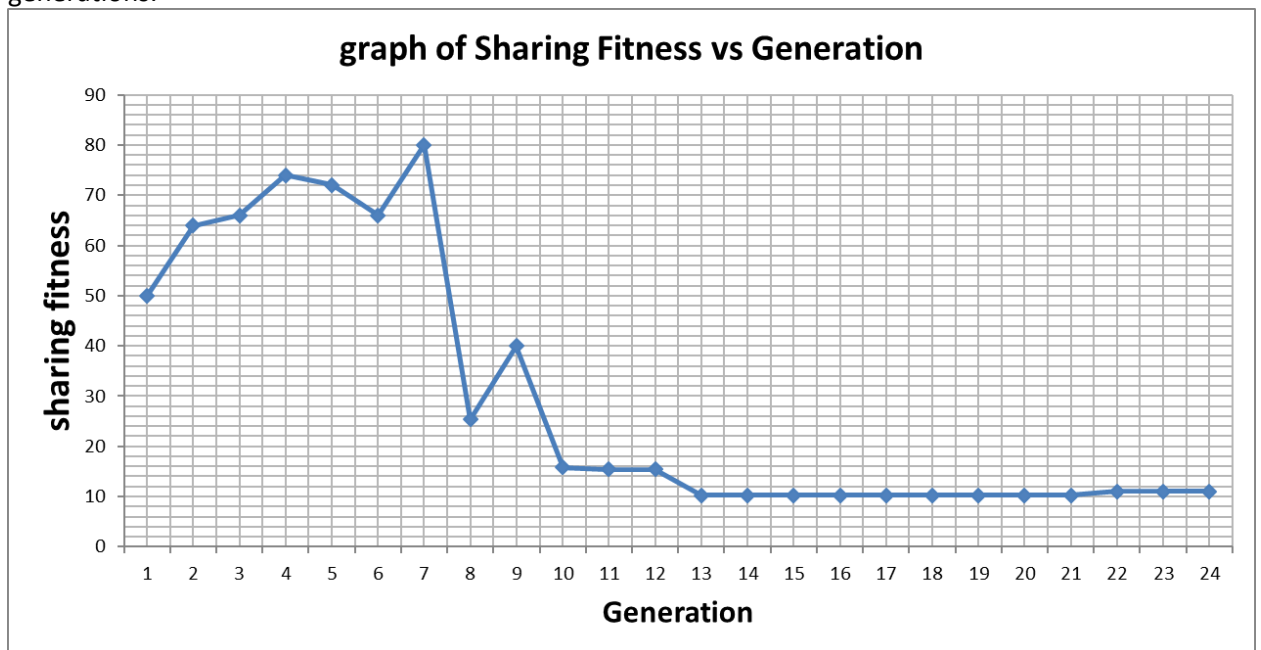


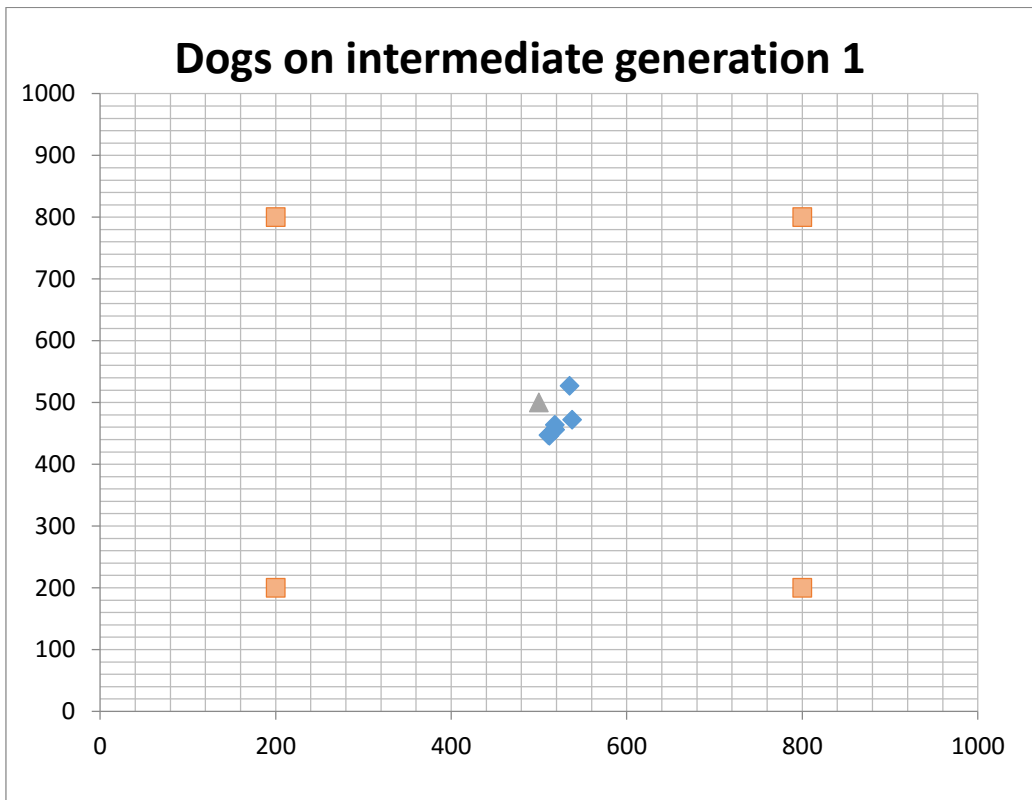
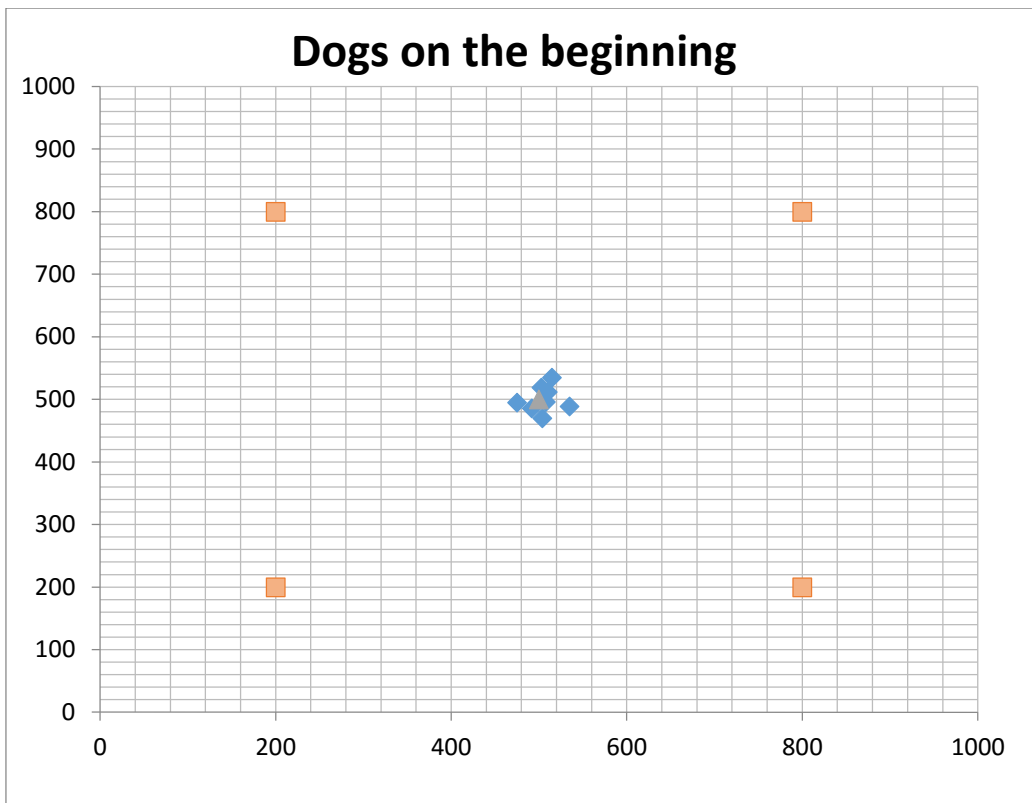
Lucky Dog Problem with Fitness Sharing Algorithm

The aim is to create a population of N dogs ($N=8$ in my case) with 1000 genes in each, whose goal is to come from the 'house' located on (500;500) and reach one of four sausages (200;200) (200;800) (800;800) or (800;200). Because of normal distribution our dogs don't reach the sausages, they roam near the 'house'.

