

Track Wise: Proactive Academic Support through Agentic AI A Review on Personalized Study Nudging and Deadline Optimization

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Abstract

College life has never been as challenging as it is today. Students are juggling through exams, homework, projects, internships and activities all at once. Although it is easier to find information through the internet, students still need to manage their own time by keeping track of their work. This leads to stress, burnouts, deadlines being missed and poor academic performance. Most time management techniques, such as calendars or to-do lists are only beneficial for simple management techniques. They are unable to adjust to the varying workloads of a student or provide intelligent suggestions based on academic requirements. Students are left to piece everything together on their own, which further leads to mental exhaustion. AI is beginning to make college life much simpler. AI can extract key information from college syllabuses and notices, provide intelligent suggestions for study materials, and even assist with automatic scheduling. Moreover, simple reminders and boosts of motivation at the right time have been demonstrated to help students stay on track and actually complete tasks. However, these solutions are usually developed independently and do not integrate well with each other. This paper examines existing AI solutions for academic productivity and points out their shortcomings. TrackWise, a system that integrates intelligent document reading, adaptive scheduling, and helpful nudges, is proposed based on the shortcomings of existing solutions.

Keywords: Agentic AI, Optical Character Recognition, Educational AI, Academic Scheduling, Behavioral Nudging, Time Management, Document Understanding.

1. INTRODUCTION

In the current academic environment, students are confronted with considerable cognitive and logistic challenges of juggling their academic, lab, Club, internship and placement schedules. These activities tend to overlap and cause stress, poor performance at school and mental well being. While it is true that

technology such as Google Calendar, Notion, and Trello are helpful in managing these activities, they only are capable of static scheduling by humans and their capability is limited in being able to reason about the distribution of tasks and predict points of stress.

The recent development in the field of artificial intelligence (AI) has unsheathed new possibilities to intelligent and context aware academic management. AI systems can now be used to automate data extraction, predict peak workload and even mimic human behavior using nudging techniques. Despite this progress, there has not been many attempts to implement multiple AI capabilities retrieval, reasoning and behavioral intelligence capabilities into a unified academic support platform.

This paper is a review of current literature in number of areas by analyzing their limitations and proposes a hybrid AI model named TrackWise. This system uses Optical Character Recognition (OCR) to extract academic deadlines from official college documents and Agentic AI to reason about the workload to offer personalized time-based nudges. Therefore, changing from reactive scheduling to proactive academic assistance.

2. EXISTING METHODS AND RELATED WORK

A. Traditional Digital Planning Tools

For the most part, the students are using calendars, task apps and LMS reminders to manage themselves and ensure timely completion of their tasks. These tools are helpful to the students to set deadlines, make their to-do lists, etc. However, everything has to be manually entered and there are no provisions to adjust according to changes in workload or estimate the time a particular task may take in the future. Students are likely to stop using calendars and there are chances of them underestimating the time a particular task may take, resulting in the failure to meet deadlines. In addition, these tools consider each task independently, without considering the workload balance, priority level or interrelation of the tasks, so these tools do not provide actual support in managing academic schedules.

B. Educational Recommender Systems (ERS)

The main aim of developing educational recommender systems is to make learning more personal by recommending courses or learning materials based on the learning behavior of the students. Da Silva et al. [6] highlight the potential of ERS to personalize learning materials in terms of the learner profile. However, recommender systems focus more on what to study, but do not consider when to study, as there is a lack of temporal intelligence, which is the ability to influence workload distribution in terms of time or schedule learning.

C. Agentic AI and Reasoning Frameworks

Recent studies, such as Kamalov et al.'s [7], discuss the emergence of the frameworks of agentic AI based on the combination of reasoning, reflection and autonomous decision-making processes within the field of education. The applications of this AI within the field of education are mostly seen within areas such as tutoring systems, adaptive learning companions and curriculum planning to help students stay on track with their learning goals over time. The majority of the existing applications of this AI are contained within a controlled environment and are mostly for teaching purposes rather than real-life academic productivity. They rarely integrate with document

processing tools, institutional systems or behavioral support features which limits their ability to manage full academic workflows.

