In this assignment, your task is to design a system that assigns students to course sections (i.e., CRN numbers) based on their expressed WebTree preferences, subject to course ceiling constraints. You have been provided with student WebTree requests from the past four semesters, with student IDs randomized to preserve confidentiality. Your job is to model this problem as a constraint satisfaction or constraint optimization problem, and solve it using an off-the-shelf solver. The goal will be to outperform the "traditional" WebTree algorithm, which has been implemented in the `webtree_baseline` script that is available on Moodle.

Resources

The SAT Live! page contains a useful listing of state-of-the-art SAT and MaxSAT solvers. My recommendation would be SAT4J or MiniSAT, though you are welcome to choose any solver that you feel comfortable with.

`http://www.satlive.org/solvers/`

Matlab and Microsoft Excel (installed on campus computers) both have built-in tools for solving linear programs. The former can also handle integer programming problems.

The Write-Up

Remember the overarching writing rule for this course: *you need to be sufficiently precise with your writing and include enough details that a competent reader could reproduce your results.* Your goal in the report is to convince me and the registrar that your proposed encoding produces superior results to the current system that is in place. Here are some specific things to address in your write-up, in no particular order. This is *not* meant to be an exhaustive list.

- Describe how you evaluate the quality of a course allocation. What metrics do you use to decide whether the matching that WebTree currently produces is superior to what your new encoding produces?
- Describe your modeling of the problem. What were the variables? How were the constraints encoded? Did you treat the problem as a discrete CSP or as a continuous optimization problem? In the event of the latter, did you assign weights to the constraints? If so, justify them.
- What solver did you use for the resulting problem? Were there any parameter settings you had to tune?

- As always, cite your sources if you sought inspiration from the literature (*not* Wikipedia!). You should also be citing relevant papers or documentation pages for your solvers.

Deliverables

Here are the deadlines for the project:

- **March 20, 11:55pm:** First drafts are due via Moodle. Upload your code archive and your write-up as a single zip file to Moodle. Papers will be emailed to individual groups soon after for peer review.
- **March 22, noon:** Feedback on your assigned papers are due.
- **March 24, noon:** Final drafts of papers are due (electronic submissions via Moodle).