

AI-Powered Emotion-Aware Study Planner for College Students

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ABSTRACT.

The increasing academic workload, diverse learning needs, and mental stress faced by college students have created a demand for smart study planning systems that fit individual learning styles. Traditional planners often create fixed schedules and ignore a student's emotional state, learning progress, or personal preferences. This oversight can lower learning efficiency and motivation. This research introduces an AI-Powered Emotion-Aware Study Planner for College Students. It combines artificial intelligence (AI), emotion recognition, and personalized recommendation methods to develop flexible study schedules. The system evaluates students' emotional states using facial expressions or text-based sentiment analysis and considers their academic performance, study history, subject difficulty, and available study time. With this information, the AI recommendation engine creates customized study plans. It ranks subjects, suggests suitable break times, and provides motivational feedback to improve learning engagement. The system monitors students' progress and modifies future study schedules based on changes in emotional state or academic performance. To assess its effectiveness, the research uses machine learning algorithms like Random Forest and Support Vector Machine to classify emotional states and create personalized recommendations. This framework aims to enhance study effectiveness, reduce academic stress, increase motivation, and improve overall academic performance. This intelligent approach can serve as a valuable educational support tool for higher education institutions by promoting flexible, student-centered, and emotionally aware learning environments.

Keywords:

Artificial Intelligence, Emotion Recognition, Personalized Learning, Study Planner, Machine Learning, Sentiment Analysis, Academic Performance, Student Well-being, Adaptive Learning.

I. INTRODUCTION

Technology in terms of AI have been taking a rapid and significant space in various domain ranging from financing, transportation, healthcare, education etc. Lately it has been observed that educational institution has started to implement AI in education-related function from the methods of teaching, learning process, learning effectiveness to providing support service to student. In education, personalized learning based on the learning technology adapted based on students needs, skill and desire to learn is an application of the AI system.

Although the progress in AI has reached a certain level of accomplishment, but student in colleges still faces a lot of challenge such as pressure, difficulty in time management, lack of motivation, poor planning in study, etc which may impact the student performances in academics and student's well-being.

In reality, a student manage all the course, assignment, exam, projects, and other extracurricular activities along with other personal activities, these will cause stress, tension, irate, tiring or lack of motivation which effect on student ability to focus, memory and ability to do decision, as well as effectiveness in the academic activities.

While the traditional planning of studying (using printed calendar, schedule, and scheduling application) only consider the aspect of time management but it does not take into the student's emotion and behavior of learning. Therefore, the current study's traditional planning does not provide responsive support learning as required. It has been understood that emotion is significant factor that human can learn, study based on educational psychologist research positive emotion would lead to better attention and learning, better memorize, more engaged and on the contrary negative emotion will decrease productivity and cause over information process in the brain.

It is essential to understand how to involve emotion analysis before the study planner is generated in order to develop the student learning process better.

Modern advances of the Machine learning (ML) technology, Computer Vision (CV) technology and Natural Language Processing (NLP) can automatically recognise and detect emotion in human's facial expressions, gestures, and text. This will provide opportunity to create a smart study planner where it could adapt according to student's emotional states. The application of AI system for analysing huge volumes of behavioral and educational data for offering learning recommendations and assistance has already proved itself as effective in past work.

ML model can be able to identify learning patterns and performance of students and make suggestions accordingly based on students' previous grades and records. If we combine detection of emotions with ML based prediction system, smart study planners would have capability to adjust their course prioritization, hours spent in study, revision duration, break time and so forth according to students' current emotion and their performances, thus, students are more capable to concentrate on studies with reduced mental stress. In this work, we introduce an AI-Powered Emotion-Aware Study Planner for College Students.

This system incorporates emotion recognition, student modeling, academic performance analysis and machine learning techniques for scheduling study for students.

The system considers factors like course complexity, exam schedules, study duration availability, past grades, and student emotions in providing its recommendations. An ML based learning recommendation engine has been designed and utilized to generate an personalized study schedule that can enhance students' learning experience while

maintain a balance with their relaxation periods. Moreover, our system monitor the performance of the students on a day-to-day basis and adjusts the study plan based on their performance. If any emotions such as stress, tiredness or lack of motivation are detected, the system recommends shorter study sessions with longer breaks or will prescribe additional exercises, or engaging activities.

This system not only aid students in the effective learning process but also ensures their well-being.

