# Fitness sharing for Lucky dog

We have 8 dogs, that start from home. They looking for one of the four sausages. Coordinates of the hous is (500;500). Coordinates of sausages are (400;600), (600;600), (400;400) and (400;600). They have 800 steps to reach the sausage.

graph of Sharing Fitness vs Generation
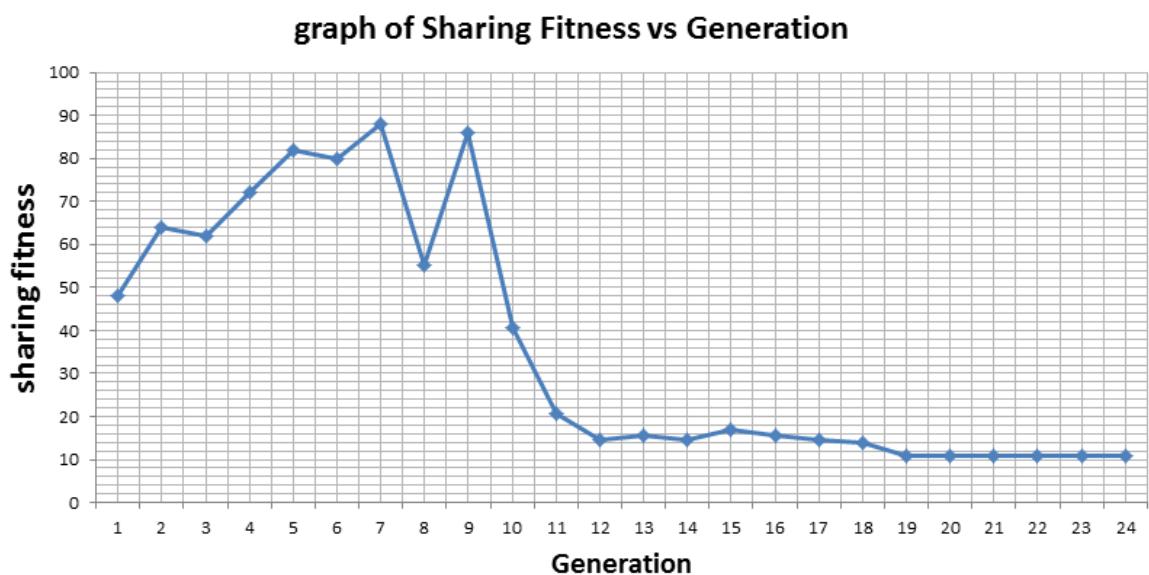
Map at first iteration
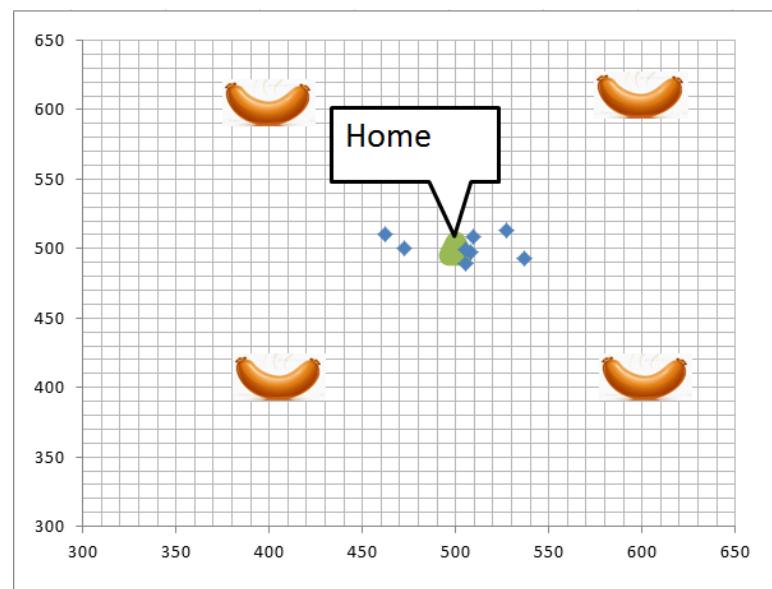
◆ - dog

