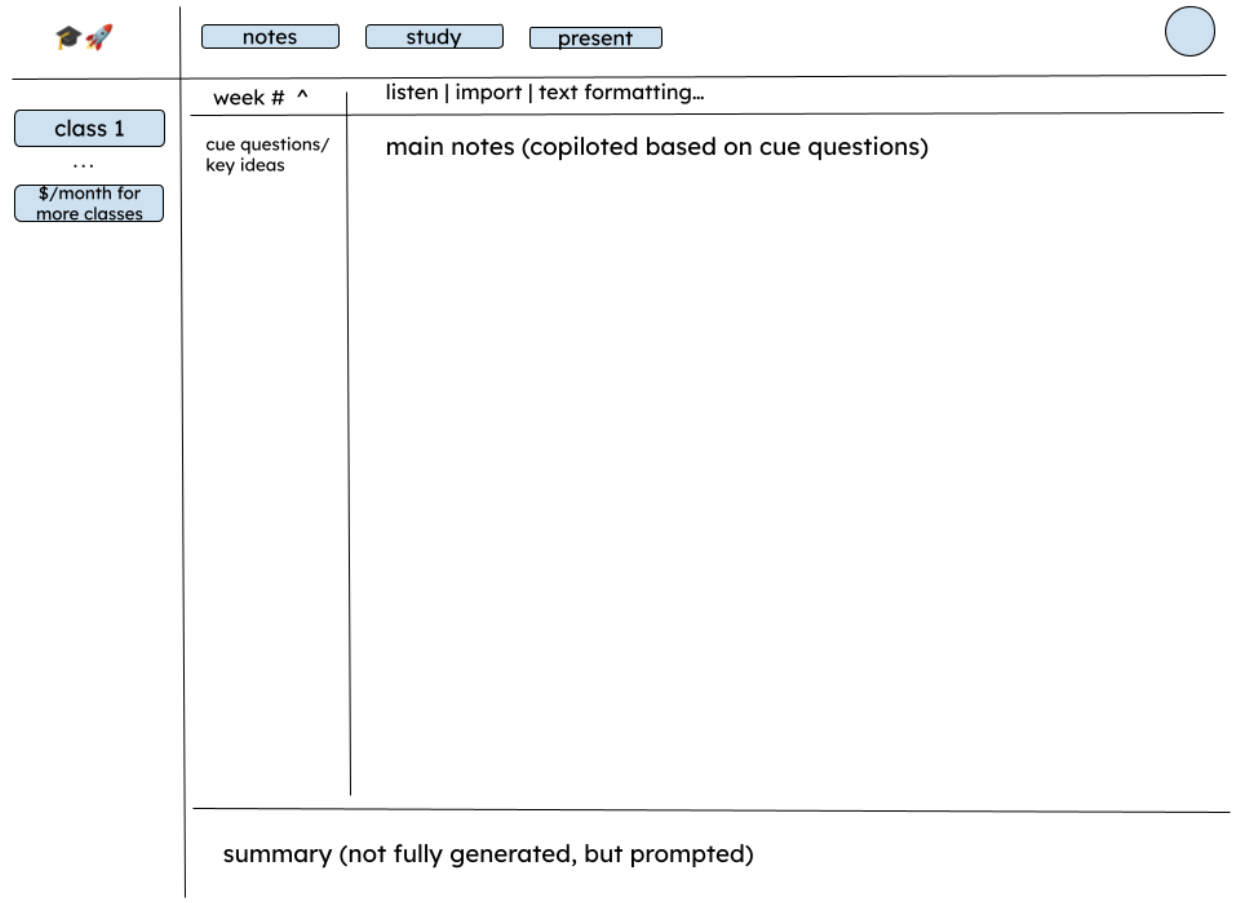
Tech Stack

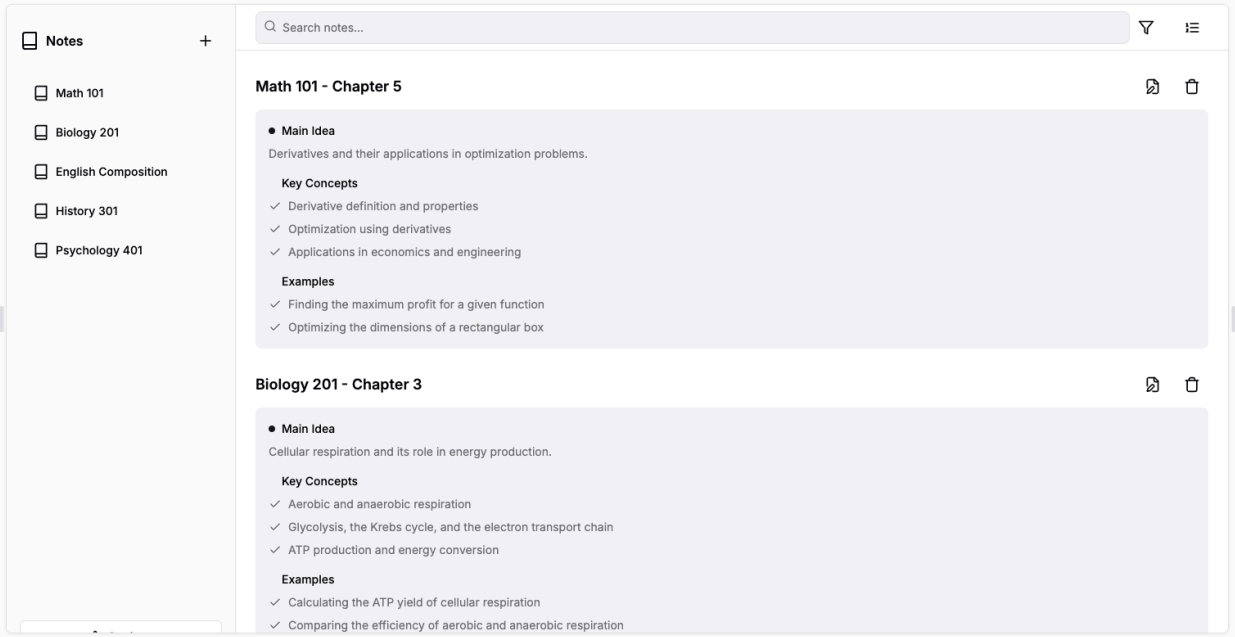
- Next.js (a framework for React) to provide an interface for structured note taking and a portal to classes
- Either the OpenAI embedding api or the BERT sentence embedding model from HuggingFace to embed textual data from notes and course materials
- Clerk for auth (no need to roll our own auth)
- PostgreSQL with the pgvector extension to store vectorized documents, and
- Google’s Gemini 1.5 Flash will be our general model for text completions

Why? (Justification)

Taking notes can be tedious. A lot of students have varying workflows, since some hand write their notes, and others use iPads, but even those with iPads might use Apple Notes, Notability, Notion, Obsidian, or any other note taking app. That list only applies for taking notes, as students then move on to physical flashcards, Quizlet, Google Workspace, or Microsoft 365 to study or present on the material they've learned. If all of this could already be as simple as pen and paper, then technology should be able to accelerate this tenfold.

Design


notes
study
present
week # ^
listen | import | text formatting...
class 1
...
$/month for more classes
cue questions/ key ideas
main notes (copiloted based on cue questions)
summary (not fully generated, but prompted)


Notes
Math 101
Biology 201
English Composition
History 301
Psychology 401
Search notes...
Math 101 - Chapter 5
Main Idea
Derivatives and their applications in optimization problems.
Key Concepts
Derivative definition and properties
Optimization using derivatives
Applications in economics and engineering
Examples
Finding the maximum profit for a given function
Optimizing the dimensions of a rectangular box
Biology 201 - Chapter 3
Main Idea
Cellular respiration and its role in energy production.
Key Concepts
Aerobic and anaerobic respiration
Glycolysis, the Krebs cycle, and the electron transport chain
ATP production and energy conversion
Examples
Calculating the ATP yield of cellular respiration
Comparing the efficiency of aerobic and anaerobic respiration