Learning Assistant for Diverse Learning Needs

1. Introduction

The **Learning Assistant for Diverse Learning Needs** leverages deep learning to enhance classroom accessibility, catering to students with diverse learning challenges. The tool provides personalised support by converting classroom interactions into accessible formats, fostering an equitable learning environment where every student can thrive.

2. Functional Requirements

2.1 Must-Have Requirements

1. **Audio-to-Text Conversion for Hearing-Impaired Students**
    - Converts spoken words (e.g., lectures, discussions) into text, displayed on the student's screen.
    - Supports multilingual input and converts it to English.
2. **Summarization of Class Lectures**
    - Provides concise summaries of class lectures in text and audio formats, tailored for students with ADHD or focus challenges.
3. **Multilingual Support**
    - Converts lectures or other in-class materials spoken in any language to English for better accessibility.

2.2 Nice-to-Have Requirements

1. **Text-to-Speech for Visually Impaired Students**
    - Converts written materials (e.g., class activities, reading materials) into audio for students with visual impairments.
2. **Captions for Recorded Class Videos**
    - Automatically adds captions to recorded class videos for later reference, helping students who missed classes or need reviews.
3. **Student-Professor Communication Interface**
    - Allows students to send questions or clarifications to the professor via a chat interface, either during or after the class.
4. **Profile Selection**
    - Provides a user-friendly interface where students can choose their preferred support: audio-to-text, text-to-speech, lecture summaries, or captions for recorded classes.

3. Non-Functional Requirements

3.1 Must-Have Requirements

1. **Accuracy**
    - The system must have high accuracy in converting audio to text and summarising content to ensure it provides valuable and reliable information.
2. **Speed and Performance**
    - The conversion of speech to text must be near-instantaneous, with minimal delay, to ensure that students stay caught up during lectures.
3. **Scalability**
    - The system should be able to scale to accommodate multiple students and classrooms simultaneously, without degrading performance.
4. **Customization**
    - The tool should allow for the customization of profiles to cater to individual learning preferences and needs.
5. **Usability**
    - The user interface must be intuitive, accessible, and easy to navigate for students with diverse learning challenges.
6. **Interoperability**
    - The system should integrate seamlessly with various educational platforms and tools (e.g., learning management systems, and video conferencing platforms).
7. **Maintainability**
    - The system should be easy to update and maintain to ensure it keeps up with evolving educational needs and technology.

4. Technology Stack

- **Programming Languages:** Python, JavaScript
- **Frameworks and Libraries:** TensorFlow for deep learning, Google Colab for development and testing, MoviePy for video processing, soundwave, whisper and IPython
- **APIs:** OpenAI for text generation, Google Text-to-Speech (gTTS) for audio processing
- **Cloud Services:** AWS for scalability and data storage
- **Platforms:** GitHub for version control, learning management systems for integration

5. Milestones and Timeline

- **Requirement Gathering**: Completed by September 25
- **Prototype Development**: October 15
- **MVP Testing and Feedback**: November 5
- **Final Project Submission**: December 1