📌 Assignment: AI-powered Educational Companion App

Problem Statement:

Design and implement a mobile application using React Native integrated with a Node.js backend, functioning as an AI-powered educational companion. This application enhances the learning experience from YouTube videos by linking video content directly with relevant NCERT textbook concepts.

Key Features and Screens

Functional Requirements:

1. Video Processing and Transcript Extraction:

- Fetch and extract the transcript of a given YouTube video ID using reliable methods (e.g., YouTube's official API or third-party services such as youtube-transcript-api).

2. Database Storage:

- Store comprehensive video information, including video ID, title, duration, thumbnail, and transcript in a structured MongoDB schema optimized for efficient querying and retrieval.

3. AI-driven Concept Mapping with NCERT Books:

- Implement a Retrieval-Augmented Generation (RAG) pipeline using frameworks like LangChain or LlamaIndex to semantically map video transcript content to corresponding NCERT textbook concepts.
- Suggest relevant NCERT concepts, clearly referenced with chapter numbers, sections, or page numbers, displayed beneath the video player during playback.

Frontend Application in React Native (Refer Designs)

Home Screen:

- **Top Section:** Display a random selection of 5 videos across any channel in a horizontal scrollable layout.
- **Channel List Sections:** Show subsequent sections with channel names and their corresponding videos (maximum 10 per channel) in a horizontally scrollable list.

YouTube Video Player Screen:

- Display the YouTube player prominently with video title and channel name.
- Below the player, dynamically show NCERT textbook concepts clearly referenced by chapter numbers, sections, or page numbers.

- Provide a vertical list of other videos from the same channel below the NCERT references.

Backend and API Requirements (Node.js)

API Endpoints:

- Clearly define all necessary RESTful API endpoints required.

Database Schema:

- Develop a scalable and efficient MongoDB schema to handle complex queries and optimize performance (Extra perks for that 😉).

Bonus Tasks:

- **Dynamic Content:** Suggest NCERT concepts dynamically based on the current playback position (timestamp) of the video.
- **Pull to Refresh:** Implement pull-to-refresh functionality on the Home Screen for data reloading.
- **Automatically scrolling:** Implement automatic horizontal scrolling to change the thumbnail of the video for the top five horizontal video thumbnails.

Evaluation Criteria:

- Frontend design quality, user experience, and coding structure.
- Backend API design, robustness, and code quality.
- Effectiveness and efficiency of the MongoDB schema design.
- Accuracy, efficiency, and scalability of the AI-RAG implementation.
- It's alright if all the functionalities are not implemented, as you will be evaluated individually for each feature mentioned.

Additional Evaluation Points:

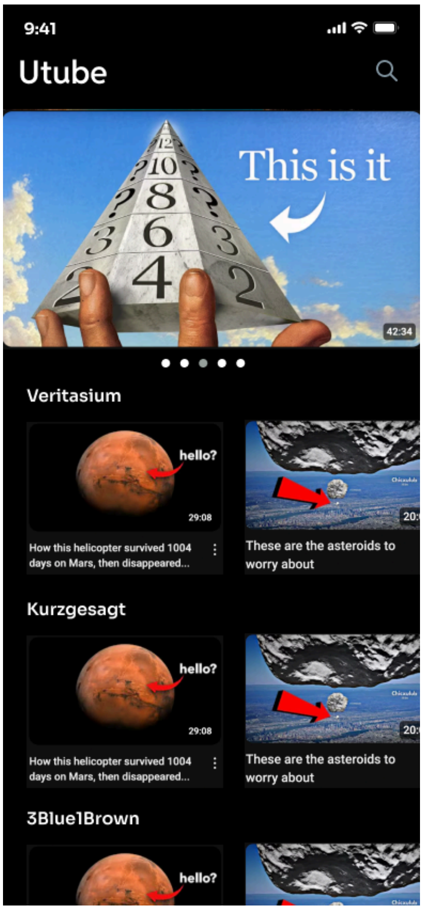
- Quality and comprehensiveness of documentation.
- Scalability and maintainability considerations of the entire system.

