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from __future__ import division
import sys, random, math
import numpy as np
sys.dont_write_bytecode = True
5 # np.random.seed(0)
# random.seed(44)
def generate_x():
    lo = -100
    hi = 100
10 new = lo + (hi-lo)*random.random()
    return new

def cal_schaffer(x):
    f1 = x**2
15 f2 = (x - 2)**2
    return f1+f2

def find_max_min():
    current_min = 1000
    current_max = 0
20 for i in range(100):
    temp = cal_schaffer(generate_x())
    if temp > current_max:
        current_max = temp
25 if temp < current_min:
        current_min = temp
    # print current_max, current_min
    return current_min, current_max

30 def energy(x, min, max):
    e = (cal_schaffer(x)- min) / (max - min)
    # print e
    return e

35 def P(old, new, t):
    x = math.e**((old - new )/t)
    return x

def say(mark):
40 sys.stdout.write(mark)
    sys.stdout.flush()

def my_main():
45 min, max = find_max_min()
    s = generate_x()
    e = energy(s, min, max)
    sb = s
    eb = e
50 k = 1
    kmax = 1000
    # emax = 0.0001
    while k < kmax:
        sn = generate_x()
        en = energy(sn, min, max)
55 if en < eb:
            sb = sn
            eb = en
            say('!')
60 if en < e:
            s = sn
            e = en
            say('+')
        elif P(e, en, k/kmax)< random.random():
65 s = sn
            e = en
            say('?')
            say('.')
            k = k + 1
70 if k % 50 == 0:
            print "\n"
            say(str(sb))
    return sb

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75 if __name__ == "__main__":my_main()

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