Design and Analysis of Algorithms

9.5 Heuristics

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9.5.2.a

- We have an N x N chessboard.
- Queens can move across rows, across columns, or diagonally.
- We want to place N queens on the chessboard so that no two queens can threaten each other.
- Design a reasonable local search algorithm for this problem. What is the objective function? What is a "move"?

We can start with all of the queens in randomized locations. All of the queens are nodes connected with negative weights if they are in danger. We can move the queens and re-assign weights to the paths if they are not in danger to be positive. Then we want to find the maximum weight of the Hamiltonian path by adjusting the location of the queens.

9.5.2.b

- Our salesman begins at one node on the graph and must visit every other node exactly once, and then return to the starting point.
- Edges have weights, and we want to find the minimum cost cycle for the salesman.
- Design a reasonable local search algorithm for this problem. What is the objective function? What is a "move"?

Objective Function: Unexplored nodes with the least weight. Move: Mark the least weigted node as explored. Or we can make tiny, least weighted circles , expanding and keeping the budget to a minimum.

9.5.4

- Our salesman begins at one node on the graph and must visit every other node exactly once and then return to the starting point.
- Edges have weights, and we want to find the minimum cost cycle for the salesman.
- Design a reasonable local search algorithm for this problem. What is the objective function? What is a "move"?