Test problems in R^n

The test bed for the functions in R^n contains seven functions. These functions will have to be minimized in two versions differing by their number of dimensions.

You will find below for each problem its formula as a .GIF file; the boundaries of the space in wich it will have to be optimized; and the first checkpoints for each of its version.

You can download the ANSI C code of these problems as .tar.gz file , or you can download each problem separately

The Generalized Rosenbrock function

$$f_R(\bar{x}) = \sum_{i=1}^{N-1} (1 - x_i)^2 + 100(x_{i+1} - x_i)^2$$

with,

$-5.12 \leq x_i \leq 5.12$ for $1 \leq i \leq N$

for

N = 5 and *N* = 10

The first checkpoint: for N = 5 1000; for N=10 5000

The Odd Square

$$f_o(x) = e^{-\frac{\|x-A\|^2_\infty}{2\pi}} \cos(\pi \| \bar{x} - A \|^2_\infty)(1 + c_1 \frac{\| \bar{x} - A \|^2}{\| \bar{x} - A \|^2_\infty + 0.01})$$

For the value of A; see the code.

with,

$-5\pi \leq x_i \leq 5\pi$ for $1 \leq i \leq N$

for

N = 5 and *N* = 10

The first checkpoint: for N = 5 1000; for N=10 5000

The modified Langerman function

$$f_L(\bar{x}) = -\sum_{i=1}^{m} c_i (e^{-\frac{1}{\pi}\|x-A(i)\|^2} \cos(\pi . \| \bar{x} - A(i) \|^2))$$

with,

m = 15 , $0 \leq x_i \leq 10$ for $1 \leq i \leq N$

For the value of the A(i), see the code.

for

N = 5 and *N* = 10

The first checkpoint: for N = 5 650; for N=10 3750

Modified Shekel''s foxehole

$$f_S(\bar{x}) = -\sum_{i=1}^{m} \frac{1}{\| \bar{x} - A(i) \|^2}$$

m = 30 , $0 \le x_i \le 10$ for $1 \le i \le N$

for

N = 5 and N = 10

The first checkpoint: for N = 5 4000; for N=10 16000

Epistatic Michalewicz

For clarity, let's define $\bar{y}$ as:

$y_i = x_i cos\frac{\pi}{6} - x_{i+1} sin\frac{\pi}{6}$ if $i \bmod 2 = 1$

$y_i = x_{-1} sin\frac{\pi}{6} + x_i cos\frac{\pi}{6}$ if $i \bmod 2 = 0$ and $i \neq N$

$y_N = x_N$

$$f_m(\bar{x}) = -\sum_{i=1}^{N} sin(y_i) sin^{2m}(\frac{iy_i^2}{\pi})$$

m = 10 , $0 \le x_i \le \pi$ for $1 \le i \le N$

The first checkpoint: for N = 5 312; for N=10 1250

Chebychev polynomials

No formula: see the code.

with,

N = 9, $-512 \le x_i \le 512$ for $1 \le i \le N$

and

N = 17, $-32768 \le x_i \le 32768$ for $1 \le i \le N$

The first checkpoint: for N = 9 1500; for N=17 10000

Value To Reach: 1E-07

The Bump function

$$f_B(\bar{x}) = | \frac{\sum_{i=1}^{N} \cos^4(x_i) - 2 \prod_{i=1}^{N} \cos^2(x_i)}{\sqrt{\sum_{i=1}^{N} i x_i^2}} |$$

subject to

$\prod_{i=1}^{N} x_i \ge 0.75$, $\sum_{i=1}^{N} x_i \le 7.5N$, $0 \le x_i \le 10$, N = 10, N=20

The first checkpoint: for N = 10 1000; for N=20 7500

About this document ...

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