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Homework 1 Writeup

Code Description:

My code works by first scanning in the homework file: the first line indicating the amount of people and then subsequent lines into personalities. A personality is a data structure that holds heuristic information about each person to be seated. It contains their numerical ID (to indicate who likes who), their gender, who they like in an array of values where index 0 refers to ID 0 and so on, and finally a net happiness of this person.

The table is a static array that gets modified each pass of the main portion of the solver. But first it's seated in a particular way: only the unhappiest people were seated at the edges. This is the first heuristic I used. I wanted to limit the number of associates these people had (thus increasing potential happiness and hopefully minimizing the state search area). That's where their net happiness came into play.

Next I ask three questions when I swap two people who are seated at the table. Should I swap left, swap right, or swap opposite? I carry out each order, making sure to not dirty the table after each one is performed. I then choose the one that maximizes the score and redo its decision. This should give me an admissible heuristic as so I can narrow down the paths to a good answer. As you can tell this is a local search.

Finally I do randomized restarts by shuffling the people around in order to look for a better answer. I hope that sometimes, even if I had seated the corners the way I did, there are some starting states that produce better results.

I ran into various pitfalls, or rather plateaus, but it turns out that after a lot of testing, the fact of sitting the unhappiest people at the corners increased my results by a good 20%. The three files take just about 50 seconds of runtime to run.

Building and Running

To build the code run: `make`

To run the code with an input file: `java DinnerTable "input.txt"`

I had routed stdout to file, see: hw1-soln1.txt, hw1-soln2.txt and hw1-soln3.txt

Software Setup:

Java with notepad++, and git for source code management.

Hardware Setup:

Home computer, 3.1ghz quad core i5 processor, 8 GB's memory @1600.

Scoring:

As far as I know scores are added with 1 point each time opposite genders are seated next to each other and 2 points across from each other. Then the personality factors are added in for each person who can reach any another person across and next to. That's how I interpreted the assignment.