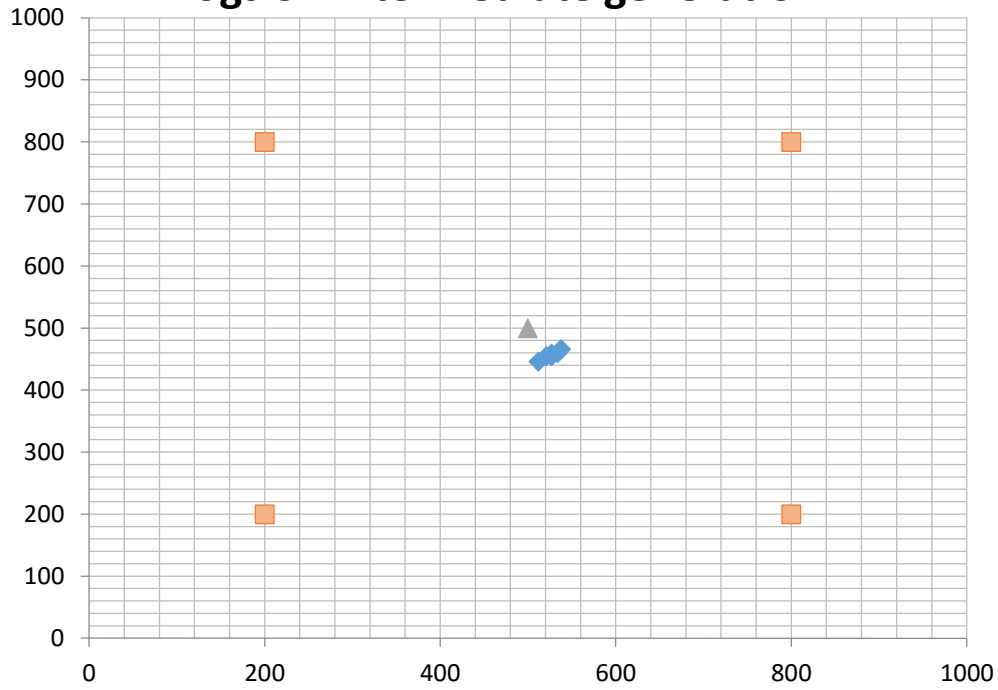
These are the Fitness vs. Generation graphic and 4 graphics of locations of dogs on different generations.



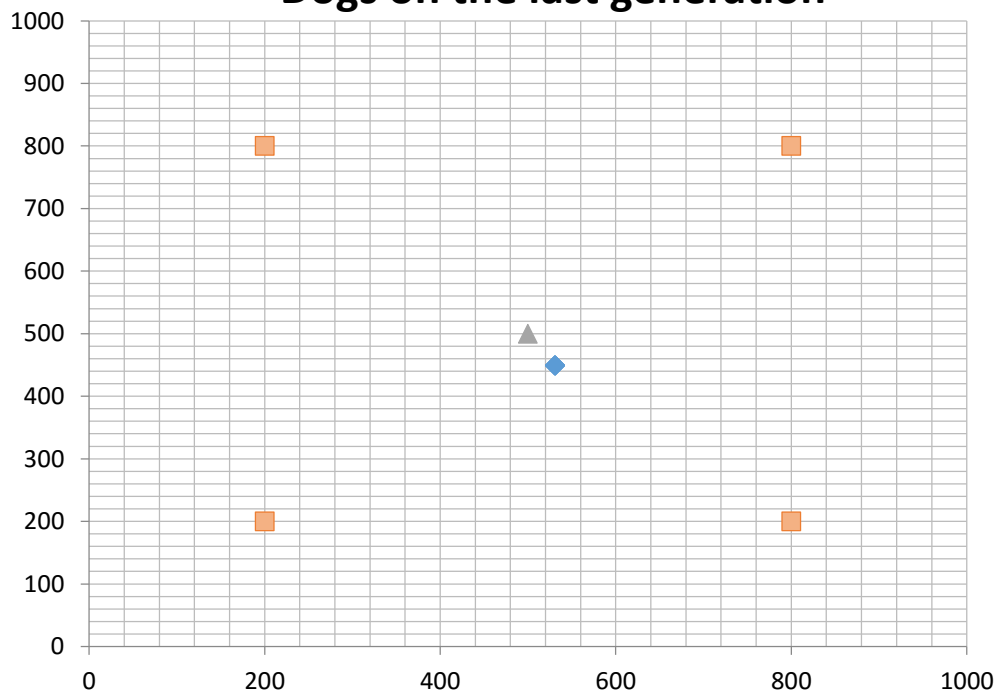
As we see, the fitness graphic doesn't look stable or fit some algorithm. In the end, fitness becomes stable and it is a straight line.



