IE 607, Spring 2004

Homework #5 (Tabu Search), Due May 13

For the QAP (below) do the following:

1. Code a simple TS to solve the problem. To do this you need to encode the problem as a permutation, define a neighborhood and a move operator, set a tabu list size and select a stopping criterion. Use only a recency based tabu list and no aspiration criteria at this point.
2. Run your TS.
3. Perform the following changes on your TS code (one by one) and compare the results.
   - Change the initial starting point (initial solution) 10 times
   - Change the tabu list size – smaller and larger than your original choice
   - Change the tabu list size to a dynamic one – an easy way to do this is to choose a range and generate a random uniform integer between this range every so often (i.e., only change the tabu list size infrequently)
   - Add one or more aspiration criteria such as best solution so far, or best solution in the neighborhood, or in a number of iterations
   - Use less than the whole neighborhood to select the next solution
   - Add a frequency based tabu list and/or aspiration criteria (designed to encourage the search to diversify)
4. Please include your code with your homework.
5. Please indicate that the percentage of each team member contributes to this assignment (only if you work with others).
6. Please **do not** copy other team/individual's work. Anyone/any team who violates this regulation will be given a grade of zero for this assignment.
7. I am including the global optimum to each problem for reference purpose, but do not use it in your solution methodology.

<u>Problem</u>

This is one of the QAP (quadratic assignment problem) test problems of Nugent et al. 25 departments are to be placed in 25 locations with five in each row (see below). The objective is to minimize costs between the placed departments. The cost is (flow * rectilinear distance), where both flow and distance are symmetric between any given pair of departments. Please download the flow and distance matrices data from the course web (file name: nug25.dat). The optimal solution is 1872 (or 3744 if you double the flows).

Layout of department locations

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25