

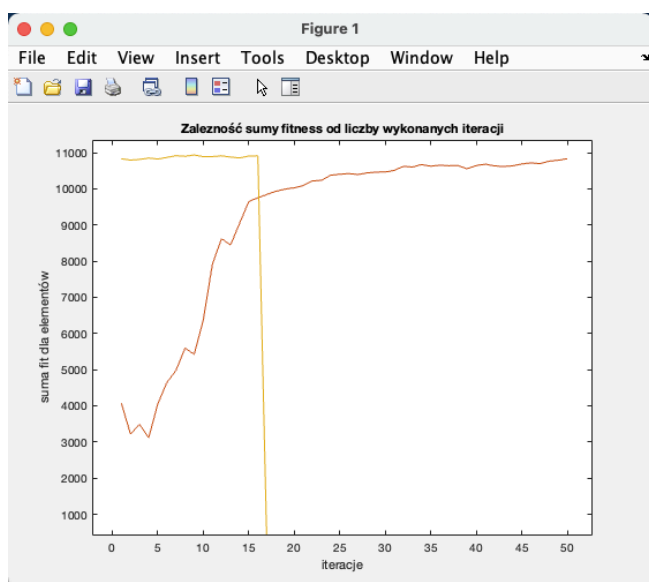
Homework 2

Genetic algorithm and swarming algorithm

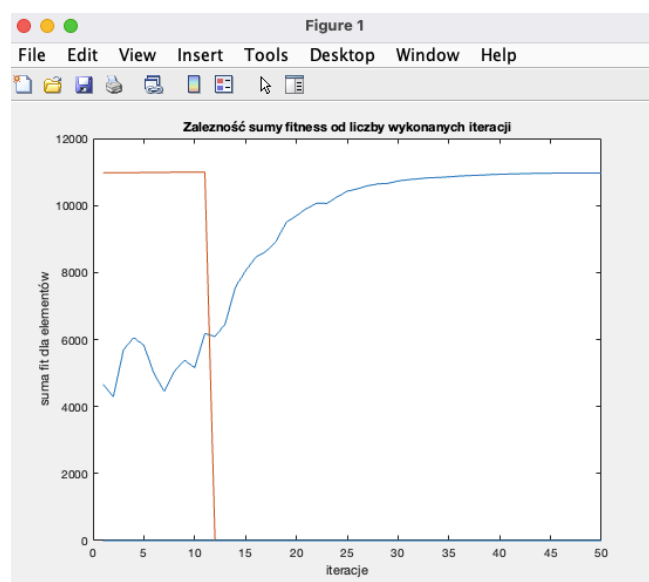
- I performed the task in matlab, used the genetic algorithm program from the lecture and implemented the swarming algorithm.
- Run scripts to check the tasks `ea_funmin.m` and `pso.m`.
- The algorithms work in such a way that it is enough to hold the space bar to end the program after repeatedly receiving the same result and display the final graph, which shows the dependence of the fitness sum on the number of iterations.
- When you hold down the space bar, you may notice changes in the position of elements and their convergence to the global minimum.

Let's analyze these charts:

Genetic algorithm



Swarming algorithm



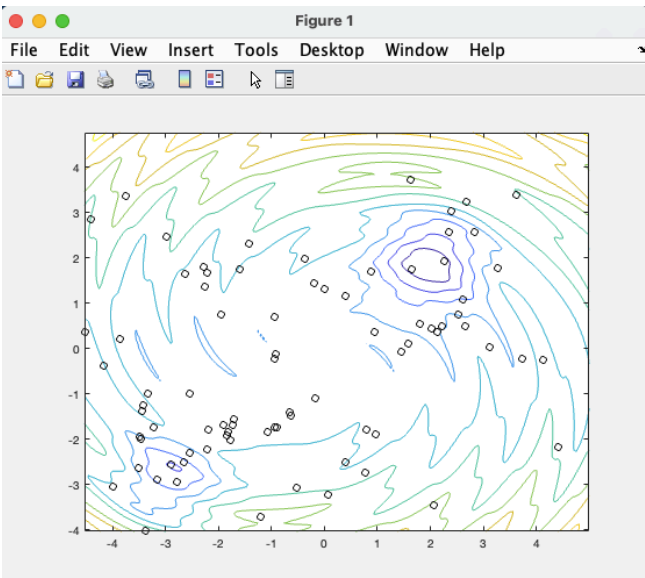
My conclusions:

