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AI-Based Study Planner

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Abstract: This paper introduces an AI-powered study planner that streamlines academic preparation bycreating personalized study schedules from syllabus PDFs uploaded by users. The system employs advanced machine learning algorithms to parse and analyse syllabus content, extracting relevant details such as subjects, topics, deadlines, and estimated study times. The AI then generates an optimized study plan tailored to the user's specific needs, preferences, and available time. The frontend of the application is built using React, providing a dynamic and user-friendly interface that allows easy input of syllabus PDFs and interaction with the study plan. On the backend, Spring Boot ensures secure, scalable, and efficient handling of data, including user authentication, syllabus processing, and AI-based recommendation generation. The system continuously adapts to the user's learning progress, offeringreal-time suggestions, reminders, and progress tracking to maintain motivation and improve academic performance. This AI-based study planner aims to enhance time management, reduce stress, and promote effective learning by automating the process of creating study schedules based on individual syllabus data.

Keywords: AI, Study Planner, React, Spring Boot, Machine Learning, Personalized Schedule, Syllabus PDF, Academic Performance, Time Management, Study Optimization, Progress Tracking.

1. INTRODUCTION

In today's fast-paced academic environment, students often face the challenge of effectively managing their time and workload. With vast amounts of course material and deadlines, many students struggle to create personalized study plans that suit their learning pace and priorities. Traditional methods of planning, such as manually creating study schedules, can be time- consuming and inefficient. To address this issue, we introduce an AI- based study planner that leverages advanced technologiesto automate the process of creating tailored studyschedules from syllabus PDFs.

The proposed system utilizes an intelligent algorithm that processes syllabus data in PDF format, which isuploaded by the user. Through natural language processing and machine learning techniques, the AI extracts key details such as subjects, topics, time estimates, and deadlines. Based on this information, the AI generates an optimized study plan, offering a personalized schedule that aligns with the user's preferences and time availability. The user interface is built using React, providing an interactive, responsive, and user-friendly experience. Reacts flexibility allows users to easily upload syllabus PDFs, view generated schedules, and interact with various features. The backend of the application is powered by Spring Boot, offering a robust, secure, and scalable framework to handle syllabus processing, user data management, and AI integration. This architecture ensures smooth communication between the frontend and backend, guaranteeing seamless functionality.

With the integration of AI, the study plannercontinuously learns from user progress, making real- time adjustments to study plans based on performance and feedback. The system also includes features likeprogress tracking, reminders, and suggestions, which further enhance the learning experience. This AI-based study planner aims to alleviate academic stress, improve time management, and optimize learning outcomes, offering a modern solution for today's digital-first education systems.

1.1 PROPOSED WORK

The goal of this project is to develop an AI based study planner that assists users in creating personalized study schedules based on their inputted syllabus and desired goals. The planner will highlight important topics, provide timely notifications. The planner will generate a comprehensive schedule, highlight important topics, provide timely notifications, and allow for easy modification.

1. Syllabus Input:

o User Interface:

A user-friendly interface to input the syllabus in various formats (e.g., text, PDF, image).

o Natural Language Processing (NLP): Utilize NLP techniques to extract relevant information from the syllabus, such astopics, subtopics, and their weightage. information from the syllabus, such as topics, subtopics, and their weightage.

2. Goal Setting:

o Goal Definition: Allow users to define their study goals (e.g., pass an exam with a certain grade, completea course within aspecific timeframe).

o Goal Prioritization:

Implement algorithms to prioritize topics based on theirGoal Prioritization: Implement algorithms to prioritize topics based ontheir importance and alignment withthe user's goals.

3. Schedule Generation:

o AI Algorithms: Employ AI algorithms (e.g., genetic algorithms, constra programming) to generate optimal study schedules considering factors like topic difficulty, user availability, and goal priorities. to generate optimal study schedules considering factors.

o Adaptive Scheduling:

Incorporate mechanisms to adjust the schedule dynamically Adaptive Scheduling: Incorporate mechanisms to adjust the schedule dynamically based onuser progress and changes in circumstances.