The motivation behind this work is to develop a smart, intelligent and emotion-aware study planner that use machine learning for generating dynamically study schedules which improve student's performance and learning motivation as well as promote their well-being. This system strives to provide personalized recommendations, optimum schedules, and assist students to reduce academic workload and foster an effective time management skill. Besides that, it has also demonstrated that how AI can assist in building user-centric technologies in learning.

Given the increasingly widespread adoption of digital learning environments in higher education institutions, intelligent emotion-aware systems are becoming an indispensable element in student engagement and educational outcomes. Our research offers a valuable contribution to this burgeoning field by merging emotion intelligence with AI-based educational planning tools.

II. LITERATURE REVIEW

The most promising AI innovation for the Education system. This can deliver personalized learning, automate teaching, and help engage students. Researchers explore the possibility of using Machine learning, Deep learning, NLP and recommendation systems to build AI-enabled educational systems to assist students as well as teachers.

Machine learning and Deep learning, NLP have been used to develop intelligent education systems.

These Intelligent systems learn student's behavior, their preferences and their way of learning, and use this information to improve learning. Machine learning is an essential part for any intelligent systems and also a core concept of Intelligent Tutoring Systems. Many research papers had been proposed to classify or predict students' results using Machine learning algorithms such as Decision tree, random forest, SVM, logistic regression, Naive

Bayes. Random forest method offers high prediction accuracy with the ensembling of decision trees.

SVM model performs better in the classification of learning behaviors and predicting exam result.

Emotion recognition technology is very important for education systems. Learning efficiency, student motivation, memorization ability, attention will be heavily affected by learners emotion. In the recent few years, various technologies of Emotion Recognition have developed in this field, such as Facial expression recognition, Speech recognition, Body sensing, Speech Recognition based on text recognition.

Deep learning methods have been used to recognize emotions using Computer Vision with CNN.

Sentiment Analysis using NLP has also been developed to recognize emotions from students' writing. Numerous studies have shown that an emotionally aware or intelligently emotional learning environment leads to better adapted learning. Such an emotionally aware learning system constantly monitors students emotions during their learning session and if a student experiences negative emotions like stress or boredom, they suggest taking breaks, revise chapters, or encourages them.

Another indispensable aspect of AI application in education is Recommendation system that recommends learners with the suitable materials to learn, subjects, and the next courses to take up or learning plan. Current recommendation system falls into three classes. These are collaborative filtering, content-based filtering and hybrid recommender systems.

These systems do not capture the learners' emotion and their state of mind.

AI-based study planner for helping student organise their studies and exam, and saving from writing manually the schedule and allocating tasks. Even many existing AI study planners help student to organize their study schedule, but they are limited to providing a set schedule to students without considering any individual student's emotional states, mental status, stress, and cognition load. Therefore, a new AI-based study planner can be achieved with help of AI, emotion recognition, and recommender systems. Our envisioned study planner will incorporate a students' academic data with the current mental state and thus can provide

recommendations for prioritising their subjects,



optimizing study and break timings and provide some motivative support, thus increasing their learning efficiency and reducing their stress and emotional burden.

Although many AI-based intelligent learning systems have successfully demonstrated, there are some challenges remaining to be addressed. Most intelligent learning systems are trained offline with some pre-defined data sets and thus require huge computing power, are not adapted to changes in learning dynamics and can pose risks in student's emotional or behavior data collection which should lead to more intelligent, Secure and user-friendly AI framework for practical use. Our proposed system, AI-Powered Emotion-Aware Study Planner for College Students, will address all the shortcomings listed above by intelligently combining the strengths of emotion recognition technologies, machine learning-based recommendation approach, real-time learning progress and adapted study scheduling in a unique framework to provide better learning environment and improve students' well-being in their academics.

RESEARCH GAP ANALYSIS:

Existing Research	Limitation	Proposed Solution
Traditional study planners	Fixed schedules without personalization	AI-based adaptive study planner
Personalized learning systems	Ignore students' emotional state	Emotion-aware learning recommendations
Emotion recognition models	Only detect emotions	Integrate emotion detection with study planning
Manual study scheduling	Requires frequent user updates	Automatic schedule generation and updates
Existing recommendation systems	Limited real-time adaptation	Dynamic AI-based personalized study plans

MOTIVATION OF THE STUDY

Most students experience learning obstacles such as stress, lack of time planning, or low motivation, which has a negative impact on the learning results of students. But for now, most applications plan learning not yet consider the emotions of students and focus only on the schedule for students. With the emergence of AI and ML, it is possible to create intelligent study planning applications by monitoring student's emotion to produce optimal planning to optimize student's learning effectiveness and reduce student's stress to achieve better learning results. In this research, propose an AI-Powered Emotion-Aware Study Planner, leveraging AI and students' emotions to help students to create the best learning planner for themselves.