At the initial iterations, both algorithms behave similarly, but after 35 iterations, you can see a significant advantage of the swarm algorithm - fitness summary results are more stable (blue line). During this, the genetic algorithm (the orange line) continues to hover around the global minimum but is unable to determine one point, as can be seen later in the report.

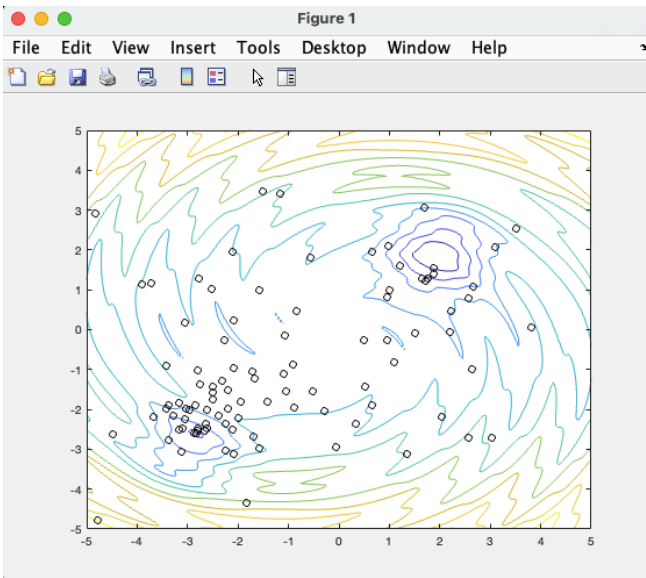
Let's analyze the function graph with search elements:

