Punto 1_Funciones

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- La funcion de Rosenbrock esta definida como

$$F(x) = \sum_{i=1}^{n-1} 100(x_{i+1} - x_i^2)^2 + (1 - x_i)^2, \; con \; x = x_i, \ldots, x_n$$

2D) $n = 2$

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

$$= 100(x_2 - x_1^2)^2 + (1 - x_1)^2$$

Si $x_1 = x$ y $x_2 = y$

$$f(x,y) = 100(y - x^2)^2 + (1 - x)^2$$

Derivamos parcialmente

$$\frac{\partial}{\partial x} = 200(y - x^2)(-2x) + 2(1 - x)(-1)$$

$$\frac{\partial}{\partial y} = 200(y - x)$$

3D) $n = 3$

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

$$= 100(x_2 - x_1^2)^2 + (1 - x_1)^2 + 100(x_3 - x_2^2)^2 + (1 - x_2)^2$$

Si $x_1, x_2, x_3 = x, y, z$

$$f(x,y,z) = 100(y - x^2)^2 + (1 - x)^2 + 100(z - y^2)^2 + (1 - y)^2$$

Derivamos parcialmente

$$\frac{\partial}{\partial x} = 200(y - x^2)(-2x) + 2(1 - x)(-1)$$

$$\frac{\partial}{\partial y} = 200(y - x^2) + 200(z - y^2)(-2y) + 2(1 - y)(-1)$$

$$\frac{\partial}{\partial z} = 200(z - y^2)$$

- la funcion de Rastrigin es definidad como

$$F(x) = An + \sum_{i=1}^{n} x_i^2 - Acos(2x_i\pi), \; con \; A = 10, \; x_i \in [-5.12, 5.12]$$

2D) $n = 2$ y $A = 10$

$$F(x) = 20 + \sum_{i=1}^{2} x_i^2 - 10\cos(2x_i\pi)$$

$$= 20 + x_1^2 - 10\cos(2x_1\pi) + x_2^2 - 10\cos(2\pi x_2)$$

Si $x_1, x_2 = x, y$

$$F(x,y) = 20 + x^2 - 10\cos(2x\pi) + y^2 - 10\cos(2\pi y)$$

Derivamos parcialmente

$$\frac{\partial}{\partial x} = 2x - 10\cos(2x\pi)(2\pi)$$

$$\frac{\partial}{\partial y} = 2y - 10\cos(2\pi y)(2\pi)$$

3D) $n=3$, $A=10$

$$F(x) = 30 + \sum_{i=1}^{3} x_i^2 - 10\cos(2x_i\pi)$$

$$= 30 + x_1^2 - 10\cos(2x_1\pi) + x_2^2 - 10\cos(2\pi x_2) + x_3^2 - 10\cos(2x_3\pi)$$

Remplazamos x_1, x_2, x_3 por x, y, z

$$f(x,y,z) = 30 + x^2 - 10\cos(x2\pi) + y^2 - 10\cos(2\pi y) + z^2 - 10\cos(2z\pi)$$

Derivar parcialmente

$$\frac{\partial}{\partial x} = 2x - 10\cos(2\pi x)(2\pi) \quad ; \quad \frac{\partial}{\partial y} = 2y - 10\cos(2\pi y)(2\pi)$$

$$\frac{\partial}{\partial z} = 2z - 10\cos(2\pi x)(2\pi)$$