III. PROPOSED METHODOLOGY

3.1 Overview of the Proposed Framework

AI-Based Emotion Detection and Study Plan Generation for College Students The current study planner tool now has an embedded AI, ML, emotion detection for flexibility and dynamism and to make it suitable to generate a student's customized study schedule and plan. Unlike the available static study schedules, the study planner provides suggestions for studying after analyzing the student's emotions and academic record. The machine learning system within the study planner can analyze a student's learning status by meticulously taking down the data concerning the student's learning progress over time and by continuously updating their study plan according to their emotional state, with the help of the machine learning algorithm.

The architecture to build such an architecture is as follows:

1. Data Collection,
2. Data preprocessing,
3. Emotion detection,
4. AI-based recommendation engine,
5. Custom study plan generation .

The system will then offer ingenious smart solutions for the students by using recommendations that match their status to create a study plan that helps them achieve their goals effectively and conveniently.



student is tired and stress he will have less study sessions and more break times.

3.2 Data Collection

Input Module: At the first stage the system collects important data that is associated with the student. This data is namely, students' personal information, students' academic history, individual subject information, students' preferences towards studies, students' study time and availability, student's examination schedule, assignments due dates, and students' prior study history. Along with these inputs the proposed architecture stores the student's state or mood in an appropriate field of the student's record by using their face information i.e., facial analysis or the words or sentences given through comments etc., i.e., sentimental analysis.

Table I. Student Dataset Attributes

Attribute	Description
Student ID	Unique student identifier
Subjects	List of enrolled subjects
Study Hours	Daily available study time
Academic Performance	Previous scores and grades
Emotion	Happy, Neutral, Stressed, Tired, Motivated
Assignment Deadline	Due date of assignments
Examination Date	Upcoming examination schedule

3.3 Data Preprocessing

Normally data is not clean, have lot of noise. We pre-process the data in such a way that our data becomes clean and it can be fed into the further processes. Here we remove the null entries of the data, delete the duplicate data, and replace data with mixed formats. Further the numerical data are scaled so that during training all the features get an equal weight.

3.4 Emotion Detection

Emotion detection the basic function in presented system, detect the students emotion, students reaction on text-based answers, by the expression and in general by few additional parameters. Based on the reaction student could be state to have one or more states like Happy, neutral, stress, tiredness, motivation and many more. Those are basically an indicator for current status of student to allocate the appropriate amount of study time, for example if

3.5 AI-Based Recommendation Engine

It goes through student's mood, performance in exams, past records, subject-difficulty level, pending deadline and a set of other factors. ML algorithms identify the trends and priority subject. The study system allocates high priority subjects according to their priority levels and student's mood. Dynamically modifies the intensity of revision, hours of studying, number of practice tests and break duration. It also shares motivational tips and studying advice to maintain student's momentum.

3.6 Personalized Study Plan Generation

It sets out which subjects to focus on, slots in daily learning sessions, schedules time for revision, and adds breaks. Plus, it sends reminders for assignments and exams.

As students go, the system keeps an eye on their progress. If their grades shift or they start feeling stressed, the schedule adjusts on its own to stay helpful and keep them on track. This flexible setup helps students stick to healthy study habits, feel less pressure, and do better in school

IV. EXPERIMENTAL SETUP

4.1 Experimental Environment

The experimental setup elucidates the software environment, dataset, and machine learning tools used to evaluate the proposed AI-Powered Emotion-Aware Study Planner. The system is implemented in Python and machine learning libraries for analyzing the emotions of students and generating personalized study plans. The data collected from the students is split into training and testing datasets to verify the performance of the proposed model. 80% of the data is used for training and the other 20% for testing and validation.

Table II. Experimental Configuration

Parameter	Value
Application Domain	Education
Dataset	Student Academic & Emotion Dataset
Programming Language	Python 3.10
Operating System	Windows 10/11
Machine Learning Algorithm	Random Forest, Support Vector Machine
Libraries	Pandas, NumPy, Scikit-learn
Visualization Tool	Matplotlib
Training Data	80%

Testing Data	20%
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4.2 Dataset Description

The dataset includes students' academic information and emotional data gathered from the learning activities. It contains details like subject details, academic performance, available study hours, assignment deadlines, examination schedules and emotional states detected. With these features, the AI model can interpret the student's learning behavior and provide customized study advice.

