CS170 Project Final Writeup

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1 How the Algorithm Works

There are two distinct steps to this algorithm. First, the algorithm assigns students to buses greedily based on a series of heuristics; we try a few different heuristics for this part. Then, the greedy assignment is handed to an optimizer which climbs the optimization space to find a better solution. Finally, we write our solution to file only if it is better than the solution we already have saved. This allows us to test many methods and take the best solutions on an input by input basis.

1.1 Greedy Assignment

1.2 Optimization

We tried two separate combinatorial optimization methods for this task. Each searches the optimization space; the units of which are swaps between two students or a student and an empty seat. The first optimizer, which we called the basic optimizer, simply samples a specified number of swaps on each iteration and takes the best swap possible; repeating for a set number of iterations. The more advanced optimizer we tried was inspired by the rollout policy of a monte carlo tree search. This method samples paths in the optimization space of a set length, taking the best path on each iteration and repeating for a set number of iterations. Of the two, the tree search optimizer performed better.

2 Other Methods

The methods above were all that we tried. Although we did try many methods within this as far as the two different optimizers and the different heuristics for bus assignment.

3 Computational Resources

The computational resources we used included Daniel's high performance PC and instructional machines; which Daniel took care of to ensure only one of us

used the machines at a time.