

Home Problem 2

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Problem 2.1

In this problem, an Ant System (AS) was used to solve a TSP (traveling salesman problem). A population of 50 ants explored the 50 nodes, which resulted in the shortest path displayed in figure 1. The parameters used were $\alpha = 1.0$, $\beta = 4$, $\rho = 0.5$ and $\tau_0 = 0.3$. The shortest path found had the length 99.79161. The full path can be found in the file `BestResultFound.m`.

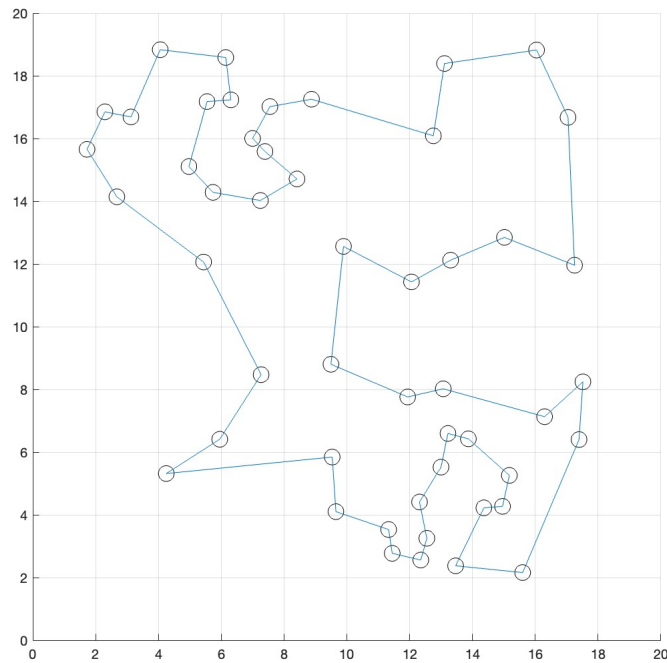


Figure 1: The best path found by the ant system for TSP.

Problem 2.2

Particle swarm optimization (PSO) was used to locate the minima of the following function:

$$f(x, y) = (x^2 + y - 11)^2 + (x + y^2 - 7)^2$$

Below, in figure 2, the contour plot for $\log(0.01 + f(x, y))$ is displayed. The (approximate) locations of the minima are marked out. As we can see, there are four minima over the range $x, y \in [-5, 5]$. The local minima found by PSO are presented in table 1, and these are corresponding well to the minima identified in the contour plot.

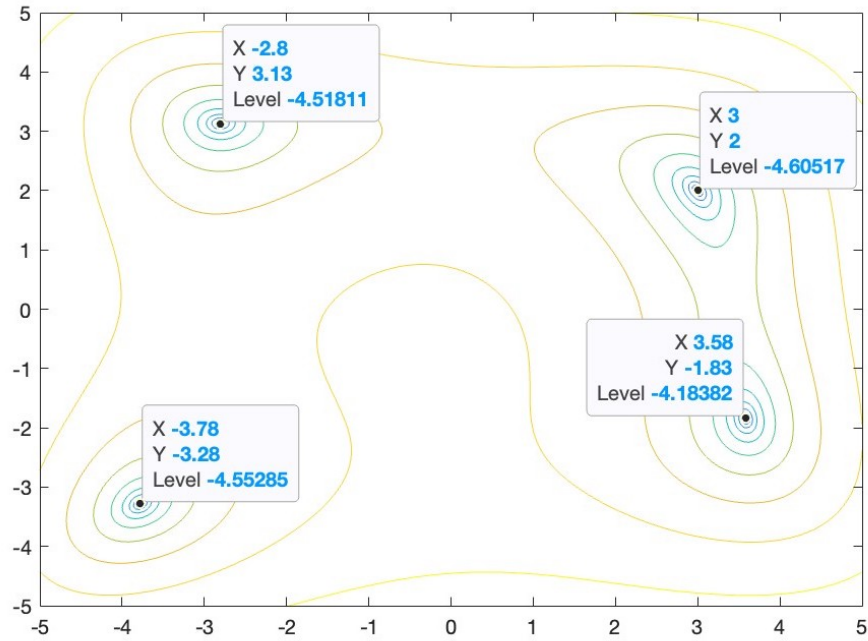


Figure 2: Contour plot of $\log(0.01 + f(x, y))$

x	y	$f(x, y)$
3	2	0
3.5844	-1.8481	0
-2.8051	3.1313	0
-3.7793	-3.2832	0

Table 1: The minima obtained from particle swarm optimization.