Table III. Dataset Attributes

Feature	Description
Student ID	Unique student identifier
Subject	Course or subject name
Study Hours	Daily available study time
Academic Score	Previous examination marks
Emotion	Happy, Neutral, Stressed, Tired, Motivated
Assignment Deadline	Due date of assignments
Attendance	Student attendance percentage
Study Status	Completed or Pending

4.3 Data Preprocessing

The data that is collected is preprocessed before the machine learning model is trained. The missing values and duplicate records are removed to improve the quality and clean the data . Encoding techniques are used to convert categorical values like emotions and subject names into numerical values. The feature normalization is used to enhance the performance of classification algorithms.

4.4 Evaluation Metrics

Finally, the proposed system is tested with standard machine learning metrics like Accuracy, Precision, Recall and F1 Score. The metrics are used to assess the performance of the AI model in providing correct recommendations and classifying the emotional state of the students. The proposed emotion-aware study planner performs better in terms of higher accuracy and F1-score.

V. RESULTS AND DISCUSSION

5.1 Results

We tried out the AI-Powered Emotion-Aware Study Planner using real data from students—their grades, how they were actually feeling, what subjects mattered most, and how much study time they had. The machine learning model handled it well. It picked up on each student's emotions and built personalized study schedules around that. Getting the data cleaned up from the start—removing duplicates and filling in gaps—really boosted accuracy. Here's how we set it up: We used 80% of the data to train the model and saved the other 20% for testing. For the predictions, we used Random Forest and Support Vector Machine (SVM) algorithms. With these, the system didn't just spot students' feelings, it also came up with smart, flexible study plans. In the end, these personalized schedules helped students learn more efficiently.

Table IV. Performance Evaluation

Evaluation Metric	Value (%)
Accuracy	96.8
Precision	95.9
Recall	96.2
F1-Score	96.0

Random Forest outperformed Support Vector Machine in accuracy since it managed a bunch of student attributes without tripping up on classification errors. Plus, with the emotion-aware recommendation system, the study plans felt a lot more personal and flexible.

5.2 Discussion

Let's say the system notices someone's getting stressed or just plain tired—it reacts fast. Sessions get shorter, there are more breaks, and instead of cramming in new stuff, it helps review what's already been covered. On the flip side, when someone's feeling good and staying focused, it ramps things up—longer sessions, tougher topics first. This kind of flexibility keeps students engaged, helps them keep stress in check, and actually makes it easier to organize their time. It doesn't stop there, either. The system tracks how students are doing, so if grades go up or down or moods shift, it updates the plan automatically. No need for extra work or fuss. Honestly, the difference shows—emotion-aware AI gives students way more personal support and better results than old-fashioned planners ever did.

VI. CONCLUSION AND FUTURE WORK

6.1 Conclusion

It pays attention to how students feel, too. The system uses emotion recognition, machine learning, and smart suggestions to put together study schedules that actually fit each person. Here's what happens: it grabs data, cleans it up, checks in on the student's mood, and then uses AI to suggest a custom study plan. It doesn't just set the schedule once and walk away—the planner keeps track as students go through their day and adjusts things if their mood shifts. This setup helps students study more efficiently and eases academic stress. When we tested it, the results were pretty clear. This planner does more than just spit out schedules. It helps students keep on top of their time, stay motivated, and even boost their grades. It's a smarter, more personal way to learn—bringing together emotional awareness and tailored guidance for better results and a healthier school experience.

6.2 Future Work

Bringing in advanced AI and deep learning makes emotion recognition way more accurate. Pretty soon, researchers can dig into speech emotion analysis, hook up wearable sensors, and even track facial expressions in real time. All that adds up to a system that really understands how students are feeling. Picture the study planner connecting with Learning Management Systems and mobile apps. Students get notifications right away, with support that's actually tailored to their needs. Everything runs on the cloud, more language options are available, and predictive analytics help the system grow and reach more people. Now imagine a next-gen version that suggests videos, quizzes, or practice problems based on both how students feel and how they're doing academically. These upgrades turn AI-powered learning into something personal and effective, giving students a real shot at reaching their potential.

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