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from __future__ import division
import sys
import random
import math
5 import numpy as np
sys.dont_write_bytecode = True

sqrt=math.sqrt

10 class ModelBasic():
    def returnMin(self,num):
        if(num<self.minVal):
            self.minVal=num
            return num
15     else:
        return self.minVal

    def returnMax(self,num):
        if(num>self.maxVal):
            self.maxVal=num
            return num
20     else:
        return self.maxVal

25 def evaluate(self,listpoint):
    energy = self.f1(listpoint)+ self.f2(listpoint)
    return (energy-self.minVal)/(self.maxVal-self.minVal)

30 def neighbour(self,minN,maxN):
    return minN + (maxN-minN)*random.random()

class Fonseca(ModelBasic):
35     maxVal=-10000
    minVal=10000

    def __init__(self,minR=-4,maxR=4,n=3):
        self.minR=minR
        self.maxR=maxR
40         self.n=n
        self.minVal=10000000
        self.maxVal=-1e6

45 def f1(self,listpoint):
    n=len(listpoint)
    rootn=(n**0.5)**-1
    sum=0
    for i in range(0,n):
        sum+=(listpoint[i]-rootn)**2
50     return (1 - math.exp(-sum))

    def f2(self,listpoint):
        n=len(listpoint)
        rootn=(n**0.5)**-1
        sum=0
        for i in range(0,n):
            sum+=(listpoint[i]+rootn)**2
55         return (1 - math.exp(-sum))

60 def info(self):
    return "Fonseca~"

    def baseline(self,minR,maxR):
        for x in range(0,50000):
            solution = [(minR + random.random()*(maxR-minR)) for z in range(0,3)]
            self.returnMax(self.f1(solution)+ self.f2(solution))
            self.returnMin(self.f1(solution)+ self.f2(solution))

70 class Kursawe(ModelBasic):
    def __init__(self,minR=-5,maxR=5,n=3):
        self.minR=minR

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        self.maxR=maxR
        self.n=n
        self.minVal=10000000
        self.maxVal=-1e6

75

80 def f1(self,listpoint):
    n=len(listpoint)
    #inspired by 'theisencr'
    return np.sum([-10*math.exp(-0.2*(np.sqrt(listpoint[i]**2 + listpoint[i+1]**
2))) for i in range (0, n-1)])
    return sum

85 def f2(self,listpoint):
    a=0.8
    b=3
    n=len(listpoint)
    #inspired by 'theisencr'
90     return np.sum([math.fabs(listpoint[i])**a + 5*np.sin(listpoint[i])**b for i
in range (0, n)])

    def info(self):
        return "Kursawe~"

95 def baseline(self,minR,maxR):
    for x in range(0,50000):
        solution = [(minR + random.random()*(maxR-minR)) for z in range(0,3)]
        self.returnMax(self.f1(solution)+ self.f2(solution))
        self.returnMin(self.f1(solution)+ self.f2(solution))

100

class ZDT1(ModelBasic):
    maxVal=-10000
    minVal=10000

105 def __init__(self,minR=0,maxR=1,n=30):
    self.minR=minR
    self.maxR=maxR
    self.n=n

110 def f1(self,lst):
    assert(len(lst)==self.n), "Something's Messed up"
    return lst[0]

115 def gx(self,lst):
    n=self.n
    assert(len(lst) == n), "Something's Messed up"
    return (1+ 9*np.sum([lst[i] for i in range(1,n)])/(n-1))

120 def f2(self,lst):
    n=self.n
    assert(len(lst)==n), "Something's Messed up"
    gx=self.gx(lst)
    assert(gx!=0), "Ouch! it hurts"
125     return gx * (1- sqrt(lst[0]/gx))

    def baseline(self,minR=0,maxR=1):
        for x in range(0,90000):
            solution = [(minR + random.random()*(maxR-minR)) for z in range(0,30)]
            self.returnMax(self.f1(solution)+ self.f2(solution))
            self.returnMin(self.f2(solution)+ self.f2(solution))

    def info(self):
        return "ZDT1~"

135

class Schaffer(ModelBasic):

140 def __init__(self,minR=-1e4,maxR=1e4,n=1):
    self.minR=minR
    self.maxR=maxR
    self.n=n
    self.minVal=10000000

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145     self.maxVal=-1e6

    def evaluate(self,listpoint):
        assert(len(listpoint) == 1), "Something's Messed up"
        var=listpoint[0]
150     rawEnergy = (var**2 +(var-2)**2)
        energy = (rawEnergy -self.minVal)/(self.maxVal-self.minVal)
        return energy

155     def info(self):
        return "Schaffer~"

    def baseline(self,minR,maxR):
        low = self.minR
        high = self.maxR
160     for index in range(0,1000000):
        inputRand =(low + (high-low)*random.random())
        #print "inputRand: %s"%inputRand
        temp = (inputRand**2 +(inputRand-2)**2)
165     self.minVal=self.returnMin(temp)
        self.maxVal=self.returnMax(temp)
        print( "Max: %d Min: %d"%(self.maxVal,self.minVal))
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