Dogs on intermediate generation 2



Dogs on the last generation



Here are also the tables, which present us original and shared fitness on different iterations.

	Beginning	
Dogs	Original fitness	Shared fitness
#1	50	50
#2	46	46
#3	34	34
#4	30	30
#5	22	22
#6	22	22
#7	22	22
#8	12	12

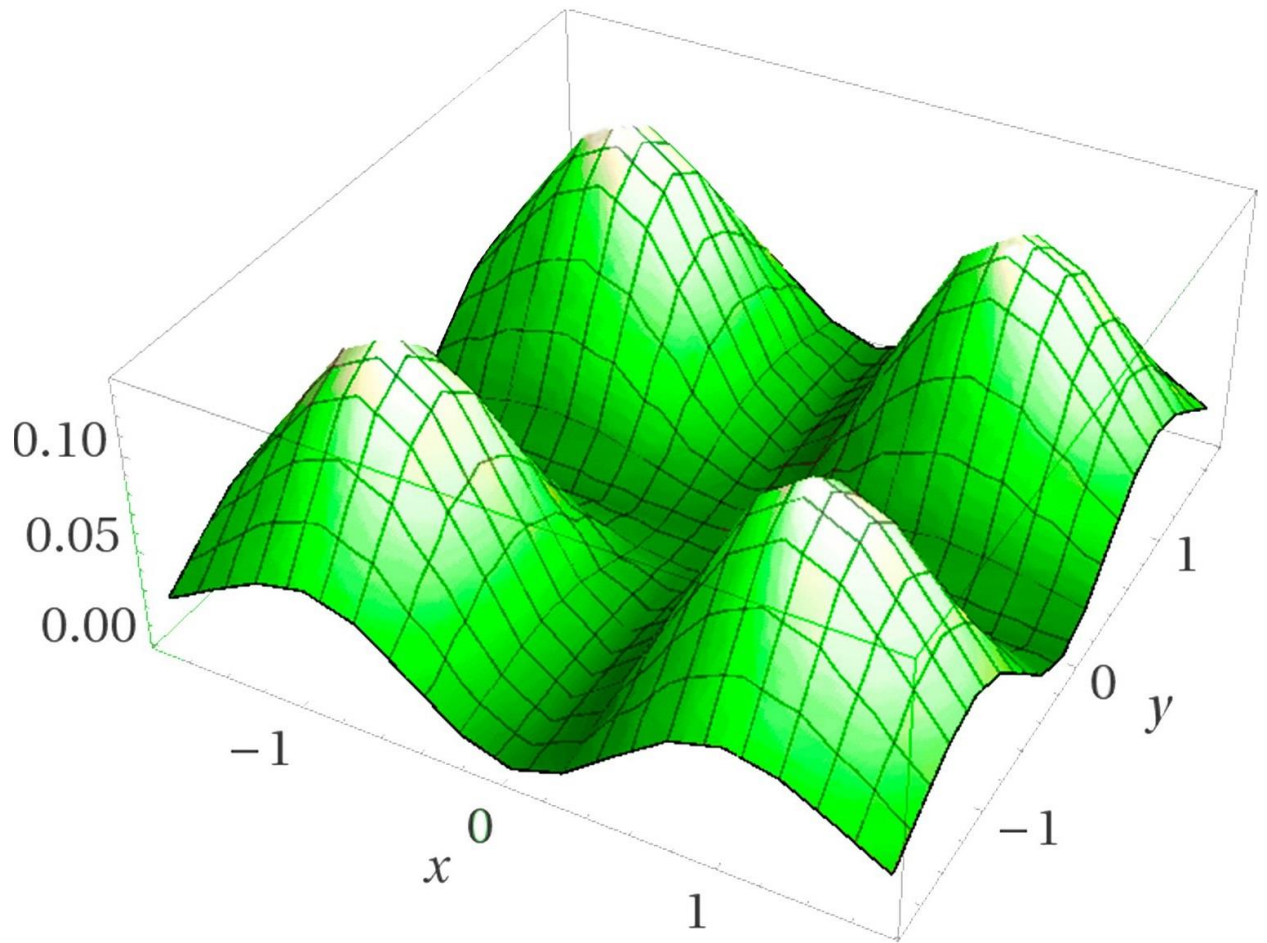
	#5 generation	
Dogs	Original fitness	Shared fitness
#1	66	66
#2	62	62
#3	54	54
#4	66	41,25
#5	64	40
#6	62	20,6667
#7	62	20,6667
#8	62	20,6667

