

Rosenbrock function

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1 Introduction

In mathematical optimization, the Rosenbrock function is a non-convex function, introduced by Howard H. Rosenbrock in 1960, which is used as a performance test problem for optimization algorithms. It is also known as Rosenbrock's valley or Rosenbrock's banana function.

The global minimum is inside a long, narrow, parabolic shaped flat valley. To find the valley is trivial. To converge to the global minimum, however, is difficult.

The function is defined as $f(x, y) = (ax)^2 + b(yx^2)^2$

In this formula, the parameters a and b are constants and are generally set to a=1 and b=100.

2 Description and Features

- The function is continuous.
- The function is convex.
- The function is defined on n-dimensional space.
- The function is multimodal.
- The function is differentiable.
- The function is non-separable.

3 Input Domain

The function can be defined on any input domain but it is usually evaluated on $x_i \in [-5, 10]$ in $i = 1, \dots, n$

4 Global Minima

The function has one global minimum $f(\mathbf{x}^*) = 0$ at $\mathbf{x}^* = (1, \dots, 1)$

5 Link to Code

<https://colab.research.google.com/drive/1shpU1bih-1f9v7In80sLNMzZa6Xin5V>

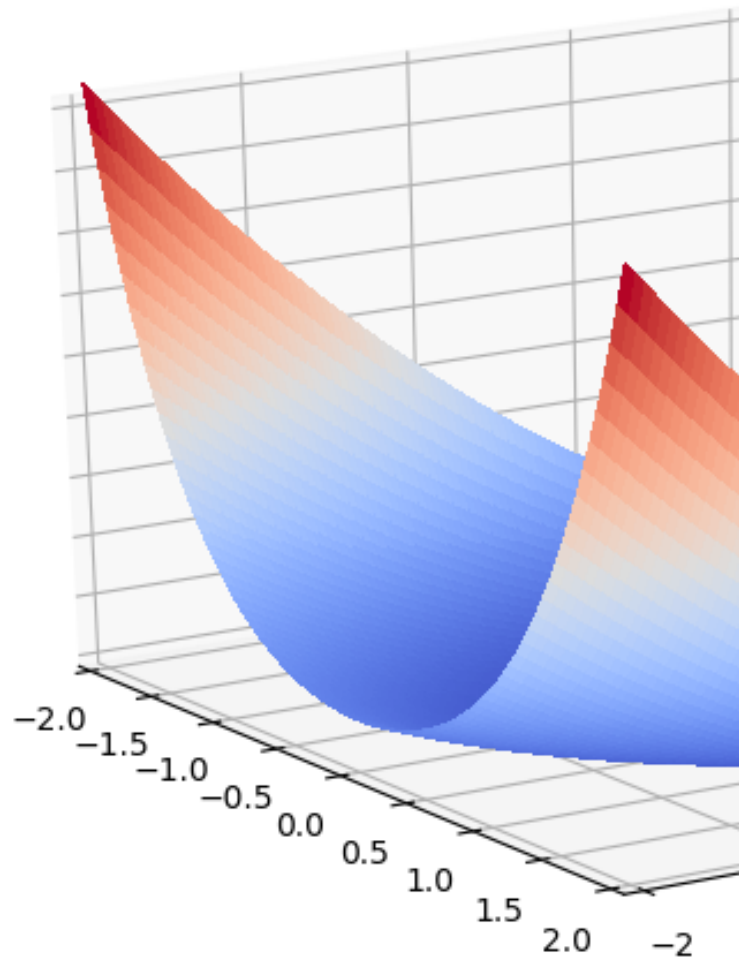


Figure 1: Resembrock Field

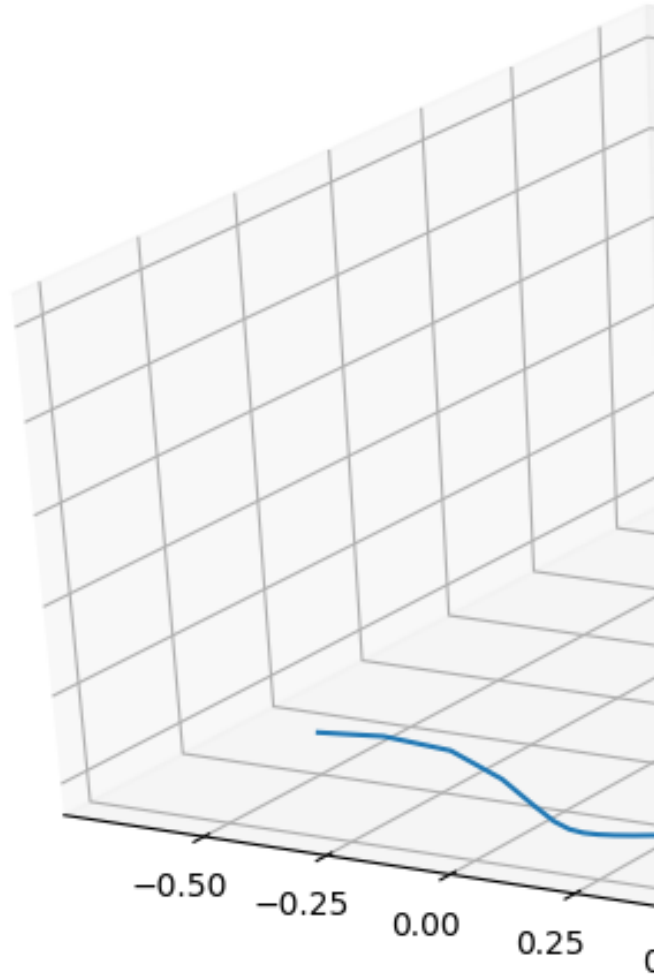


Figure 2: Divergence of Resembrock function