

VIP Textbook Summarization Frontend Visualization Fall 2023 Project Proposal

Group Membership:

Member		
Sagar Gupta	Skills	Javascript (React), Python, HTML/CSS, SQL, Java
	Credits	1
	Responsibility	ChatGPT frontend integration to allow users to submit text/questions to ChatGPT directly from site
Saloni Bedi	Skills	Java, Python, C, HTML/CSS
	Credits	1
	Responsibility	Developing the flashcard navigation system, specifically the way in which users go from one flashcard to the next and flip to the back/front of a flashcard.
Dennis Tsui	Skills	Java, Python, C/C++, SQL, Javascript, HTML/CSS
	Credits	2
	Responsibility	Enhancing user experience through modifications to layout, interactivity (ex adjacent highlighting of nodes) Mode/Feature selection Advising team/other teams on working with existing code.

Project Goals:

The existing textbook reference system represents the textbook as a graph of subchapter nodes connected by edges representing nodes that are related to each other based on keyword similarity/concept relatedness. It allows users to hover over a certain node to obtain a paragraph summary of the contents of the section.

However, the system is very primitive. Thus, other teams plan to be adding functionality such as, but not limited to, ChatGPT, automated outside references generation, enhanced keyword searching, and embedded quizzes. These functionalities all require frontend implementations to allow the users to interact with all of these in an integrated, easy to use studying environment.

Furthermore, the existing functionality, namely the graph visualization, is difficult to navigate. For instance it is difficult to be able to view the node connections when a node has a lot of connections. A feature such as adjacent-node highlighting would help with this. Overall, enhancing the existing user interface is also important to create a seamless student experience.

Project Timeline:

Week 1-3: Team formation, proposing project ideas, and planning the project

Week 4-5: Review/Learn D3 visualization library

Week 6-10: Create flashcard navigation, ChatGPT input, and MC option to switch.

Week 11-14: Integrate backend/API team's work into frontend UI

Week 15: Testing, adjusting and optimizing accordingly

Week 16-17: Final Presentation

Milestones:

We can start by just getting a graph representing the connections between textbook subchapters to display on a site. We can make major UI components (display box on hover showing summary, ChatGPT text box etc.) major milestones as we develop the frontend. After implementing each major future we can ask members of other teams to test out the platform as users and give feedback. For future work, we will check our progress with each other and meet regularly to report our progress and the work we have done during the week.

Our milestones include:

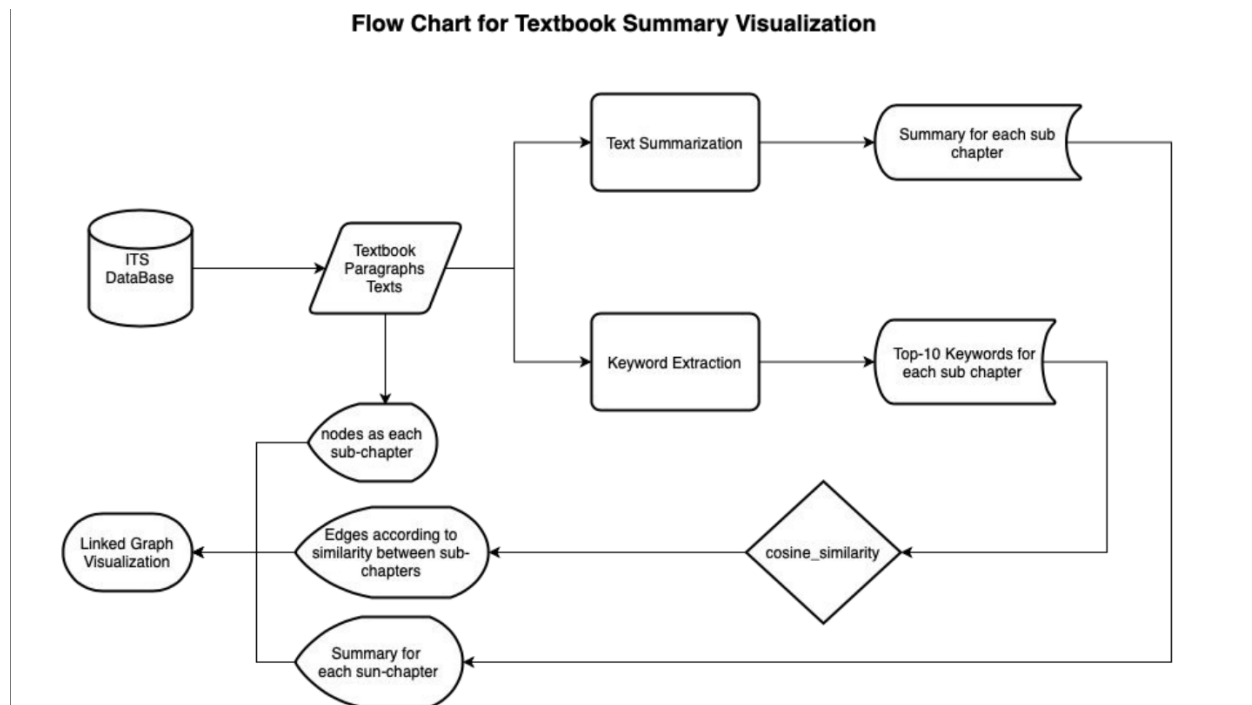
1. Framing the demo without the integrations. So we'll have the selector of mode (ChatGPT vs Flashcard) and it will allow the user to go through either pregenerated flash cards or enter text into a textbox which will be saved into a variable and output sample text.