	#15 iteration		Last iteration	
Dogs	Original fitness	Shared fitness	Original fitness	Shared fitness
#1	72	72	82	10,25
#2	66	66	82	10,25
#3	66	66	82	10,25
#4	68	48,5714	82	10,25
#5	74	37	82	10,25
#6	74	37	82	10,25
#7	72	32,7273	82	10,25
#8	72	32,7273	82	10,25

A maximization of 3D function with Crowding Algorithm

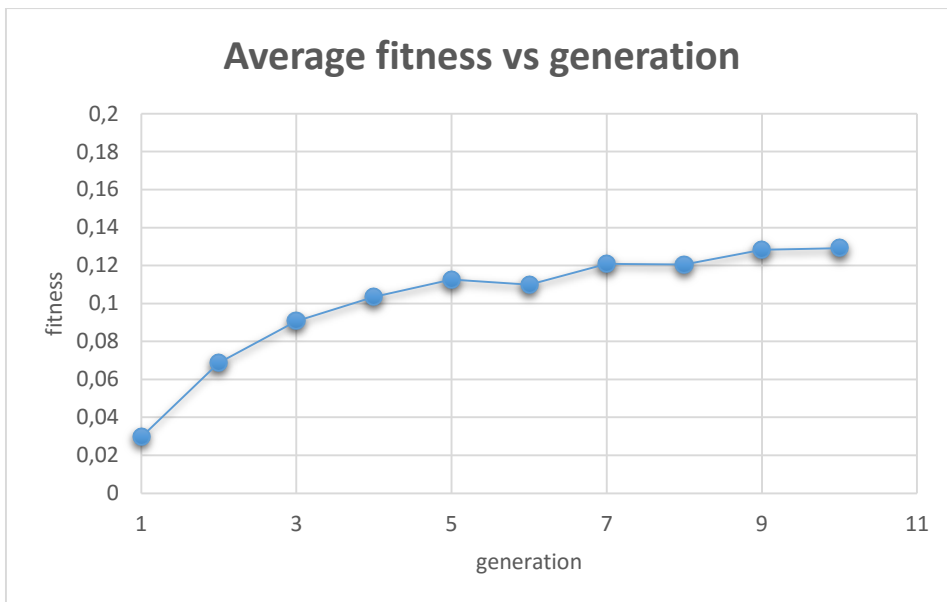
Our goal in this problem is to create a population of 10 binary chromosomes of 22 genes each of which represents one point in $x - y$ plane $-2 \leq x; y \leq 2$, then to build a function

