GradeGuard

Integrating Intelligent Systems and Data Insights for Academic Success

1 Overview

GradeGuard is an AI-driven academic management web application developed to assist university students in monitoring their academic performance, analysing historical trends, and optimising their study schedules. The platform provides advanced grade analytics, AI-powered study planning, and interactive dashboards, thereby delivering tailored insights to enhance the overall learning experience.

The application features a modern, customisable user interface, seamless integration with university calendars, and leverages machine learning for accurate grade prediction and study recommendations. Furthermore, it incorporates a community-driven discussion forum alongside an AI-powered chatbot to support academic inquiries.

2 Project Objectives

- To develop a comprehensive academic assistant that facilitates effective study management.
- To employ AI and machine learning techniques to forecast academic outcomes and recommend study strategies.
- To enhance student engagement through a customisable interface and community-driven features.

3 Key Features and Enhancements

3.1 Advanced Grade Tracking and Analytics

✓ **Customisable Grading Schemes:** Enable students to configure diverse grading systems (percentage-based, GPA, letter grades).

✓ **Historical Grade Trends:** Present past performance trends complemented by AI-driven forecasts.

✓ **AI-Powered Grade Prediction:**

- Utilises machine learning regression models to forecast final grades based on current performance data.
- Provides recommendations on the grades required in forthcoming assessments to meet academic targets.

✓ **Deep Insights and Visualisation:**

- Implements credit-weighted GPA tracking.
- Displays performance trends across semesters through advanced visual analytics.

3.2 AI-Powered Study Planner Enhancements

✓ **Personalised Study Recommendations:**

- Analyses individual study habits and module complexities to recommend optimal study durations.
- Incorporates dynamic difficulty adjustment, allocating additional study time for more challenging modules.

✓ **Task Prioritisation and Smart Reminders:**

- Suggests time-blocking techniques to improve study efficiency.
- Dispatches push notifications and email reminders for study sessions, assignments, and examinations.

✓ **Pomodoro Timer Integration:**

- Features an integrated study timer to monitor session durations.
- Recommends optimal break intervals based on tracked study durations.

3.3 AI-Powered Calendar and Scheduling

✓ **iCalendar (iCal) Integration:**

- Permits students to import their university timetable directly into GradeGuard.
- Automatically associates academic deadlines with the corresponding module data.

✓ **AI-Generated Study Timetable:**

- Organises study blocks based on upcoming deadlines, module difficulty, and individual study habits.
- Supports exporting to Google Calendar and Outlook for enhanced integration.

3.4 UI/UX Enhancements

✓ **Dark Mode and Custom Themes:**

- Offers interface customisation to suit individual preferences.

✓ **Drag and Drop Dashboard Widgets:**

- Provides a fully customisable study homepage featuring interactive widgets.

✓ **Gamification Features:**

- Incorporates achievements and badges to recognise study milestones.
- Implements daily study streak tracking to promote consistent study practices.

3.5 Community and AI Chatbot

✓ **AI-Powered Study Chatbot:**

- Utilises GPT-based AI models to address module-specific queries.
- Assists in clarifying academic concepts, summarising topics, and offering study tips.

✓ **Discussion Forums:**

- Facilitates a platform where students can pose and respond to academic queries.
- Employs a community-driven Q&A system featuring upvotes and downvotes to promote high-quality responses.

4 Technical Implementation

4.1 Frontend

- Developed using **Vue.js** to ensure an interactive and responsive user interface.
- Utilises **Chart.js** and **D3.js** for real-time data visualisation of academic metrics.
- Styled with **Tailwind CSS** to maintain a modern and customisable design.

4.2 Backend

- Built on **Node.js** with **Express.js** to handle API requests and server-side logic.
- Employs **CosmosDB** for secure and scalable NoSQL database storage.
- Integrates **Azure Functions** to automate AI-driven tasks and processes.

4.3 AI and Machine Learning

- Implements regression models for accurate grade predictions.
- Utilises Natural Language Processing (NLP) models (e.g., DeepSeek AI) to power the chatbot's responses.
- Applies optimisation algorithms to generate efficient study schedule recommendations.

4.4 Cloud and Deployment

- Hosted on **Azure App Services**, ensuring reliable and scalable deployment of the web application.

5 Expected Outcomes

- ✓ A fully functional AI-powered study management platform that addresses key academic needs.
- ✓ Automated grade tracking coupled with predictive analytics to monitor and enhance student progress.
- ✓ AI-generated study schedules offering personalised recommendations tailored to individual academic goals.
- ✓ Seamless integration with university calendars to ensure timely management of academic deadlines.
- ✓ An AI chatbot and community discussion forums to facilitate academic support and peer engagement.
- ✓ A gamified user experience designed to motivate and sustain consistent study habits.

6 Conclusion

This project aims to deliver a comprehensive academic assistant that combines advanced AI, robust analytics, and interactive planning tools. By integrating these technologies, GradeGuard is poised to empower students to achieve their academic objectives with greater efficiency and effectiveness.