Metaheuristic Algorithms and Applications: Program Report III
Program Report on Traveling Salesman Problem

Deadline: June 9, 2025

Apply the metaheuristic algorithms (Ant Colony Optimization, GA, PSO, etc.) to the Traveling Salesman Problem on **Berlin52 data set**, which is referred to https://www.kaggle.com/datasets/keknure/berlin52, http://comopt.ifi.uni-heidelberg.de/software/TSPLIB95/tsp95.pdf., and is also given at the end of this file.

About Dataset

Most of the TSP examples come from TSPLIB, ("G Reinelt, (1991). TSPLIB—A Traveling Salesman Problem Library"), a collection of traveling salesman problem datasets maintained by Gerhard Reinelt at http://comopt.ifi.uni-heidelberg.de/software/TSPLIB95 .

The Program Report should include the following two parts.

Part I: Each team should execute at least two different metaheuristic algorithms and make the comparisons by Best (shortest) Distance, Best fitness value, Average Distance, and Computation Time. Three cases are examined: (i) the first 12 cities, (ii) the first 36 cities, and (iii) all 52 cities.

Part II: Only the first 36 cities are considered; determine the shortest route path if all the odd-numbered cities are not connected. Note that the fitness function is different from that in Part I.

Discussions:

(i) Compare all the parameters you used, for example, please verify the Encoding of solutions (e.g., permutations), the Fitness function (total path length), the Selection, the crossover, the mutation strategy, and the stopping condition for the Genetic Algorithm. So do ACO, PSO, etc.

(II) Path visualization: plot a map of the Best Roundtrip route for Parts I and II.

NAME: berlin52

TYPE: TSP COMMENT: 52 locations in Berlin (Groetschel)

DIMENSION: 52 EDGE_WEIGHT_TYPE: EUC_2D

NODE_COORD_SECTION

Node/City	X-Km	Y-Km
1	565.0	575.0
2	25.0	185.0
3	345.0	750.0
4	945.0	685.0
5	845.0	655.0
6	880.0	660.0
7	25.0	230.0
8	525.0	1000.0
9	580.0	1175.0

10	650.0	1130.0
11	1605.0	620.0
12	1220.0	580.0
13	1465.0	200.0
14	1530.0	5.0
15	845.0	680.0
16	725.0	370.0
17	145.0	665.0
18	415.0	635.0
19	510.0	875.0
20	560.0	365.0
21	300.0	465.0
22	520.0	585.0
23	480.0	415.0
24	835.0	625.0
25	975.0	580.0
26	1215.0	245.0
27	1320.0	315.0
28	1250.0	400.0
29	660.0	180.0
30	410.0	250.0
31	420.0	555.0
32	575.0	665.0
33	1150.0	1160.0
34	700.0	580.0
35	685.0	595.0
36	685.0	610.0
37	770.0	610.0
38	795.0	645.0
39	720.0	635.0
40	760.0	650.0
41	475.0	960.0
42	95.0	260.0
43	875.0	920.0
44	700.0	500.0
45	555.0	815.0
46	830.0	485.0
47	1170.0	65.0
48	830.0	610.0
49	605.0	625.0
50	595.0	360.0
51	1340.0	725.0
52	1740.0	245.0

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