Research Proposal: ByteMentor – AI-Powered Academic Assistance Tool

The Problem

Students often struggle to access relevant academic materials efficiently, leading to fragmented learning and knowledge gaps. Traditional learning tools, such as textbooks, online forums, and general AI chatbots, do not provide tailored, immediate, and context-specific answers. Current solutions suffer from inefficiencies, outdated information, and lack of personalization. There is a pressing need for an AI-powered tool that centralizes academic knowledge, delivers precise and reliable responses, and enhances learning engagement.

Novelty

Existing research has explored AI-driven learning tools but has not effectively addressed the integration of structured academic content from ZHAW Data Science course.

Traditional learning platforms are static and require manual searching, while search engines often provide broad, irrelevant, or outdated results that lack academic credibility. General-purpose AI chatbots are not optimized for curriculum-specific learning, and existing AI tutoring systems are limited in scope, often failing to deliver personalized, in-depth explanations.

Idea

The proposed solution, ByteMentor, is a specialized AI-powered learning assistant trained on structured academic content from the Data Science course at ZHAW. It will:

- Aggregate and organize course materials, textbooks, and research papers.
- Fine-tune an LLM to provide precise, contextual, and validated responses.
- Offer real-time interactive assistance, improving study efficiency and comprehension.

By combining structured data curation, deep learning techniques, and interactive learning mechanisms, ByteMentor will address the core limitations of existing solutions.

Hypothesis

The primary hypothesis is that a specialized LLM, trained on structured academic content from ZHAW, will significantly improve students' ability to access, understand, and apply knowledge compared to existing study methods. This will be measured through accuracy, student engagement, and learning outcomes.

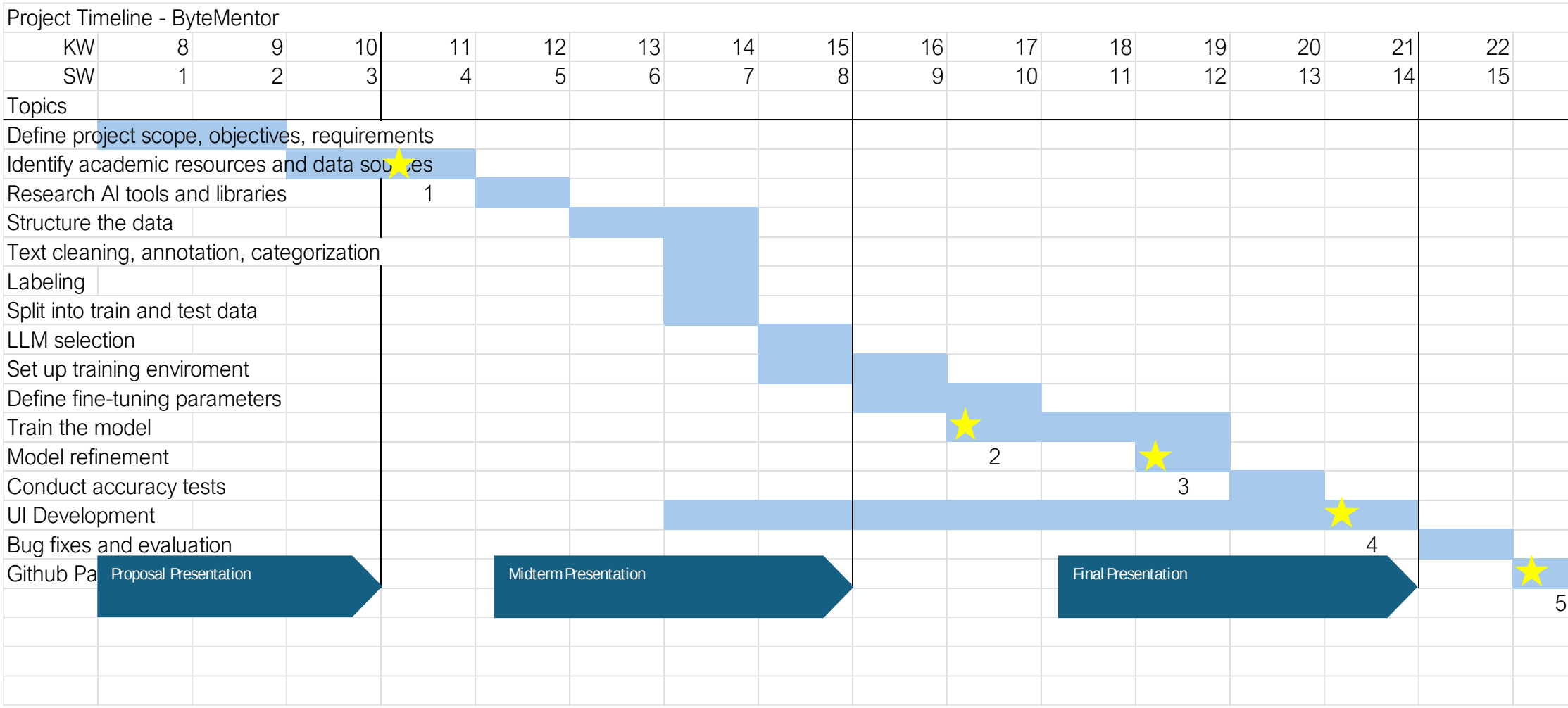
Methodology

- Data Collection: Gathering structured academic materials from textbooks, lecture slides, research papers, and verified online sources.
- Preprocessing & Annotation: Cleaning, tokenizing, and structuring the content for optimal LLM training.
- Model Selection & Training: Fine-tuning an existing LLM (e.g., GPT, Llama) with a focus on academic datasets.
- Validation & Testing: Measuring accuracy through expert review and controlled student trials.
- User Interface Development: Creating a web-based or mobile-friendly platform for real-time interaction.

Success Evaluation

- Mid-Term Review: Assess model accuracy, user adoption, and engagement.
- Final Evaluation: Evaluate the impact on student comprehension and academic performance, ensuring ByteMentor achieves its goal as an effective AI-driven learning tool.

Conclusion ByteMentor presents an innovative approach to academic assistance, leveraging AI to deliver an interactive, context-aware, and highly specialized study tool. By integrating verified academic content from ZHAW with LLM technology, ByteMentor has the potential to redefine how students access and interact with knowledge, leading to more efficient and effective learning outcomes during the semester.


Project Timeline - ByteMentor
KW 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22
SW 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Topics
Define project scope, objectives, requirements
Identify academic resources and data sources
Research AI tools and libraries
Structure the data
Text cleaning, annotation, categorization
Labeling
Split into train and test data
LLM selection
Set up training enviroment
Define fine-tuning parameters
Train the model
Model refinement
Conduct accuracy tests
UI Development
Bug fixes and evaluation
Github Pa
Proposal Presentation
Midterm Presentation
Final Presentation
1
2
3
4
5