Practical Uses of AI in EFL: Education Major Recommender System

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Table of Contents

1. Introduction

Artificial Intelligence (AI) has opened new possibilities in the education field, especially in helping students make informed decisions about their academic futures. One such application is the Education Major Recommender System, designed to assist students in selecting the most suitable university major based on their interests, performance, and preferences. This document provides an overview of how this AI-powered system is developed and how it can be used in real-life educational settings.

2. Overview of the Education Major AI Recommender

The Education Major AI Recommender is an intelligent web-based application that helps guide students in choosing their university major. By analyzing user responses and preferences, the system recommends academic disciplines that align with the student's profile. It also presents potential career paths and learning resources. The application consists of a user-friendly frontend, a responsive backend, and an AI engine that drives the recommendation logic.

3. Frontend Design and Implementation (Angular)

The frontend of the application is developed using Angular, a TypeScript-based open-source framework. It features:

- Component-based structure: The UI is modular and reusable.

- TypeScript support: Enhances development with type safety and cleaner code.

- Built-in directives: Such as *ngIf and *ngFor to manage dynamic content.

- Two-way data binding: Keeps the UI in sync with logic and data layers.

Angular enables a seamless user experience through fast rendering and clear visual feedback. Pages like the login screen, home page, and survey interface are all built using Angular components.

4. Backend Structure (Node.js)

The backend is developed using Node.js, which provides an asynchronous, non-blocking I/O model. Key features include:

- Single-threaded event loop: Efficiently handles multiple requests.

- Fast execution: Powered by Google's V8 engine.

- NPM ecosystem: Access to powerful libraries like Express and Mongoose.

The backend handles logic such as authentication, data storage, and communication between the frontend and the AI engine.

5. AI Component: Mistral and Ollama

The intelligence of the system is powered by Mistral, a series of open-weight Large Language Models (LLMs) that perform tasks like:

- Text generation

- Summarization

- Question answering

- Coding support

- Chatbot responses

Mistral is integrated locally using Ollama, which allows these AI models to run on personal computers without needing external cloud services. Ollama is lightweight and optimized for speed and memory, making the AI engine accessible and efficient.

6. System Workflow and UML Design

The application consists of:

- Login page with username and password fields

- Main page with access to grades, quizzes, and a survey form

- Database designed using MySQL, represented with a UML diagram

UML Diagram:

- USER table contains: ID, username, password

- Result table contains: ID_R (primary), ID (foreign), and recommendation text

The structure is designed to manage user data and recommendation output efficiently.

7. Future Work

To enhance the system, the following improvements are proposed:

1. Integration with Real Academic Data: Connect to real university databases to improve recommendation quality.

2. Adaptive Learning Algorithms: Use reinforcement learning to refine recommendations based on user feedback.

3. Mobile App Version: Develop a mobile application for improved accessibility.

4. Career Path Integration: Link academic majors to potential careers, salaries, and market demand.

5. Caching: Implement caching mechanisms to optimize performance.

8. Conclusion

The Education Major AI Recommender demonstrates how AI can personalize and improve educational guidance. Through the use of modern technologies such as Angular, Node.js, and Mistral, the system creates a smart, accessible, and scalable platform. With future enhancements, this application could significantly impact how students plan their academic and professional futures.