Project 4 TSP
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Project Report

Description of three methods/algorithms for solving the traveling salesman problem:

One method for solving the traveling salesman problem is the greedy approximation approach. Due to the problem being NP Complete, a greedy algorithm selects vertices to visit based on some greedy criteria. Without thinking ahead, the algorithm visits every vertex.

A second method for solving the traveling salesman problem is using a MST. A algorithm for finding a MST is found, such as Kruskal's algorithm, for intance. The program then travels along that MST visiting every vertex.

A third method for solving the traveling salesman problem is using brute force. All possible combinations of routes are examined, and the smallest routes are selected. This approach is not very resource efficient.

Verbal description of algorithms used in this project:

This project uses a greedy algorithm to approximate a traveling salesman route. The shortest path to another vertex is chosen from a current vertex, so long as that vertex has not already been visited. The program traverses the path until all vertices have been visited. The program then returns to the beginning vertex.

Discussion of why this algorithm was selected:

This algorithm was selected in order to compute a path quickly. In order to compete in the time competition, it was decided that a greedy algorithm would provide good running time

Pseudo Code:

read file, insert into vector all vertices
compute distance between all vertices
choose a starting vertex
while all havent been visited:
        visit the closest one that hasnt been visited
        mark the visited vertex as visited
        repeat

Best Tours for the three example instances:

example1:

.00433 seconds

170766/170742 = 1.00014056 **(test script / program)**

example2:

.2333861 seconds

2890 / 2866 = 1.00837404 **(test script / program)**

example3:

259376 seconds

112321988 / 112314640 = 1.00006542334997 **(test script / program)**

Best Tours for the competition instances:

test-input-1.txt:

0.001928 seconds

27865 / 27842 = 1.00083 **(test script / program)**

test-input-2.txt:

0.01267 seconds

48721 / 48680 = 1.00084 **(test script / program)**

test-input-3.txt:

0.167318 seconds

123892 / 123774 = 1.00095 **(test script / program)**

test-input-4.txt:

1.27076 seconds

247639 / 247392 = 1.001 **(test script / program)**

test-input-5.txt:

10.2512 seconds

522667 / 522217 = 1.00086 **(test script / program)**

test-input-6.txt:

84.2454 seconds

1050413 / 1049477 = 1.00089 **(test script / program)**

test-input-7.txt:

1209.84 seconds

2579701 / 2577388 = 1.0009 **(test script / program)**