Virtual Library of Simulation Experiments:

Test Functions and Datasets

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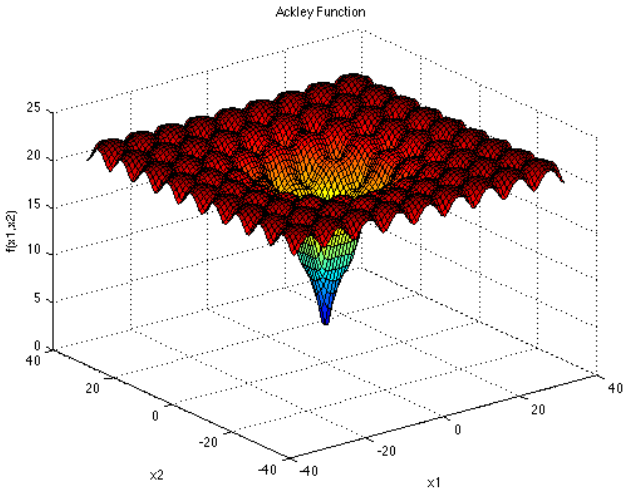
ACKLEY FUNCTION



$$f(\mathbf{x}) = -a\exp\left(-b\sqrt{\frac{1}{d}\sum_{i=1}^{d}x_i^2}\right) - \exp\left(\frac{1}{d}\sum_{i=1}^{d}\cos(cx_i)\right) + a + \exp(1)$$

Description:

Dimensions: d

The Ackley function is widely used for testing optimization algorithms. In its two-dimensional form, as shown in the plot above, it is characterized by a nearly flat outer region, and a large hole at the centre. The function poses a risk for optimization algorithms, particularly hillclimbing algorithms, to be trapped in one of its many local minima.

Recommended variable values are: a = 20, b = 0.2 and c = 2π.

Input Domain:

The function is usually evaluated on the hypercube $x_i \in$ [-32.768, 32.768], for all i = 1, …, d, although it may also be restricted to a smaller domain.

Global Minimum:

$f(\mathbf{x}^*) = 0$, at $\mathbf{x}^* = (0, \ldots, 0)$

Code:

MATLAB Implementation

R Implementation

References:

Adorio, E. P., & Diliman, U. P. MVF - Multivariate Test Functions Library in C for Unconstrained Global Optimization (2005). Retrieved June 2013, from http://http://www.geocities.ws/eadorio/mvf.pdf.

Molga, M., & Smutnicki, C. Test functions for optimization needs (2005). Retrieved June 2013, from http://www.zsd.ict.pwr.wroc.pl/files/docs/functions.pdf.

Back, T. (1996). *Evolutionary algorithms in theory and practice: evolution strategies, evolutionary programming, genetic algorithms*. Oxford University Press on Demand.

For questions or comments, please email Derek Bingham at: dbingham@stat.sfu.ca.

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Authors: Sonja Surjanovic & Derek Bingham, Simon Fraser University