

Assignment 3 (Traveling salesman)

Python 3.8.2 was used in this assignment. Requested pictures of best routes are presented in figures 1 and 2 along with the program output.

For changing the route with each iteration of the trials, i first considered of changing the places of two randomly chosen cities. That got me some solutions but i could clearly see from the plots that they were not the best routes as there were still a lot of lines crossing and going from side to side.

Then i updated the *swap_cities* function to reverse the order between two randomly chosen cities. This got the program giving better results. After that i started to optimize the parameters with going for 100000 trials and with k value of 0.01. Also i started to run *optimize_route* multiple times with starting temperature of every new call of the function taking the value of the last run of the function. This worked really well and i started to find the more optimal solutions. Making steps separately fine tuned the route, making more crude changes at first and finer at the end.

Finding reasonable solution with these values took about 30-40 seconds with my old computer. Differences between results after trying to run the program few dozens of times varied between 35-40 distance with 20 cities and 29 to 30 distance with 10 cities.

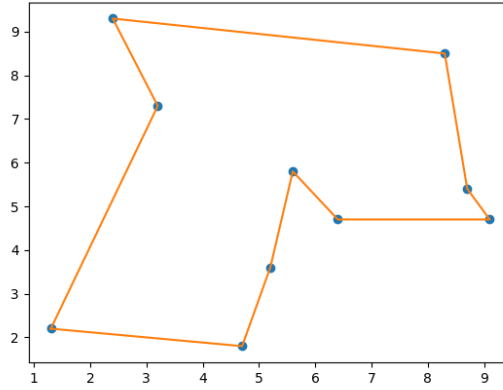


Figure 1: Best route found for 10 cities.

Program output:

shortest trip distance found: 29.070225558943015

shortest trip found: [0 9 1 6 7 4 3 8 2 5 0]

run time 31.049776077270508

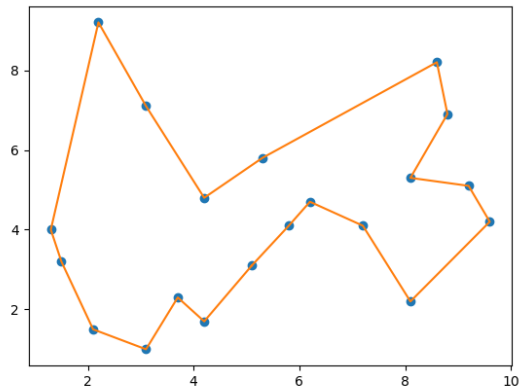


Figure 2: Best route found for 20 cities.

Program output:

shortest trip distance found: 36.17614429210609

shortest trip found: [1 10 12 17 16 0 15 2 6 18 7 9 19 3 14 4 11 5 8 13 1]

run time 35.685041189193726