D. Document Understanding Models

Document understanding models have made it so much easier to extract structured information from unstructured or semi-structured documents like PDFs, scanned forms, tables and academic notices. Xu et al. [1] introduced LayoutLM, a transformer-based architecture that combines textual and spatial layout features by improving performance on tasks like key-value extraction, document classification and form understanding. Appel et al. [2] proposed DocFormer, an end to-end multimodal transformer that integrates visual, textual, and structural features for complex document reasoning. Liet al. [3] introduced Donut, a vision only transformer that skips traditional OCR pipelines and maps document images directly to the structured text. These models work well for extracting entities, relationships and the structure of academic documents such as syllabus, grade sheets and exam schedules. However, they are rarely applied in systems that help students to manage their academic work.

Method	Strengths	Limitations
Traditional Planners	Easy to use and familiar user interface	Requires manual input and lacks reasoning capabilities.
Educational Recommender Systems (ERS)	Provides personalized content delivery	Not focused on Time optimization or Work load balance.
Document Understanding Models	Extracts structured data from semi-structured documents (e.g., PDFs, Excel, syllabi)	Not integrated with scheduling, work load modeling, or behavioral interventions.
Agentic AI	Offers dynamic reasoning and autonomous decision-making	Under-utilized in educational and academic productivity domains.
Intelligent Scheduling Systems	Optimizes timetables and study plans based on structured data	Only accepts structured inputs; does not have the ability to automatically parse deadlines from documents.
Behavioral Nudging	Enhances engagement and motivation through reminders	Static nudges without AI-driven timing or adaptability

Table No. 1 Summary of Existing Methods and Their Limitations

3. MOTIVATION AND PROBLEM STATEMENT

India's higher education system is large, evolving and increasingly digital. Universities are adopting Learning Management Systems (LMS), institutional portals such as KJSIT SIMS and other online learning tools. Students now-a-days manage a complex combination of academic, extracurricular and personal responsibilities. This crossover results in substandard time management skills, burnout and an eventual decline in academic performance. Despite the use of digital calendars and reminders through the Learning Management System, they lack the personalization and contextualization elements. This is where the need for TrackWise comes in. It utilizes Agentic AI technology in the analysis of the habits, schedules and workloads of the students.

A. Fragmented Academic Information

Academic information can be found in many different formats: syllabus, online course sites, email, PDFs, spreadsheets and even handwritten postings. Students must try to make sense of all of this information, including deadlines, grading criteria, submission formats and exam schedules. What happens is that information gets lost, confusion reigns and deadlines are misinterpreted, particularly in large programs.

B. Cognitive Overload and Burnout

Students are often managing multiple internships, committee work and hackathons simultaneously, resulting in burnout and stress. Traditional planning tools, such as Google Calendar or Notion, are too rigid and do not account for changes in events or schedules. TrackWise's Agentic AI Scheduler solves this problem by keeping a watchful eye on the amount of work to be accomplished, anticipating conflicts and dynamically adjusting each student's schedule according to their workload and time constraints to ensure academic progress without burnout.

C. Lack of Personalized Productivity Nudges

The majority of current solutions on campuses simply send generic messages that do not respond to the individual's unique learning rhythm, energy level and engagement signals. This is where TrackWise helps by adding behavioral modeling and reinforcement learning to create adaptive micro-nudges. Reminders based on contextual cues, such as prep work for a lab or work on assignments, improve over time according to the user's schedule. A continuous feedback loop helps with continuous productivity and a personalized approach to learning behaviors.

D. Limited Visibility for Faculty and Administrators

The reality is that faculty members and mentors often do not understand the student's true workload and pressure until the student's performance begins to suffer as looming deadlines near. However, the Faculty and Administrator Dashboard within TrackWise eliminates this problem by using clusters of approaching deadlines to forecast when each student will be at maximum stress levels.

E. Lack of Interoperability with Institutional Systems

Most modern management systems in the academic sphere are not compatible with cooperation systems like SIMS, Moodle or Google Workspace. This creates problems like duplication of data,

conflicting schedules and so on. TrackWise solves this issue by interoperating at the API level by ensuring that calendars, grades and academic tasks are always in sync across platforms, through this method, changes in one system are automatically reflected everywhere, thus creating a consistent and integrated academic environment across all platforms.

