

21-110: Problem Solving in Recreational Mathematics

Algorithms to find a low-cost Hamiltonian circuit in a weighted complete graph

Wednesday, April 14, 2010

Nearest-neighbor algorithm:

1. Specify a starting vertex.
2. If unvisited vertices remain, go from the current vertex to the unvisited vertex that gives the least-cost connecting edge.
3. If no unvisited vertex remains, return to the starting vertex to finish forming the low-cost Hamiltonian circuit.

Cheapest-link algorithm:

1. In the beginning, all edges are acceptable and no edges have been selected.
2. From the set of acceptable edges, select the edge of smallest weight. If there is a tie, select any of the edges with the smallest weight.
3. If the selected edges do not form a Hamiltonian circuit, then determine the set of acceptable edges. Unacceptable edges are those that either share one vertex with two selected edges or that would close a circuit that is not a Hamiltonian circuit. Now repeat step 2.
4. If the selected edges form a Hamiltonian circuit, that circuit is your low-cost Hamiltonian circuit.

21-110: Problem Solving in Recreational Mathematics

Algorithms to find a low-cost Hamiltonian circuit in a weighted complete graph

Wednesday, April 14, 2010

Nearest-neighbor algorithm:

1. Specify a starting vertex.
2. If unvisited vertices remain, go from the current vertex to the unvisited vertex that gives the least-cost connecting edge.
3. If no unvisited vertex remains, return to the starting vertex to finish forming the low-cost Hamiltonian circuit.

Cheapest-link algorithm:

1. In the beginning, all edges are acceptable and no edges have been selected.
2. From the set of acceptable edges, select the edge of smallest weight. If there is a tie, select any of the edges with the smallest weight.
3. If the selected edges do not form a Hamiltonian circuit, then determine the set of acceptable edges. Unacceptable edges are those that either share one vertex with two selected edges or that would close a circuit that is not a Hamiltonian circuit. Now repeat step 2.
4. If the selected edges form a Hamiltonian circuit, that circuit is your low-cost Hamiltonian circuit.