

Exercises to
Swarm Intelligence
Summer 2022
Sheet 9

These problems are for the meetings on July 26th and on July 29th. Please start implementing your solutions at home before visiting the meetings. The room will be 0.157-115 – CIP Pool EEI, the times will be the regular exercise times.

Problem 20:

- (a) Solve the *Traveling Salesperson Problem* (TSP) by implementing and applying the following (50,50)-EA:
1. Create 50 random permutations (initial population) and evaluate them.
 2. Repeat 500 times:
 - **Selection 1:** Select 50 parental pairs using *tournament selection*
 - **Crossover:** Create 50 offspring using *one-point crossover*
 - **Mutation:** Perform *inversion mutation* on each offspring with probability 1%
 - Evaluate the offspring
 - **Selection 2:** From the now 100 available individuals, select the 50 best individuals for the next generation (*deterministic selection*).

What results do you get for TSPLIB's problems *ulysses16* and *ulysses22* (cf. sheet 7)?

- (b) Compare your results with your results for the ant algorithm from Problem 18. Which heuristic do you recommend for use with TSP and why?
- (c) Implement additional crossover, mutation, and selection operators and compare the results. For example, you can compare two crossover operators by setting the remaining parameters identically and then determining the mean results for 10 runs per crossover operator.