清大排課推薦系統

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***Abstract*—In this proposal, we will outline the research motivation, methods, and expected outcomes of the project. The research motivation stems from the pressure students face in selecting courses during the final exam period, and aims to efficiently provide a class schedule. The research methods include needs analysis, data collection, user interface development, system testing, and evaluation. The expected outcomes include a well-functioning course scheduling recommendation system that enhances the efficiency of students' course selection.**

I. Motivation

During the final exam period at National Tsing Hua University (NTHU), each student faces the pressure of exams, and the timing of initial course selection coincides with this period. We fully understand the critical importance of the initial course selection process at NTHU and are committed to alleviating the stress students face during this time. Our goal is to guide students in efficient course selection, ensuring they don't face delayed graduation due to poorly planned schedules.

This system will analyze the multitude of courses offered each semester, taking into full consideration the unique academic needs of each student, which are closely linked to their respective departments. Through these key elements, we aim to create personalized timetables for each student, optimizing the course selection experience at NTHU.

II. Related Work

The concept of a course scheduling system is not novel, and various implementations have been attempted in academic institutions worldwide. Previous systems have focused on addressing scheduling conflicts, optimizing course loads, and aligning student preferences with available courses. For instance, some systems use complex algorithms to manage course prerequisites and time-slot conflicts, while others integrate student feedback to improve course recommendations. However, these systems often lack a personalized approach that considers the unique academic needs and preferences of individual students, especially in a diverse university setting like NTHU.

Our project aims to build upon these existing models by incorporating a more nuanced understanding of student needs, departmental requirements, and course dynamics. By analyzing historical data on course enrollments, grades, and student feedback, our system intends to offer a more tailored and efficient course scheduling experience.

III. Problem Formulation

We are given a list of mandatory and elective courses for students, along with pertinent details for each course (e.g., instructor, GPA, location). Our goal is to generate a future semester schedule based on the student's academic department and preferences. To achieve this, we will first gather comprehensive information on all courses. Subsequently, we will categorize courses into mandatory and elective based on the student's specified academic department. Using the recommended course maps for each department as training data, we will establish priority criteria (e.g., preventing delays in graduation, high GPA, time slots). We will then train an AI model to predict the optimal course schedule. Finally, the results will be presented through a user interface.

IV. Planned Method

A. Needs Analysis

In this phase, a thorough identification of target users will be conducted, focusing on students from various academic departments to understand their diverse scheduling needs. We will gather detailed functional requirements, emphasizing on essential functionalities such as course filtration based on departmental needs, elective preferences, and flexibility in scheduling.

B. Data Collection

The data collection process will involve a systematic aggregation of extensive course information from NTHU's databases, capturing details like course names, times, locations, professors, credits, and average GPAs. Historical data regarding course enrollments and grades will also be analyzed, alongside department-specific course maps, to discern patterns and trends that can influence the scheduling algorithm. Emphasis will be placed on standardizing this data to ensure consistency and ease of processing, setting a strong foundation for accurate and efficient system functioning.

C. User Interface Development

The development of the user interface will be centered on creating an intuitive and user-friendly platform accessible to all student demographics at NTHU. Key features such as departmental filters, preference inputs for course types, and time-slot selections will be implemented to enhance user experience. A feedback mechanism will be integrated into the system, allowing students to provide valuable input on both the interface and the suggested schedules. This feedback will be instrumental in facilitating continuous improvement of the system.

D. System Testing

Testing will be comprehensive, focusing first on the efficiency of the recommendation algorithm to ensure it generates optimal schedules. The accuracy of data input, crucial for reliable schedule generation, will be rigorously verified, encompassing both user inputs and university course data. Additionally, the system's stability and scalability will be tested under various loads to confirm its capability to support a large user base without compromising performance. This multi-faceted testing approach is designed to guarantee a robust and reliable scheduling system.

E. Evaluation and Outcome Analysis

In the final phase, the system’s performance will be evaluated in terms of user satisfaction, accuracy of schedule generation, and overall system responsiveness. An impact analysis will be conducted to assess the system's

effectiveness in improving students' academic planning, focusing on its role in reducing graduation delays and enhancing GPA outcomes. Feedback and performance data collected will be utilized for continuous system improvement, ensuring the scheduling system remains effective and responsive to student needs over time.

V. Expected Results

A. A Well-Functioning NTHU Course Scheduling Recommendation System

Develop a functional system that allows students to input their needs and preferences, and then generates personalized timetable suggestions.

B. Improved Efficiency in Course Selection for Students

One of the expected outcomes is to assist students in selecting courses more effectively, reducing the stress during the course selection period, and ensuring that they can obtain the courses they need.

C. Better Timetable Fulfillment of Student Needs

The system is expected to generate timetables that better meet the course requirements and personal preferences of students, reducing timetable conflicts and unnecessary delays in graduation.

D. Enhanced Academic Performance

It is hoped that this system will help students better arrange their courses, recommending courses with historically higher average grades, ultimately improving students' academic performance.

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