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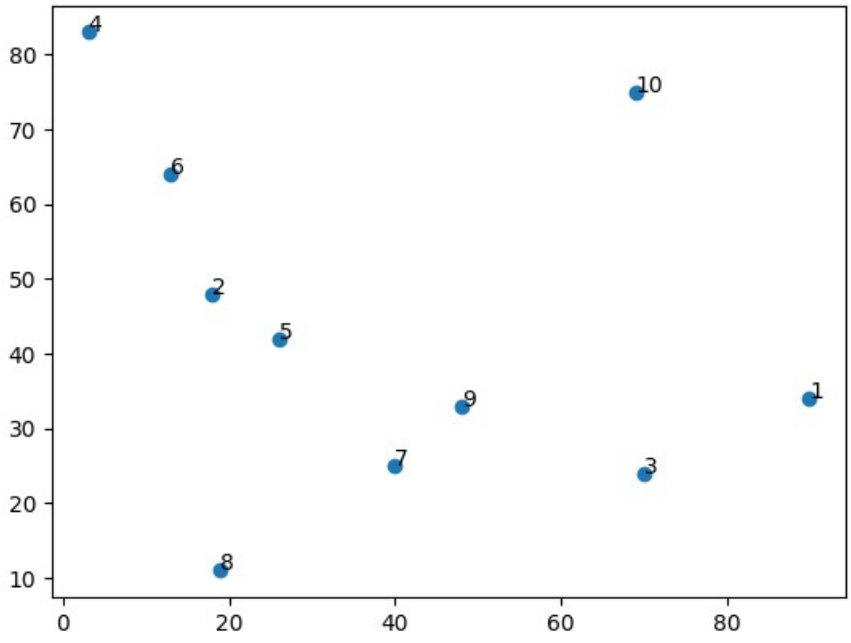
Traveling salesman problem

Ant Colony algorithm

1. Initialization



2. Algorithm description

Ants are placed in randomly chosen cities. Each ant travels from city to city at the same time. Ants repeat this sequence until they finish the whole path and return to the starting point. After they finished their paths, the total distance travelled by each ant is calculated and based on this distance, pheromones are placed throughout the path. At the end of the iteration, the pheromones partially evaporate. In the next iterations, the ants will choose their next city based on the distance and the amount of the pheromones on the path.

3. Pseudocode

```
Initialize ant colony

While time < 120s do:
    For city = 0 to city_number do:
        For ant = 0 to ant_number do:
            calculate probabilities
            select next city
            move to the next city
    For ant = 0 to ant_number do:
        calculate total distance
        update trail levels
        check for min total distance
        return to spawn city

    evaporate trail levels
```