Table of fitness at first iteration

	Original fitness	Sharing fitness
1	48	48
2	44	44
3	40	40
4	28	28
5	18	18
6	16	16
7	10	8,33333
8	6	5

Map at 5 iteration
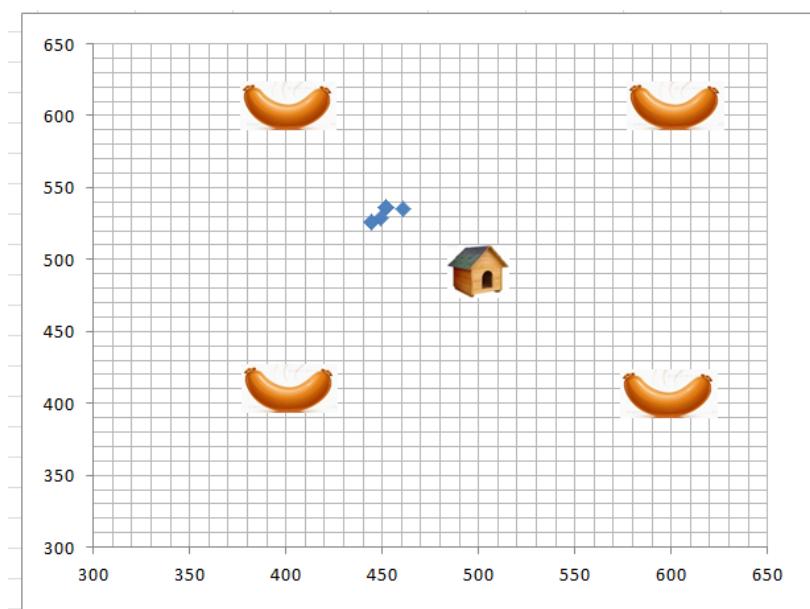
Table of fitness at 5 iteration

	Original fitness	Sharing fitness
1	80	80
2	74	74
3	82	41
4	82	41
5	84	21
6	84	21
7	84	21
8	84	21
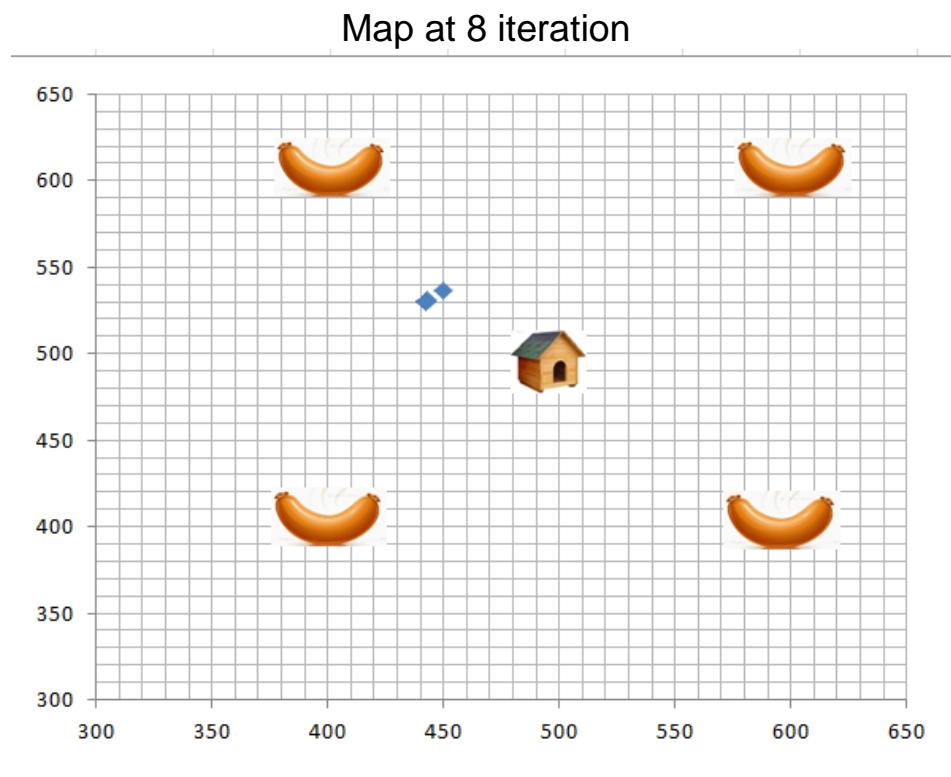
Map at 8 iteration

