Forward and Backpropagation Calculation

Step 1: Forward Propagation

1. Compute Hidden Layer Input:

   z1 = (0.05 * 0.15) + (0.10 * 0.20) + 0.35 = 0.3775

   z2 = (0.05 * 0.25) + (0.10 * 0.30) + 0.35 = 0.3925

2. Compute Hidden Layer Output (Sigmoid):

   h1 = 1 / (1 + e^(-0.3775)) = 0.59327

   h2 = 1 / (1 + e^(-0.3925)) = 0.59688

3. Compute Output Layer Input:

   o1 = (0.59327 * 0.40) + (0.59688 * 0.45) + 0.60 = 1.106

   o2 = (0.59327 * 0.50) + (0.59688 * 0.55) + 0.60 = 1.225

4. Compute Output Layer Output (Sigmoid):

   y1' = 1 / (1 + e^(-1.106)) = 0.75136

   y2' = 1 / (1 + e^(-1.225)) = 0.77292

Step 2: Compute Error

   Error1 = 0.5 * (0.01 - 0.75136)^2 = 0.2748

   Error2 = 0.5 * (0.99 - 0.77292)^2 = 0.0235

   Total Error = 0.2983

Step 3: Backpropagation

1. Compute Output Layer Gradients:

delta_o1 = (0.75136 - 0.01) * (0.75136 * (1 - 0.75136)) = 0.1384

delta_o2 = (0.77292 - 0.99) * (0.77292 * (1 - 0.77292)) = -0.0378

2. Compute Hidden Layer Gradients:

delta_h1 = ((0.1384 * 0.40) + (-0.0378 * 0.50)) * (0.59327 * (1 - 0.59327)) = 0.00884

delta_h2 = ((0.1384 * 0.45) + (-0.0378 * 0.55)) * (0.59688 * (1 - 0.59688)) = 0.00998

3. Update Weights:

w_h1 = w_h1 - alpha * delta_o1 * h1

w_h2 = w_h2 - alpha * delta_o2 * h1

w_11 = w_11 - alpha * delta_h1 * x_1

Repeat until the error is minimized.