VirgilPlus - Course Selections Made Easy

Our Team

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Overview

VirgilPlus is a software that makes course planning effortless for students. Whereas currently students have to browse through an entire catalog that contains mostly irrelevant or unavailable courses, VirgilPlus lets students bypass the frustration of picking out the courses right for them. In particular, given a set of courses that a student has already taken and a set of preferences such as graduation year, day of the week or time window, VirgilPlus outputs the courses that fit these constraints up to a threshold, and eases the process of choosing desired courses.

Specifications

Data:
Our data will come from the Columbia CS course catalog. We will collect information such as course number, course name, course description, class times, and prerequisites. These raw data will be stored and retrieved using a combination of a database management system and a querying language, such as pgAdmin and PostgreSql. Notice that for every course, we obtain the prerequisites. So by using these topological constraints, we can construct a forest (a graph consisting of multiple components, each of which is a tree). Naturally, such data structure will be stored in our database with respect to the nodes' adjacency relations.

Algorithm:
The core algorithm is a graph search. After prompting for user input, we know which courses (i.e. nodes) that the students will prefer. Using this information, we can perform an A* or BFS search starting from the nodes that correspond to the courses that the student has already taken, and assigning weights to the nodes dynamically according to the preferences. After performing the search for only one layer outward (which corresponds to the courses that are available to the student right now), we output the top-weighted terminal nodes as the course recommendations.

Language & Platform:

We will use Java 8 and Windows.

Technical Specs:
The software will be implemented in Java 8. External libraries will include Apache for general purposes, and possibly Alchemy API for performing NLP on user input and Hibernate for mapping between Java objects and database tables.

User Stories

User1:
As a new graduate student in Columbia University, I want to get suggestions on how to arrange courses for my whole study so that I can complete track requirements. Moreover, the recommended course arrangements should fit prerequisites and I do not need to think about the order of taking these courses. My conditions of satisfaction are: for every search, I can get multiple feasible course paths(each course is returned with its course number and description) which lead me to fulfill track requirements successfully and the course path has already satisfied the prerequisite relation between those courses.

User2:
As a student who has studied in Computer Science department for some time and has already completed several courses, I want to check what other courses I should take to meet my track requirements, and what order it should be so that I can have a sense of my studying status. I hope this system can show me as many choices as possible so that I can make decisions based on my own preference like course time, etc. My conditions of satisfaction are: after inputting my previous courses and my track, I can get multiple course paths to follow to achieve the graduation requirement. And each course should show different sections. Any course time conflict should be eliminated. Plus, course informations are also listed to help me make decision. If my current study status is already left behind by normal schedule, it should give me a 'warning'. If my current study status already satisfied graduation requirement, it should remind me to start graduation process.

User3:
As a student who is at the next semester, I want to select the courses which are easy to enroll and also without heavy workload so that I can have time for internship or research. My conditions of satisfaction are : after inputting my previous courses and my track, I can get multiple combinations of the last two courses. Any course time conflict should be eliminated. Plus, course informations are listed to help me make decision. If I already fulfill graduation requirement, it should remind me to start graduation process. If I owe too many credits to graduate this semester, it should return the whole course path until I can graduate.

User4:
As a high-school student who is really enthusiastic about pursuing B.S. degree in Computer Science, I want to know what kind of courses the department offered and search keywords to get related course information so that I can gather more information about CSCU knowledge system and choose the university that best fits me. My conditions of satisfaction are: after inputting my interested course keywords, I can get a list of courses sorted by relevance, shown with the course description and instructor. If there are no relevant courses, it should return 'no relevant course in record'.

User 5:
As a professor in C.S. department, Columbia University, I want to find information about courses opened by the department in a certain field through searching keywords about the field so that I can get relevant

course descriptions and know if there is a need to open more courses or make some improvements. My conditions of satisfaction are: after inputting my interested course keywords, I can get a list of courses sorted by relevance, shown with the course description and instructor. If there are no relevant courses, it should return ‘no relevant course in record’.

User 6:
As a current student who is uncertain about future development path, I want to get some course suggestions based on my previous courses record and knowledge pool to help me develop a professional skill set so that I can get some guidance of future job and development options. My conditions of satisfaction are: after inputting my previous courses, it should return me a list of feasible course options with detailed information.