4. Algorithm illustration

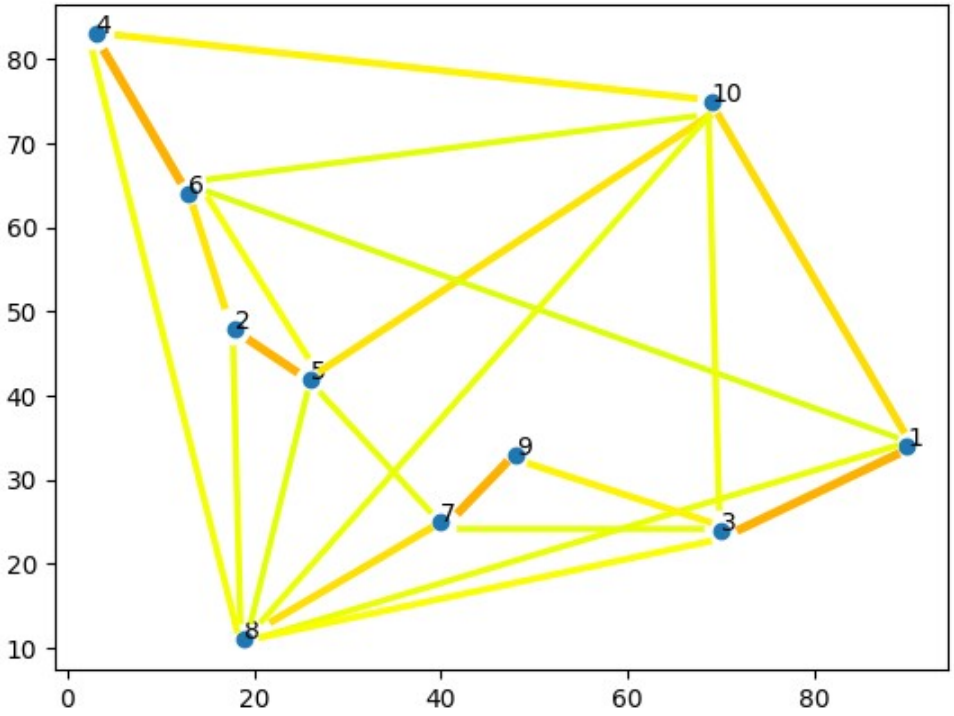


Figure 1: Pheromone distribution for chosen paths after 1st iteration

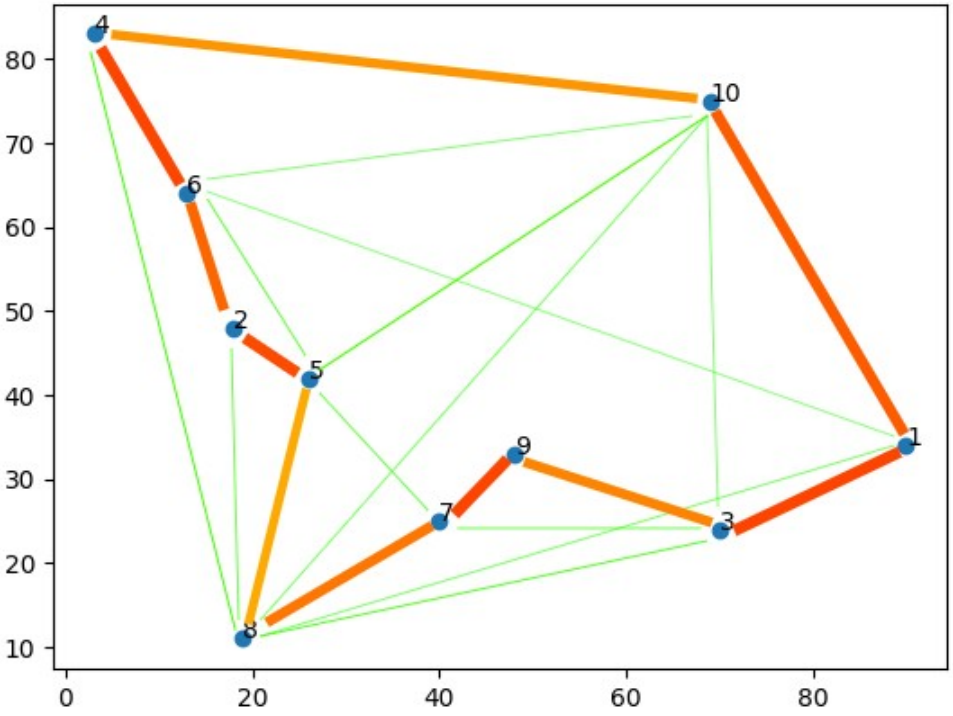


Figure 2: Pheromone distribution for chosen paths after 1st iteration

5. Finalizacja

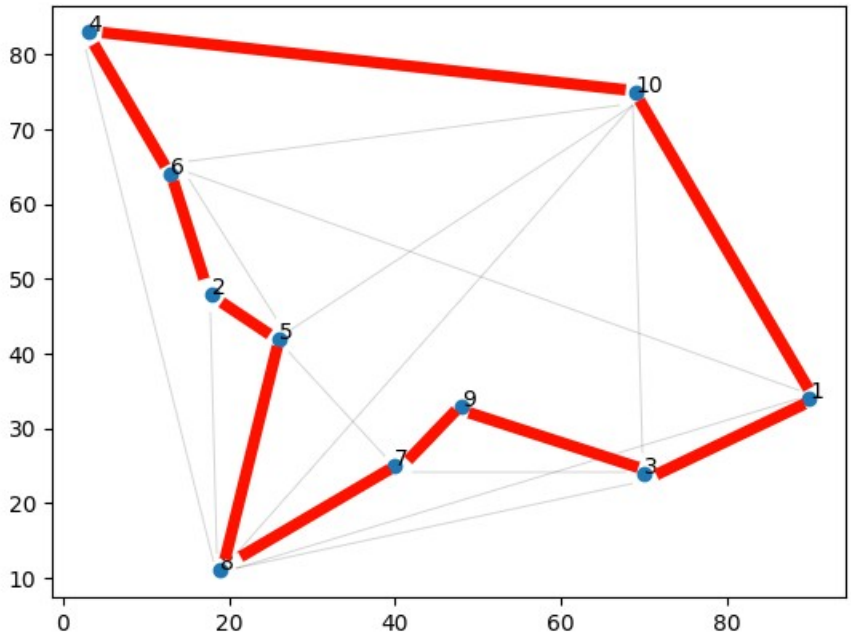
