Proposal for CSU Student Research Competition

Project Title : Zoom Learning Assistant

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Problem Statement

As remote and hybrid learning become increasingly prevalent, video conferencing tools like Zoom have revealed limitations in supporting active and personalized learning. Students must often watch or rewatch entire recorded lectures to locate specific information, and instructors expend considerable effort creating quizzes and supplemental materials. These challenges reduce engagement and impede efficient study.

Purpose: This project aims to develop an AI-powered Zoom Learning Assistant that generates real-time summaries, quizzes, and resource recommendations to enhance student learning and reduce instructor workload.

Research Question

How can integrating AI-driven summarization, quiz generation, and resource suggestions within Zoom enhance student engagement and learning efficiency in virtual classrooms?

Introduction and Motivation

Video conferencing platforms such as Zoom lack features that cater to personalized and interactive student learning needs. By integrating state-of-the-art AI capabilities, the Zoom Learning Assistant offers a comprehensive solution to bridge this gap. Inspired by successful AI teaching systems, this project is designed to complement existing learning platforms and drive educational innovation.

Features

1. **AI-Powered Lecture Summarization**
    - Extracts key points from lectures for quick and easy review.
    - **Example**: Converts a 60-minute lecture on "Data Structures" into a concise summary.
    - **Function:** Automatically distills 60-minute (or longer) lectures into concise bullet points, highlighting key concepts.
    - **Value Add:** Students save time by reviewing a short summary instead of scanning entire video recordings.
2. **Interactive Quiz Generation**
    - Generates multiple-choice questions based on lecture content.
    - **Example**: After a lecture on "Sorting Algorithms," quizzes are created with varying difficulty levels.
    - **Function:** Creates multiple-choice, true/false, and short-answer questions based on real-time lecture content.
    - **Value Add:** Promotes active learning and reinforces material through immediate feedback.

3. **Supplementary Resource Suggestions**
    - Recommends relevant articles, videos, and books to deepen understanding.
    - **Example**: Suggests "Introduction to Algorithms" after a lecture on divide-and-conquer techniques.
    - **Function:** Recommends relevant articles, textbooks, or video links based on lecture topics.
    - **Value Add:** Gives students curated paths for deeper learning and more comprehensive understanding.
4. **Automated Note Saving**
    - Saves generated notes directly to Google Drive for future reference and organization.
    - **Example**: Uploads notes titled "Machine Learning Week 1" to a pre-specified Google Drive folder.
    - **Function:** Uploads automatically generated summaries, quizzes, and key points to a cloud drive (e.g., Google Drive).
    - **Value Add:** Organizes content for quick retrieval and consistent study habits.

Implementation Approach

1. **Backend Development**
    - **Frameworks**: Flask for API development.
    - **Database**: Qdrant to store and retrieve lecture embeddings for quick processing.
    - **AI Models**: NLP models such as OpenAI GPT for summarization and quiz generation.
2. **Frontend Development**
    - **Interface**: Intuitive chatbot integrated within Zoom via Zoom APIs.
    - **User Interaction**: Commands like /summarize lecture, /generate notes, and /start quiz.

Expected Outcomes

1. **Enhanced Learning Efficiency**: Students access concise lecture summaries, reducing the time needed for review.
2. **Higher Engagement**: Quizzes and additional resources promote active participation and deeper understanding.
3. **Instructor Benefits**: Reduces the burden of creating study materials, allowing educators to focus on teaching.

Value and Significance

- **Originality:** Real-time AI support directly within Zoom rather than post-lecture.
- **Impact:** Potential to benefit multiple disciplines beyond computer science.
- **Scalability:** Future integration with other video conferencing or LMS platforms.

References

1. Jill Watson: AI-powered virtual teaching assistant by Georgia Tech's Design Intelligence Lab.
2. Eduaide.AI: An AI tool for generating educational materials, quizzes, and summaries