Table of fitness at 8 iteration

	Original fitness	Sharing fitness
1	86	86
2	88	19,1304
3	88	13,3333
4	88	13,3333
5	88	13,3333
6	88	13,3333
7	88	13,3333
8	88	13,3333

Map at last iteration
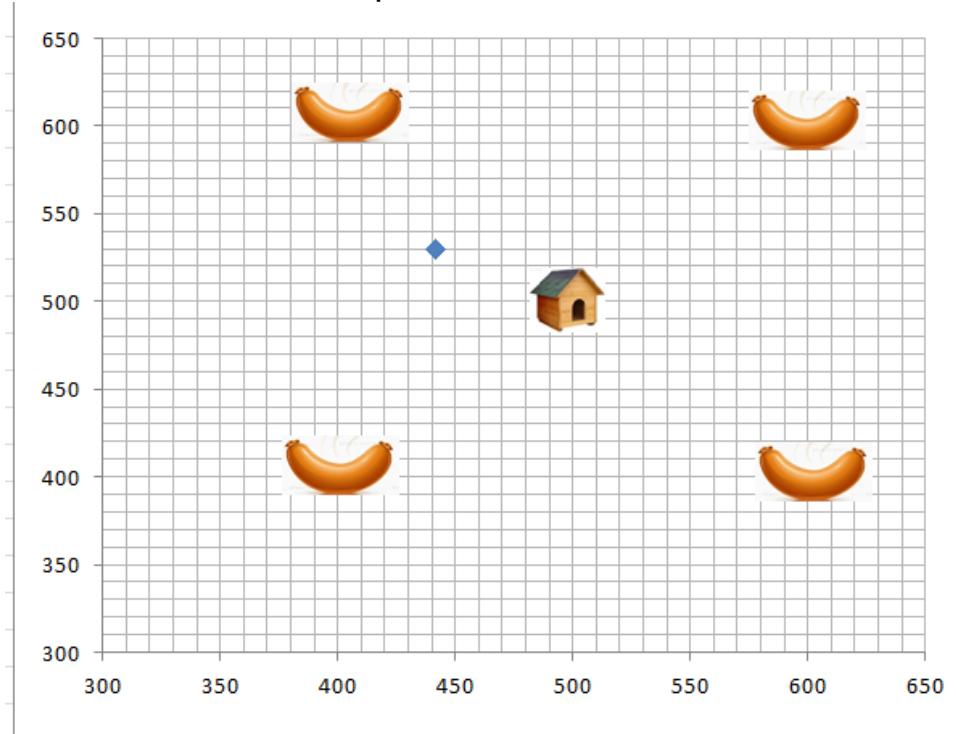
Table of fitness at 5 iteration

	Original fitness	Sharing fitness
1	88	11
2	88	11
3	88	11
4	88	11
5	88	11
6	88	11
7	88	11
8	88	11

As seen on the graph above, the all dogs have the same coordinates at last iteration.

Crowding Algorithm

Algorithm 1 *1. Choose two parents, p_1 and p_2, at random.*

2. Produce two children, c'_1 and c'_2.

4. Replace parent with child as follows:

- *IF* $d(p_1, c_1) + d(p_2, c_2) > d(p_1, c_2) + d(p_2, c_1)$

  * *IF* $f(c_1) > f(p_1)$ *THEN replace p_1 with c_1*

  * *IF* $f(c_2) > f(p_2)$ *THEN replace p_2 with c_2*

- *ELSE*

  * *IF* $f(c_2) > f(p_1)$ *THEN replace p_1 with c_2*

  * *IF* $f(c_1) > f(p_2)$ *THEN replace p_2 with c_1*