$$z = x^2 * y^2 * e^{-x^2} * e^{-y^2}$$

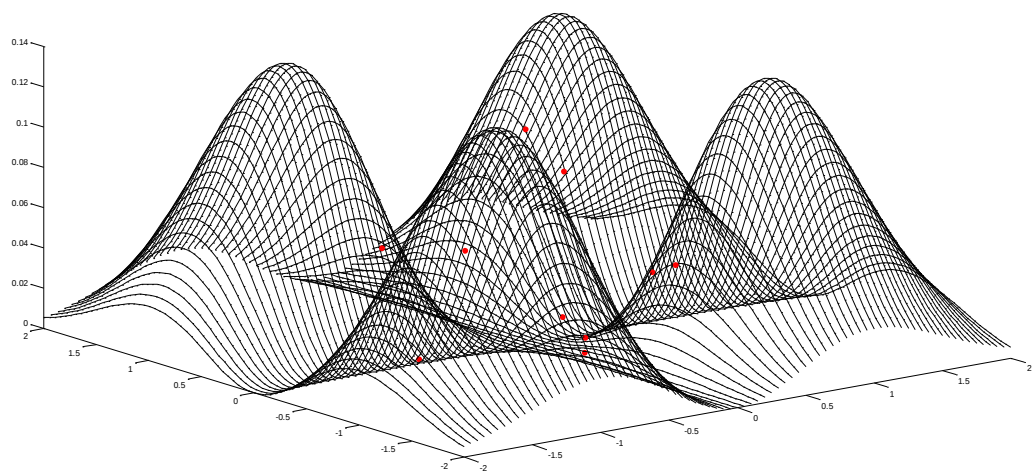


With fitness being value of Z , we should maximize Z applying to Crowding Algorithm.

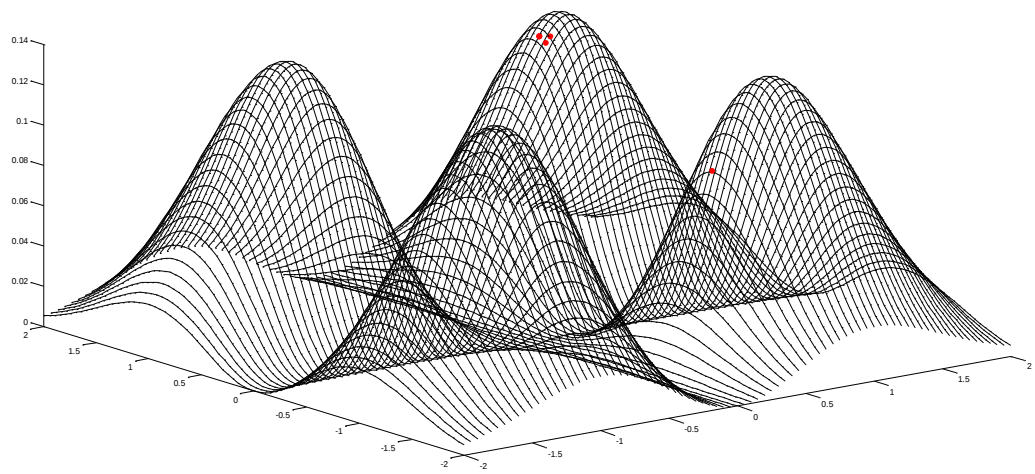
There are presented graphs of Fitness vs Generation and 4 3D graphs including 10 points on different generations.



