

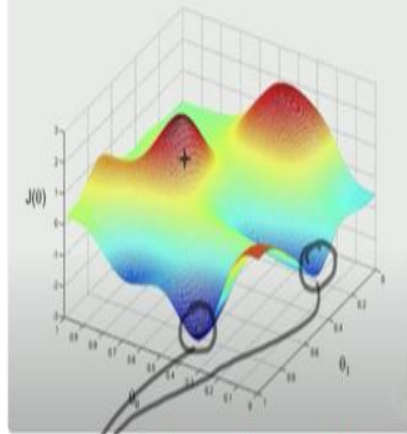


United States



 CERN: Summer

## Gradient Descent



- Start at some point
- Take 360° look & figure out which direction baby step leads to lowest value
- Repeat

→ here  $\theta_2$  is not included to make a 3-D diagram

Lowest point

\* Slope  $\Rightarrow$  Give rate of change  
Derivative  $\Rightarrow$  Slope  
- Derivative  $\Rightarrow$  -ve slope which means the rate of lowest descent.

$a = b$   
 $\hookrightarrow$  expression  
 $a := a + 1$   
 $\hookrightarrow$  assignment

Ex:- if  $f(x, y) \rightarrow$  here unlike slope the function doesn't change in one direction like the above fig. We use gradient instead of slope (a vector that points in the direction of greatest rate of increase of the function)

$$\nabla f = \left( \frac{\partial f}{\partial x}, \frac{\partial f}{\partial y} \right)$$

If the gradient vector at  $(2, 3)$  is  $\nabla f = (4, 5)$ , it means:

- Moving in the direction where  $x$  increases by 4 units and  $y$  increases by 5 units will make you climb the hill the fastest.

$$x := x - \alpha \frac{\partial J(\theta)}{\partial x} \quad \text{Gradient descent step}$$

JPMORGAN CHASE & CO.

---



Inspiring and empowering  
future professionals

# Goutham N

## Software Engineering Job Simulation

### Certificate of Completion

October 6th, 2023

---

Over the period of October 2023, Goutham N has completed practical tasks in:

Interface with a stock price data feed  
Use JPMorgan Chase & Co. frameworks and tools  
Display data visually for traders  
Bonus task: Open source contribution