F. The Larger Problem Definition

The issue at hand is no longer a matter of time management but has evolved into a matter of the lack of intelligent, interconnected and adaptive academic planning systems in departments. The current systems in place consider deadlines as fixed points in time, failing to recognize the potential to influence behavior and increase productivity. TrackWise resolves this issue with its AI-powered, modular system that utilizes document intelligence, dynamic scheduling and behavioral knowledge. With its ability to convert static schedules into a dynamic, student-focused system, it allows students to be more productive and efficient in managing stress and achieving long-term academic success.

4. PROPOSED SOLUTION: THE TRACKWISE FRAMEWORK

A. Conceptual Overview

TrackWise is designed to help students in their academic pursuits more effectively. It automates the task of extracting deadlines, scheduling and workload. It provides customized productivity reminders by combining document processing capabilities with intelligent planning and behavioral support. It provides proactive and context-aware support. It is different from generative information systems because TrackWise focuses on verifiable data and flexible reasoning to support various academic tasks.

B. System Architecture

The system architecture is comprised of two primary components:

1) OCR-Based Extraction Layer:

This layer is also responsible for the extraction of structured academic information like deadlines, exam schedules and assignments from semi-structured documents. This layer employs deterministic OCR engines and document understanding models for the extraction of scanned or digital documents into machine-readable text.

2) Agentic Planner Layer:

This layer is responsible for reasoning, workload analysis and planning based on the extracted data. It also predicts when the workload is about to increase by processing the data collected and provides users with personalized suggestions on how best to manage their academic life.

C. Algorithmic Workflow

Here is an overview of the workflow of the proposed application:

1) Document Ingestion:

The documents are ingested into the application from the LMS platform, emails, the institute's document repository and direct uploads by the staff.

2) OCR and Layout Parsing:

We extract the text and retain the hierarchy of the documents, including headings, tables and the overall structure of the documents, by employing Optical Character Recognition techniques.

3) Entity Extraction:

We use techniques such as sequence labeling, pattern recognition and document modeling to identify the deadlines, descriptions, weightage and dependencies.

4) Temporal Normalization:

The extracted temporal information is normalized to standardized timestamps taking into account academic calendars, institutional timetables and time zone constraints.

5) Workload Graph Construction:

Learning activities are represented as graph nodes in a temporal dependency graph. The edges are weighted to show precedence constraints, estimated effort and resistance to fatigue.

6) Agentic Scheduling:

A planning agent is used to optimize the order and schedule windows of tasks using constraint satisfaction and multi-objective optimization techniques to efficiently allocate workload.

7) Nudging and Feedback:

Personalized behavioral nudges are designed using real-time progress analysis, procrastination risk analysis and stress analysis to promote on-time task completion.

D. Expected Outcomes

- Decrease in missed deadlines and last-minute submissions
- Better time management and mental health
- Better coordination of faculty through workload analysis

5. DISCUSSION AND IMPLICATIONS

The TrackWise system assists students in organizing tasks, bringing all the documents together, while at the same time assisting the users in navigating through the daily decisions. Unlike the current planners, the TrackWise system is an active assistant that understands the needs of the students, thinks ahead and selects what is most important at a particular time. The TrackWise system illustrates how models such as LayoutLM and DocFormer could potentially surpass information extraction by being incorporated into intelligent planning systems that are constantly refining schedules and interventions. The TrackWise system has behavioral nudges that ensure these modifications result in positive changes to the students' behavior. From an educational perspective, the TrackWise system is a massive support system for schools in managing their workload, especially when they lack enough advisors.

6. CONCLUSION

The AI solutions for course overload and scheduling systems explored in this paper, trace their roots from document intelligence systems, course recommendation systems, agentic systems, intelligent scheduling and behavioural nudges, where the areas of gaps in automation, time-related reasoning, personalization and integration with educational process were identified. Thus, TrackWise was identified as an all-inclusive solution that relies on advanced document intelligence, fatigue-focused scheduling and contextualized behavioural nudges. With the development of an automated, scalable and contextualized solution that automates deadline detection and areas of beneficial intervention to optimally schedule and support against student fatigue, TrackWise presents a situation-aware solution for course overload and student burnout. Future work would include system assessment through empirical studies of a larger implementation scale, improved prediction of burnout and fatigue slopes and integration with education policymaking for equity and fairness as well as privacy of data concerns. Therefore, the integration of document intelligence systems with agentic schedules and behavioural considerations, presents a novel approach to increasingly helpful education systems.

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