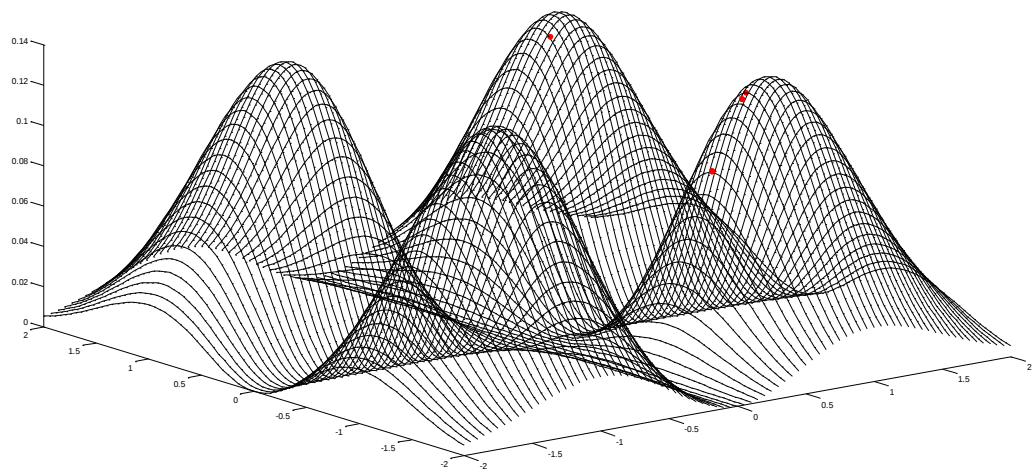
3D Graphic, Beginning



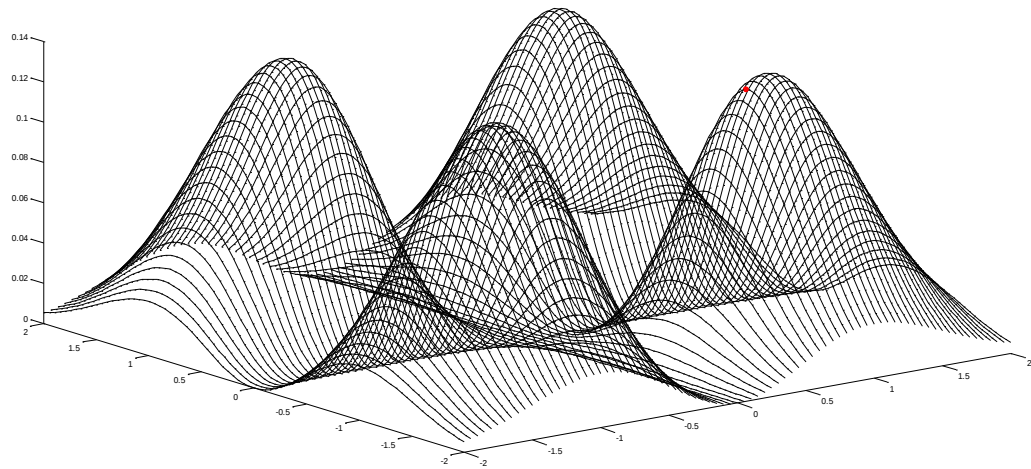
3D Graphic, 5 iteration



3D Graphic, 6 generation



3D Graphic, the end



Tables of first 3 generations. It makes no sense to make all tables, so I'll do only first, intermediate and last one.

Generation 0				
Selected parents & fitness	Created children & fitness	D(p1,c1)+ d(p2,c2)	D(p1,c2)+ d(p2,c1)	New chromosomes
p1: (1100110100111100111101) = (0.6031;0.8104) z=0.0861 p2: (1110100101100101010101) = (0.8240;-0.3333) z=0.0342	c1: (1100110101100101010101) = (0.6051;-0.3333) z=0.0252 c2: (1110100100111100111101) = (0.8221;0.8104) z=0.1171	2.2874	0.4379	1100110100111 100111101 1110100100111 100111101
p1: (1100110100111100111101) = (0.6031;0.8104) z=0.0861 p2: (1110100101100101010101) = (0.8240;-0.3333) z=0.0342	c1: (1100110100111101010101) = (0.6031;0.8338) z=0.0877 c2: (1110100101100100111101) = (0.8240;-0.3099) z=0.0300	0.0469	2.3297	1100110100111 100111101 1100110100111 101010101
p1: (1010010001011111011110) = (0.2835;0.9677) z=0.0272 p2: (1010001111100010111011) = (0.2805;-0.1828) z=0.0024	c1: (1010010001011111011011) = (0.2835;0.9648) z=0.0272 c2: (1010001111100010111110) = (0.2805;-0.1857) z=0.0024	0.0059	2.3011	1010010001011 111011110 1010010001011 111011011
p1: (1100110100100110011010) = (0.6031;-0.4008) z=0.0346 p2: (1010010001011111011110) = (0.2835;0.9677) z=0.0272	c1: (1100110100100111011110) = (0.6031;-0.4673) z=0.0444 c2: (1010010001011110011010) = (0.2835;0.9013) z=0.0267	0.1329	2.8109	1100110100100 110011010 1100110100100 111011110
p1: (1100110100100110011010) = (0.6031;-0.4008) z=0.0346 p2: (1100110100111100111101) = (0.6031;0.8104) z=0.0861	c1: (11001101001001100111101) = (0.6031;-0.3099) z=0.0221 c2: (1100110100111110011010) = (0.6031;0.9013) z=0.0912	0.1818	2.4223	1100110100111 110011010 1100110100111 100111101