4. Notification System:

Topic Recommendations: Provide recommendationsfor additional resources orpractice materials to strengthen understanding ofimportant topics.

Personalized Notifications: Tailor notifications based on user preferences and learning

o Reminders: Send timely notifications to remind users about**2**upcoming study sessions, deadlines, and important events.

5. User Interface and Modification:

o Intuitive Interface: Design a user-friendlyinterface for easy navigation and friendly interface for easy navigation

o Schedule Modification: Allow users to modify the generated schedule, adjust study Schedule Modification: Allow users tomodify the generatedschedule, adjust study times, and reschedule topics as needed.

1. Homepage - The image shows a web application interface, specifically the homepage of a scheduling app, running on a local server (localhost:3000). The top navigation bar includes a red "LOGOUT" button, a

blue "CREATE NEW SCHEDULE" button for adding new schedules, a purple "PROFILE CREATION" button for managing profiles, and a user icon labeled "U" that likely provides access to user settings or profile details. Below the navigation bar, the main content is titled "Previously Created Schedules," displaying three cards labeled Schedule 1, Schedule 2, and Schedule 3. Each card includes the schedule name and its creation date, "11/25/2024." The overall layout is clean and minimalist, with a focus on clarity and ease of use.

2. Profile Creation Page- Profile creation is a simple yet essential step in personalizing the user experience. To create a user profile, the user is required to provide several key details. First, they must enter their name and email address for identification and communication purposes. Next, they will upload a profile photo to make their profile visually unique. The user will then input their college name and the university name they are affiliated with. As part of the academic details, the degree is fixed as BTECH, and the department is preset to CSE (Computer Science and Engineering), as these are the only available options. The user will also specify their current yearof study (e.g., 1st year, 2nd year, etc.) and their current semester of study (e.g., Semester 1,Semester 2).

3. Study Plan - The **Study Plan Page** helps students organize their study schedules by allowing them to upload their syllabus, specifystudy duration, and set academic goals. Users can enter the number of study days, daily study hours, and choose a target goal (e.g., "Just Pass the Exam," "Average Marks," "Top the Exam"). Additionally, a toggle switch lets users enable or disable notification alerts for reminders. The page features a clean design with an educational background and a straightforward form layout. It ensures a smooth user experience, allowing students to create a customized study plan to enhance their exam preparation.

2. LITERATURE SURVEY

[1] The paper discusses the importance of academic advising in enhancing student performance particularlyin diverse college settings effective advising supports students academic and career goals by managing and making accessible the knowledge necessary for informeddecision ai- based solutions are proposed as a way to improve the advising process by reduce workloads and providing decision the paper discusses the importance of academic advising in enhancing student performance verse college settings effective advising supports students academic and career goals by managing and making accessible the knowledge necessary for informeddecision based solutions.

[2] This paper introduces a planning model that adapts virtual course behavior using AI techniques, including multi-agent systems and AI planning methods. The system is built on a pedagogical multi-agent framework designed for adaptability, incorporating diverse educational and technological strategies suited to collaborative learning. A unique pre-planner is introduced to ensure openness and neutrality. The model also supports translating virtual course components into a planning problem specification. The paper concludes witha demonstration of the experimental platform, SICAD+.

[3] This study addresses challenges faced by undergraduate when eligible for credit exemptions. Manual planning can lead to issues such as selecting non- corresponding courses and imbalanced credit hours. To solve this, the study proposes an algorithm combining rule- based logic and the knapsack problem to create an automated, accurate study plan. The results demonstratehigh accuracy, suggesting that this approach is effective in generating balanced and optimized study plans, helping students organize their courses more efficiently.

[4] This paper presents a planning model for adapting virtual course behavior using artificial intelligence (AI) techniques, specifically through a multi-agent system approach and AI planning methods. The system is designed and implemented using a pedagogical multi-agent approach and a framework to define adaptation strategies. This integration incorporates various pedagogical and technological perspectives, ensuring a practical and team- oriented implementation. A novel pre planner enhances transparency and neutrality by translating virtual courseelements into a planning problem specification. The model's validation is demonstrated through the experimental platform SICAD+ (Intelligent System for Adaptive Courses), showcasing its effectiveness in adaptivecourse management.

