Homework 0

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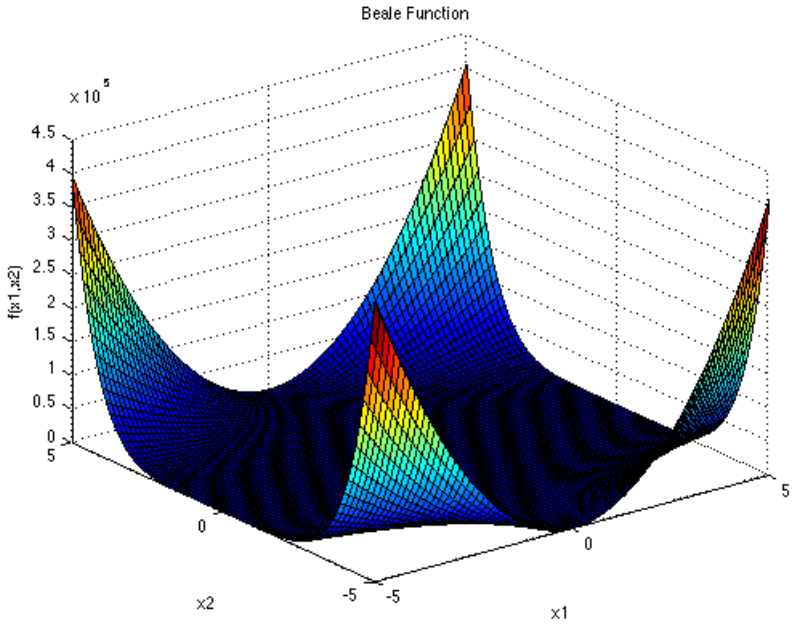
This documentation is about my result on finding the minimum value of any function. I used two methods: heuristic and deterministic. To have a known result I used **Beale** function : $f(x) = (1.5-x_1+x_1x_2)^2+(2.25-x_1+x_1x_2^2)^2+(2.625-x_1+x_1x_2^3)^2$ which has a minimum value of 0 in point $X = (3, 0.5)$. The function can be easily modified by changing the fun() method, the number of components and the intervals.



The algorithm will randomly choose a point X and calculate the function value in that point. To get a good result I'm gonna repeat the process increasing the chance of getting the minimum point with a precision of 0.01. I will put the results in the next table.

	Deterministic	Heuristic
Result	0.656325	0.664847
Point	$(2.12, 7.689e^{-}6)$	$(2.16, 0.09)$
Nr. Rep.	1	1000
Time(milis)	14	3

As you can see, the result between deterministic approach and heuristic is pretty close. Even tho the deterministic algorithm is the best, we got a greater time. More than that, the complexity of the deterministic algorithm is $O(f(X)\prod_{i=1}^{n-1} m_i/\epsilon)$ where n is the dimension of X, m_i is the interval of every component of X, ϵ is the precizion and f(x) is the time for calculating the function. But heuristic algorithm has the time complexity of $O(knf(X))$ where k is a constant and can be ignored. So the heuristic function wins even if it's not the exact result but the time complexity is much better than the deterministic algorithm.

Biblograpy

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