2. Designing the user interface for querying ChatGPT about a specific subchapter. This will likely be in the form of a text box, where users enter text and some other text would output (this outputted text would be ChatGPT's response to the question the user posed).
3. Developing the system for flashcards to flip when the user presses on a flashcard and to go to the next flashcard when the user indicates they want to move on. This will be the flashcard navigation system.

Project Description:

Currently, the textbook reference project has these 5 steps in the control flow:

- Create textbook summaries for each sub-chapter (1.1, 3.10, ...)
- For each sub-chapter, extract the keywords
- Use these keywords to calculate the similarity between each pair of sub-chapters
- Visualize similar sub-chapters using a vertex-edge graph model
- Allow users to view the summaries for each sub-chapter



In parallel, other teams will focus on improving the textbook summarization algorithm and refining the NLP approaches implemented on the dataset. For example, we want to improve keyword extraction using Monkeylearn and feed these keywords along with the textbook text into a model like ChatGPT to generate relevant and reproducible summaries. This will allow us to more accurately capture the meaning of the content. From there, we can create a connection between the textbook and piazza questions or between chapters and subchapters. Similarities between keywords or summaries can be incorporated with various algorithms such as cosine similarity to make the graph more robust.

Foreseeable Challenges

Group Challenges: We have a mix of new and returning members so coordinating gaps in knowledge and experience may be a challenge.

Sagar: Not super familiar with NLP terms/algorithms. Understanding the existing codebase/project structure and project progress. Coordinating progress across different subteams since some of our work will build on theirs and vice versa.

Saloni: Understanding the codebase of the existing project. Learning how to use frontend languages such as JavaScript and familiarizing myself with frontend frameworks/tools such as D3.js. Brainstorming the ways in which we can make the user's interaction with ChatGPT more fluid and simple.

Dennis: Teaching new members from this team and other teams how to work with the existing technologies. Growing pains from scaling up existing code. Coordinating work with other teams to create a final product.

Implementation and Teamwork

In addition to the Wednesday 12:30-1:30 meeting, we will also meet virtually from 3:30-4:30pm every Friday. If a team member cannot make this meeting then they should notify the team as soon as possible and catch up on the work that they missed.

Implementation Tools / Resources / File Management

We will use the textbook and Piazza dataset for our new system. We will be using javascript and html/css for writing our code, and we are going to use GitHub to share and contribute our work with each other and implement the algorithm we are working on. We can also create GUI or some visuals to present our work at the end. We plan to tie everybody's work together by the end of the project. Once we are done with our rather individual parts, we plan to spend some amount of weeks combining our work together into a single demonstrable product.