[5] In this paper, the challenges in artificial intelligence (AI) research on planning are explored, focusing on the generation of linear or nonlinear action sequences to achieve desired goals. The study highlights the complexity, lack of clarity, and limited documentation in existing research. It observes that most planners are tested in restricted application domains, making it difficult toevaluate their performance or applicability across different contexts. To address this, the paper emphasizes theimportance of domain-independent planners while stressing the need to understand the conditions under which they operate to assess their suitability for specific tasks.

[6] In this paper, an algorithm is proposed to automate the creation of accurate study plans for undergraduate students, addressing issues that arise from manual course arrangement, such as mismatched courses and imbalanced credit hours. The study integrates a rule-based approach with the knapsack problem to develop the automated study plan generator. A quantitative evaluation, including expert reviews and surveys, demonstrates the high accuracy of the proposed algorithm. The findings suggest that this approachis effective in generating efficient and accurate study plans, helping students optimize their course schedules throughout their study duration.

[7] The paper "Artificial Intelligence-based Adaptive System for Virtual Learning Environments" explores innovative applications of artificial intelligence (AI) in creating adaptive virtual learning systems. It addresses the growing demand for personalized educational experiences in online learning platforms. By leveraging machine learning algorithms and AI-driven decision-making, the system dynamically adapts learning materials, assessments, and feedback to suit individual student needs, learning styles, and progress. The research highlights the role of data analysis in evaluating student behavior and performance to enhance learning outcomes.

[8] In this paper, the concept of planning is explored, comparing human planning, which can be explicit or spontaneous, with artificial intelligence (AI) planning, where machines or software exhibit intelligent planningcapabilities. AI planning focuses on formulating problems to achieve optimal results and involves attributes such asthe initial state, possible actions, goals, and path cost functions. This study provides a concise review of planning algorithms in AI, highlighting their role in achieving efficient goal-oriented outcomes.

3. PROBLEM IDENTIFICATION

1. **Lack of Personalized Study Plans**: Students often struggle to create effective study schedulestailored to their unique needs, such as varying learning speeds and preferred study times. A onesize-fits-all approach can lead to inefficient studying and lower retention of information.
2. **Overwhelming Syllabi:** Many students face an extensive syllabus that can feel daunting.Identifying important topicsknowledge and preparednessand prioritizing them is challenging, leading to potential gaps
3. Time Management Issues: Balancing study time with other commitments (like work orextracurricular activities) can be difficult. Students may not know how to allocate their availablehours effectively, leading to procrastination or cramming.
4. **Lack of Accountability and Progress Tracking:** Without a structured approach, students often lack motivation and accountability. They may not track their progress, making it hard torecognize improvements or areas needing more focus.
5. **Customizability Needs**: Students have different preferences for study methods, topics ofinterest, and schedules. A rigid study plan can hinder engagement andcustomizable approach can enhance learning experiences.motivation
6. **Notification Overload:** With many digital tools available, students often receive too manyalerts or notifications, leading to distraction rather than motivation. A well-timed alert system isessential for effective reminders without overwhelming the user.
7. **Integration with Existing Tools**: Many students use various tools for studying, scheduling, andnote-taking. Lack of integration can lead to inefficiencies and fragmentation in their studyroutines.
8. **Adaptability:** Students' schedules and needs can change frequently. The study planner must beadaptable

to accommodate last- minute changes or shifts in focus, ensuring it remains relevantand useful.
By addressing these issues, the "AI-Based Study Planner" aims to create a comprehensivesolution that enhances students' study habits, improves their learning outcomes, and fosters amore organized approach to education

5. CONCLUSION

This AI-based study planner, with its combination of a user- friendly React interface and a powerful Spring Boot backend,offers a compelling solution for personalized academic planning. It helps students optimize their study routines by intelligently organizing tasks, setting deadlines, and offering personalized recommendations. With continued improvements in AI algorithms and PDF parsing technologies, this system has the potential to revolutionize how students manage their academic schedules, boosting productivity and academic success.

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