ECE 3484 - Combinatorial Optimization - Project #5

Local Search

In the next assignment you will evaluate the usefulness of local search. Use your benchmark to evaluate the quality of the solutions found. Make sure to include data describing run times as a function of instance size, and comparisons between all solutions you have found for each instance, including the greedy, ILP, and exhaustive algorithms, and the LP lower bound.

In each case a maximum amount of compute time will need to be specified. Describe the effect of increasing this limit (for example from 1 minute to 5 or 10 minutes) on the quality of solutions found.

To evaluate local search algorithms, first develop a set of algorithms that find reasonably good solutions without spending too much time. You should use at least two such algorithms, and they can be based on any of the approaches you have worked on so far (greedy, exhaustive, branch and bound, random).

Then define the neighborhood of each solution and use the local search algorithm (or tabu search) to iteratively search for a local minimum. Compute the quality of the final solutions, the number of iterations required.

Your analysis must include:

1. at least two techniques for finding an initial solution,
2. some aspect of both steepest descent and tabu search, and
3. a clear graphical comparison of the exhaustive algorithm and ILP (for as many instances as possible), ILP, greedy, local search, and the LP lower bound.