Initial iterations

Genetic algorithm

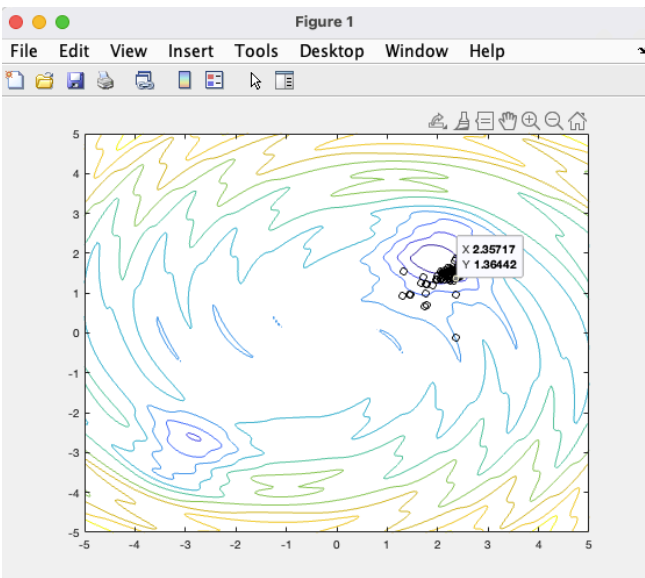


Swarming algorithm

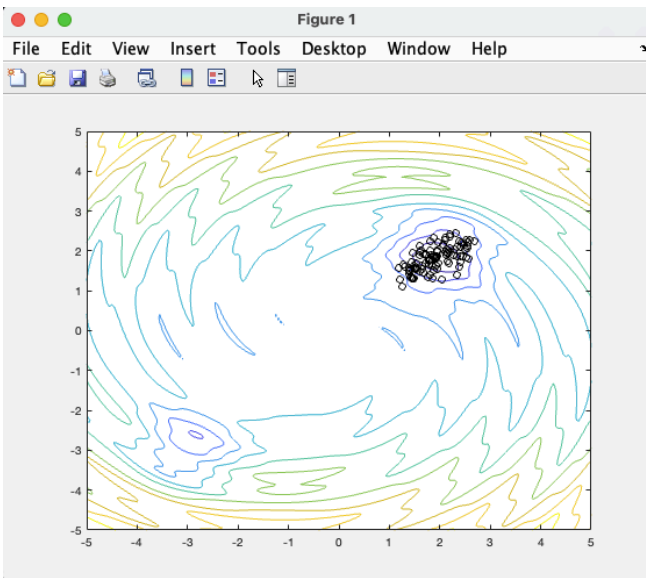


15th iteration

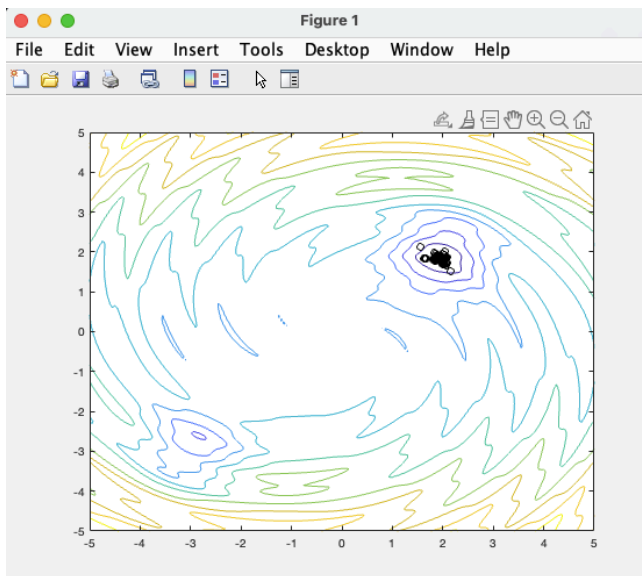
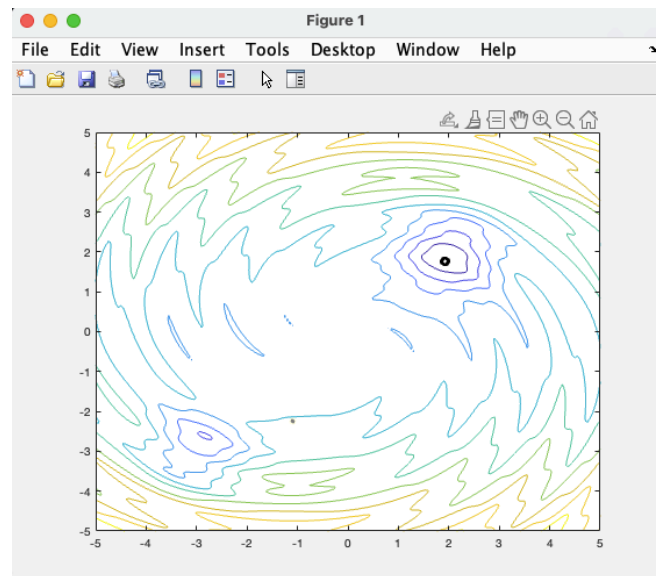
Genetic algorithm



Swarming algorithm



45 iteration

Genetic algorithmSwarming algorithm

My conclusions:

At first there is no difference between the algorithms, you can see an interesting case where a swarming algorithm can be 'tempted' by the local minimum in the lower left corner. In the next iterations (15), it can be seen that the swarming algorithm is more dispersed - at the same time, the genetic algorithm is concentrated in one place, and it can also be seen that the swarming algorithm passed the test of this unusual case and hit the global minimum.

Finally (iteration 45) we see that all points of the genetic algorithm are duplicating, unfortunately the genetic algorithm still oscillates around the global minimum. From this it follows that the swarming algorithm is the better algorithm.