Generation 5				
Selected parents & fitness	Created children & fitness	D(p1,c1)+ d(p2,c2)	D(p1,c2)+ d(p2,c1)	New chromosomes
p1: (1110110100111110011010) = (0.8534;0.9013) z=0.1267 p2: (1110110100101111011110) = (0.8534;-0.9677) z=0.1291	c1: (1110110100111111011110) = (0.8534;0.9677) z=0.1291 c2: (1110110100101110011010) = (0.8534;-0.9013) z=0.1267	0.1329	3.7380	1110110100111 110011010 1110110100101 111011110
p1: (1110100100101111011110) = (0.8221;-0.9677) z=0.1262 p2: (1110110100111110011010) = (0.8534;0.9013) z=0.1267	c1: (1110100100111110011010) = (0.8221;0.9013) z=0.1240 c2: (1110110100101111011110) = (0.8534;-0.9677) z=0.1291	3.7380	0.0626	1110100100101 111011110 1110110100101 111011110
p1: (1100110100101111011110) = (0.6031;-0.9677) z=0.0928 p2: (1110110100111110011010) = (0.8534;0.9013) z=0.1267	c1: (1100110100111110011010) = (0.6031;0.9013) z=0.0912 c2: (1110110100101111011110) = (0.8534;-0.9677) z=0.1291	3.7380	0.5005	1100110100101 111011110 1110110100101 111011110
p1: (1100110100101111011110) = (0.6031;-0.9677) z=0.0928 p2: (1110110100111110011010) = (0.8534;0.9013) z=0.1267	c1: (1100110100111110011010) = (0.6031;0.9013) z=0.0912 c2: (1110110100101111011110) = (0.8534;-0.9677) z=0.1291	3.7380	0.5005	1100110100101 111011110 1110110100101 111011110
p1: (1110100100101111011110) = (0.8221;-0.9677) z=0.1262 p2: (1110110100111110011010) = (0.8534;0.9013) z=0.1267	c1: (1110110100111110011010) = (0.8534;0.9013) z=0.1267 c2: (1110100100101111011110) = (0.8221;-0.9677) z=0.1262	3.7385	0.0000	1110110100111 110011010 1110110100111 110011010

Last generation				
Selected parents & fitness	Created children & fitness	D(p1,c1)+ d(p2,c2)	D(p1,c2)+ d(p2,c1)	New chromosomes
p1: (1110110100101111011110) = (0.8534;-0.9677) z=0.1291 p2: (1110110100101111011110) = (0.8534;-0.9677) z=0.1291	c1: (1110110100101111011110) = (0.8534;-0.9677) z=0.1291 c2: (1110110100101111011110) = (0.8534;-0.9677) z=0.1291	0.0000	0.0000	1110110100101 111011110 1110110100101 111011110
p1: (1110110100101111011110) = (0.8534;-0.9677) z=0.1291 p2: (1110110100101111011110) = (0.8534;-0.9677) z=0.1291	c1: (1110110100101111011110) = (0.8534;-0.9677) z=0.1291 c2: (1110110100101111011110) = (0.8534;-0.9677) z=0.1291	0.0000	0.0000	1110110100101 111011110 1110110100101 111011110
p1: (1110110100101111011110) = (0.8534;-0.9677) z=0.1291 p2: (1110110100101111011110) = (0.8534;-0.9677) z=0.1291	c1: (1110110100101111011110) = (0.8534;-0.9677) z=0.1291 c2: (1110110100101111011110) = (0.8534;-0.9677) z=0.1291	0,0000	0.0000	1110110100101 111011110 1110110100101 111011110
p1: (1110110100101111011110) = (0.8534;-0.9677) z=0.1291 p2: (1110110100101111011110) = (0.8534;-0.9677) z=0.1291	c1: (1110110100101111011110) = (0.8534;-0.9677) z=0.1291 c2: (1110110100101111011110) = (0.8534;-0.9677) z=0.1291	0,0078	0.0000	1110110100101 111011110 1110110100101 111011110
p1: (1110110100101111011110) = (0.8534;-0.9677) z=0.1291 p2: (1110110100101111011110) = (0.8534;-0.9677) z=0.1291	c1: (1110110100101111011110) = (0.8534;-0.9677) z=0.1291 c2: (1110110100101111011110) = (0.8534;-0.9677) z=0.1291	0.0000	0.0000	1110110100101 111011110 1110110100101 111011110