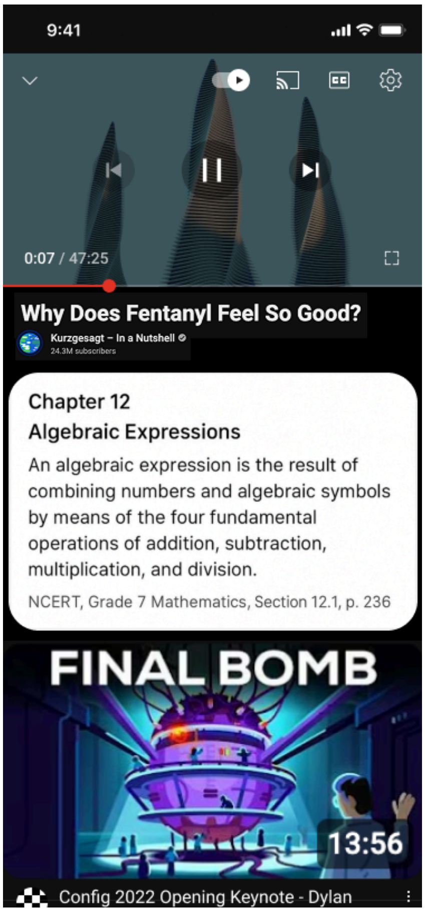
Deliverables:

- Fully functional React Native frontend application.

- Complete Node.js backend service with defined REST APIs.
- Operational AI-RAG pipeline demonstrating accurate concept mapping.
- Detailed MongoDB schema design documentation.
- Comprehensive guide and documentation for running and testing the application.

Screens:


9:41
Utube
This is it
42:34
Veritasium
hello?
29:08
How this helicopter survived 1004 days on Mars, then disappeared...
20:
These are the asteroids to worry about
Kurzgesagt
hello?
29:08
How this helicopter survived 1004 days on Mars, then disappeared...
20:
These are the asteroids to worry about
3Blue1Brown
hello?


9:41
0:07 / 47:25
Why Does Fentanyl Feel So Good?
Kurzgesagt – In a Nutshell
24.3M subscribers

Chapter 12

Algebraic Expressions

An algebraic expression is the result of combining numbers and algebraic symbols by means of the four fundamental operations of addition, subtraction, multiplication, and division.

NCERT, Grade 7 Mathematics, Section 12.1, p. 236

FINAL BOMB
13:56
Config 2022 Opening Keynote - Dylan

Notes:

- Feel free to use any packages, libraries, icons, styles, or color schemes you prefer.
- Feel Free to use ChatGPT, Claude, Llama, cursor or any other vibe coding tool.
- The screen designs provided are for general reference, but you are encouraged to bring your creative approach.
- For simplicity feel free to use any NCERT book for the assignment, please mention everything in the ReadMe
- If assumptions are made regarding functionality, clearly document them in the README.
- Each feature mentioned will be individually evaluated; partial progress is encouraged and acceptable.
- Certain aspects of this assignment are intentionally open-ended to allow demonstration of decision-making skills and project ownership.
- If you have any questions or require clarifications, please reach out.

- Channels for your reference which you can use (YOU ARE FREE TO USE ANY OTHER CHANNEL AS WELL)
    - 3Blue1Brown - Mathematics
    - Veritasium - Science & Physics
    - Kurzgesagt – In a Nutshell - General Science
    - Numberphile - Mathematics

Deadline: 17th July 2025

Submission Requirements:

- **GitHub Repository:** Provide a link to a GitHub repository with your code, a README file with setup instructions, and screenshots of your application.
- **APK File:** Submit the APK of your app.
- **Video Demonstration:** Record and submit a video demonstrating the main flows and features of your app clearly.