Backward Difference Method

Theory:

The Backward Difference Method is used when the derivative is required near the end of the data table. Instead of using future values, it approximates the derivative using the current point and the previous data point.

For equally spaced data with spacing h, the backward difference approximation of the first derivative is given by:

$$\left(\frac{dy}{dx}\right)_x \approx \frac{y(x) - y(x-h)}{h}$$

In finite difference notation, this is written as:

$$\frac{dy}{dx} \approx \frac{\nabla y_n}{h}$$

where ∇y_n denotes the backward difference.

The backward difference method is structurally similar to the forward difference method but is applied in the opposite direction. When comparing forward and backward difference methods, both require equally spaced data and provide comparable accuracy. The choice between them depends mainly on the location of the point at which the derivative is to be computed.