Using MATLAB to Optimize UWEC Class Schedule Building

Claire Arneson, John Kemp, Eric Mallmann, Nathan Pinter, Nathan Walgurski, Prof. Abra Brisbin, and Prof. Danielle Brake

Mathematics Department University of Wisconsin – Eau Claire

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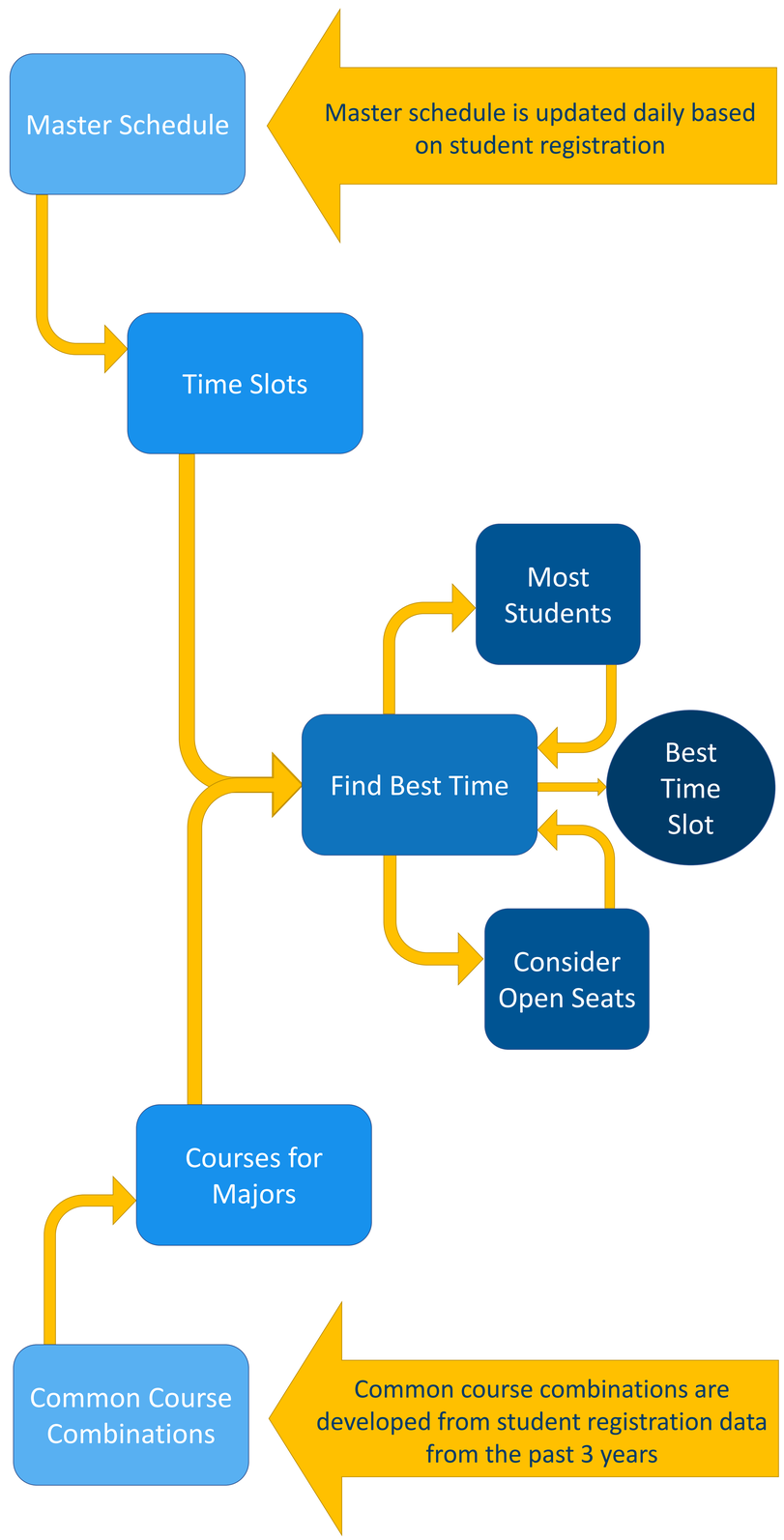
Background

- As courses fill up during student registration, the College of Arts and Sciences needs to open new sections.
- MATLAB, a programming language that implements the use of mathematical functions, was used to create a model to help the College of Arts and Sciences find the optimal time to open a new course section.
- However, there are restrictions on which times a new section of a particular class can be scheduled.
- In this model, the worst case scenario is assumed; no student registers for the proposed course until courses typically taken by other students of the same major are full.
- The following data, taken from administration, was read into the model:
  - The number of students predicted to want to take the proposed class.
  - Other classes offered at the proposed time.
  - The number of open seats in the classes offered at the proposed time.
- This model finds the optimal time by comparing the estimated number of available students at each proposed time slot.

Assumptions

- All students will enroll in a course commonly taken by students of that major until those sections at the proposed time slot are full. Further, students are not enrolled in any of these classes at another time.
  - Justification: Since all of the courses are commonly taken for their major, we are presuming that they won't make preferences. Further, each individual student's schedule can't be considered.
- Students are equally likely to enroll in classes at anytime in the day.
  - Justification: The ratio between students who prefer morning and night classes will balance out the preferences of the student population.
- This program presumes that the optimal time slot outputted always has a professor available to teach the course.
  - Justification: Without all of the professors' availability for the next semester, there is no method for implementing this with the data provided.
- Courses are one hour in duration starting on hour.
  - Justification: Courses that start off the hour (e.g. X:30) will still conflict with a course starting on the hour. To account for this, our code only considers the hour at which a class starts, not the minute.
- The time slot with the most available students will be the best time slot to add a course.
  - Justification: An individual's time slot preference will average out to be negligible.

Design



Functionality

- Excel Document Requirements:
  - Academic plan identifiers and start times must be strings.
- When entering the times that are to be compared the following syntax is required:
  - "XX:XX:XX AM" or "XX:XX:XX PM"
- When using this program first create a vector with all of the times you want to search through (using the above syntax).
- Then create the call for the function using the following syntax:
  - find_best_time('X', 'X', 'X', 'X', 'X', times, "Course Name")
  - 'X' is the capital first letter of the day (with Thursday being 'R') , or 0 if that day is being omitted.
- The program will then search to find the number of available students to take the course at the time slots that were selected by subtracting the number of open seats for courses commonly taken by students of a specific major by the number of students in that major.
- The code will then determine the optimal time to maximize the amount of students that can take the course and then output that time in the same format as was entered.

Future Development

- Be able to account for the availability of professors when looking for best time to open a new course section.
- Add functionality to find a room with the appropriate equipment and capacity to fit all the students who desire to take the new course.
- Add in elements to the program to make classes with more demand have more weight in determining class times.
- Creating a feature to ensure classes have a minimum amount of students before another class section is opened.
- Be able to incorporate students with multiple academic plans.
- Check various start time intervals and end times to more accurately determine which classes are offered at the proposed time.

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