Nesterov Accelerated Gradient (NAG)

Nesterov Accelerated Gradient - Coding Ninjas

https://www.codingninjas.com/studio/library/nesterov-accelerated-gradient

Let's break down the intuition behind Nesterov Accelerated Gradient (NAG) in a simpler way:

1. **Momentum's Boost:**
   - Imagine the optimization process as a ball rolling down a hill (representing the cost function).
   - Momentum helps the ball gather speed as it moves down the hill, preventing it from getting stuck in shallow areas or oscillating in narrow valleys.
2. **Anticipatory Lookahead:**
   - NAG goes a step further by looking ahead before updating the position of the ball.
   - Instead of blindly evaluating the gradient at the current position, it considers where momentum would take the ball in the next step.
   - It adjusts the current gradient based on the anticipated future position.
3. **Smarter Updates:**
   - NAG calculates the gradient not just at the current point but also considers the momentum's influence on the next step.
   - This anticipatory adjustment helps the optimization process make more informed and accurate updates to the ball's position.
4. **Faster Convergence:**
   - By considering the future position before making updates, NAG can navigate the cost function more efficiently.
   - This helps the optimization process converge faster, especially in situations where the cost function has complex and elongated valleys.

In essence, Nesterov Accelerated Gradient is like a skilled hiker anticipating the terrain ahead and adjusting their steps accordingly, rather than blindly following the gradient at their current location. This foresight helps navigate the optimization landscape more effectively, resulting in quicker convergence during the training of neural networks.

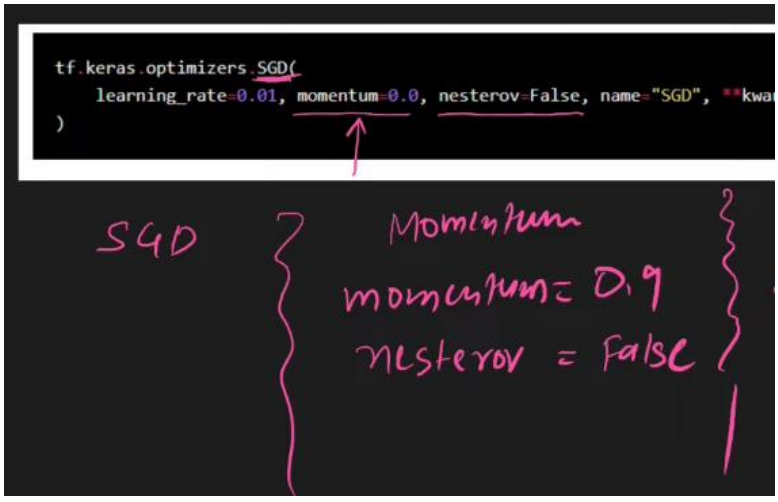
Disadvantages of NAG

1.) NAG jo hai Momentum ke Oscillations ko Dampin kardeta hai
2.) Becoz of This it can happen Like , we can get trapped in Local Minima, So this is 1 Potential Problem

Keras Implementation of Momentum & NAG

For SGD->

For SGD with Momentum->



For NAG →