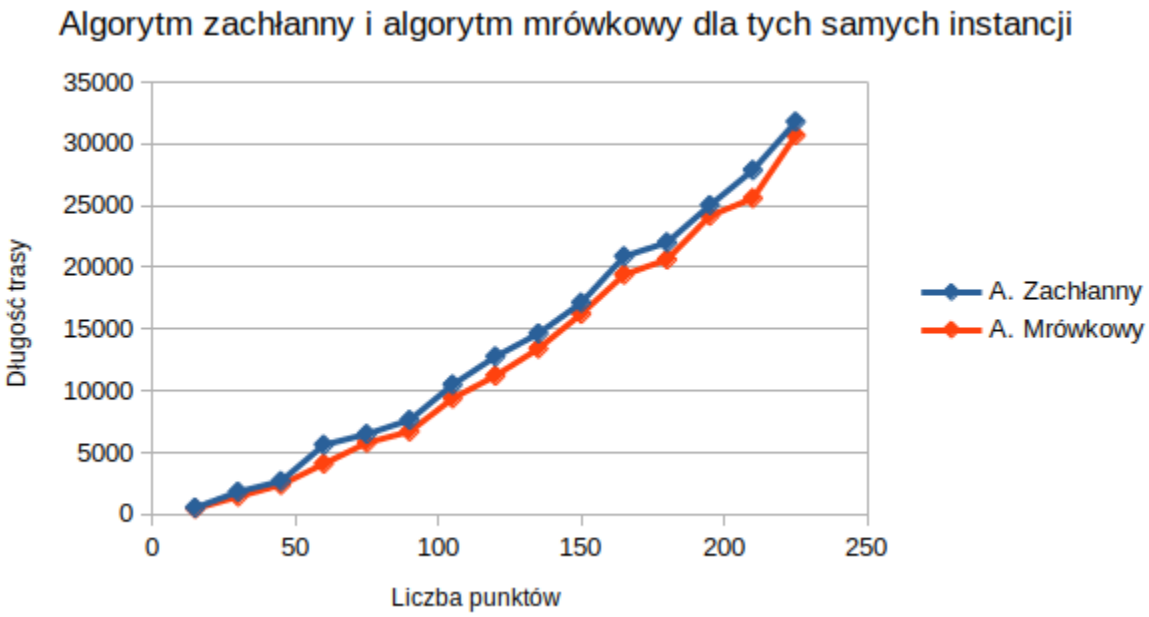


Figure 3: Pheromone distribution for chosen paths at the end (100 iterations)

6. Graphs


Algorytm zachłanny i algorytm mrówkowy dla tych samych instancji
Długość trasy
35000
30000
25000
20000
15000
10000
5000
0
0
50
100
150
200
250
Liczba punktów
A. Zachłanny
A. Mrówkowy