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Program 6

TSP with a Stack

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The new algorithm for solving the TSP problem uses a Stack to keep track of the shortest tour in a more time efficient way than going through every possible route. Using the pruning method for the 12 city tour, the program takes 3 seconds. Using the Stack method, it only takes 0 seconds. With short tours, a 3 second difference may not seem like a huge deal, but once you get up to 19 city tours, the difference is much more. Using the pruning method for a 19 city tour, the program has to be left running for over 24 hours and it still hasn't finished running through all the options. Using a stack, you can get an answer in 2 seconds.

The Stack algorithm starts with an empty Stack and empty array. Each time you visit a city, you push it onto the stack and change that value in the array to signify that it has already been used. Once a city has been used, it is only checked with the other cities once. Cities get popped off the stack after all their calculations have been finished. Because of this, not every possible tour is checked. Therefore, it is possible to not get the shortest tour. But the tour that you do get is fairly decent.

The answer on which program is better is the long debate of what goal needs to be accomplished. In code, people are always trying to find the most time and space efficient way to solve a problem and get the best result. Many times, the most time efficient isn't the most space efficient. And the different ways of solving can give you different answers. So, which program do you use? That's up to the person who is designing the code. Both ways are correct.

Program 6:

run:

0

5

7

4

9

1

8

10

3

11

2

6

Cost: 1315

BUILD SUCCESSFUL (total time: 0 seconds)

TSP Lab 4:

run:

for tour 1605

0 1 2 3 4 5 6 7 8 9 10 11 for tour 1579

0 1 2 3 4 5 6 7 8 11 10 9 for tour 1524

0 1 2 3 4 5 6 7 10 9 8 11 for tour 1435

0 1 2 3 4 5 6 11 8 9 10 7 for tour 1414

0 1 2 3 4 5 7 6 9 8 10 11 for tour 1362

0 1 2 3 4 5 7 6 9 10 8 11 for tour 1329

0 1 2 3 4 5 7 6 11 8 9 10 for tour 1257

0 1 2 3 4 5 7 6 11 8 10 9 for tour 1256

0 1 2 3 4 5 8 9 10 7 6 11 for tour 1202

0 1 2 3 4 5 8 9 10 11 6 7 for tour 1196

0 1 2 3 5 4 7 6 11 8 9 10 for tour 1124

0 1 2 3 5 4 7 6 11 8 10 9 for tour 1115

0 1 2 3 5 4 8 9 6 11 10 7 for tour 1073

0 1 2 3 5 4 8 9 10 7 6 11 for tour 1019

0 1 2 3 5 4 8 9 10 11 6 7 for tour 995

0 1 2 4 5 3 6 11 8 9 10 7 for tour 943

0 1 2 4 5 3 8 9 10 11 6 7 for tour 931

0 1 2 4 5 3 9 10 8 11 6 7 for tour 914

0 1 2 4 5 8 10 9 3 11 6 7 for tour 912

0 1 2 9 10 7 6 11 3 8 4 5 for tour 865

0 1 2 9 10 8 4 5 3 11 6 7 for tour 842

0 4 5 3 8 10 9 2 1 11 6 7 for tour 832

0 5 3 8 10 9 2 4 1 11 6 7 for tour 821

0 5 3 9 10 8 4 2 1 11 6 7 BUILD SUCCESSFUL (total time: 3 seconds)