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"""
Homework 1

Authored by Rahul
5 Last updated September, 1st 2014
"""

from __future__ import division
import sys, re, random, math, datetime, re, time
10 sys.dont_write_bytecode = True

rand=random.random
randi=random.randint
exp=math.exp

15 class simulatedAnnealing:

    def __init__(self):
        pass

20    def energy(self,x):
        return x**2+(x-2)**2

    def neighbour(self, x, xmin, xmax):
25        x_new=x+xmin+(xmax-xmin)*rand()
        return x_new

    def pAcceptance(self, e, en, t):
        p=exp((e-en)/t)
30        return p

    f=open('output.log','w')
    def say(self,x):
        self.f.write(str(x));
35        sys.stdout.flush()

# Initial temperature

class main:
40
    k=1
    kmax=2000
    emax=40
    xmax=100;
45    xmin=-100;

    sa=simulatedAnnealing()

    # Initial state and energy
50    s=randi(-1000,1000)
    e=sa.energy(s)

    # Initial best state and energy
    sb=s;
55    eb=e;

    sa.say(sb)
    emin=2

60    while (k<kmax ^ eb>emin):
        sn=sa.neighbour(sb,xmax,xmin)
        en=sa.energy(sn)
        t=k/kmax
        #print eb
65        if en<eb:
            sa.say('!!')
            sb=sn
            eb=en

70        if en<e:
            s=sn
            e=en
            sa.say('+' )

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75    elif sa.pAcceptance(e, en, t)>rand():
        s=sn
        e=en
        sa.say('?' )

80    sa.say('.')
    k=k+1
    if k%50==0: sa.say('\n'), sa.say(sb)

    if __name__=='main':
85        main()

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