ANN Assignment

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CSE-B

4.1) Predict quality level class (3 to 8) of red wine using a ANN model with one hidden layer and number of hidden neurons is equal to 1.5 times of number of input neurons. Use the back propagation algorithm with Ada Delta optimizer.

Solution:

Version 1

Step-1 (x, y), $\eta = 0.1$, $m = 1$, $c = -1$.

epoch = 1, $Gm^2 = Gc^2 = 0$, $w = 3$

Version-2

Step-1

Read (x, y), $\eta = 0.1$, $\gamma = 0.9$, $m = 1$

$c = -1$, epochs = 1.

$Em^2 = Ec^2 = 0$, $\Delta m = \Delta c = 0$,

$E_{\Delta}m^2 = E_{\Delta}c^2 = 0$.

Step-2 : iter = 1

Step-3 : Sample 1

Step-4 $g_m = -(-y_i^a - mx_i^a - c)x_i^a$

$g_c = -(y_i^a - mx_i^a - c)$

Step-5 $E_m^2 = \gamma E_m^2 + (1-\gamma) g_m^2$

$E_c^2 = \gamma E_c^2 + (1-\gamma)(g_c)^2$

$E_{\Delta m}^2 = \gamma E_{\Delta m}^2 + (1-\gamma)[\Delta m]^2$

$E_{\Delta c}^2 = \gamma E_{\Delta c}^2 + (1-\gamma)[\Delta c]^2$

Step-6 $\Delta m = \frac{-\eta \sqrt{E_{\Delta m}^2 + \varepsilon}}{\sqrt{E_m^2 + \varepsilon}} g_m$

$\Delta c = \frac{-\eta \sqrt{E_{\Delta c}^2 + \varepsilon}}{\sqrt{E_{\Delta c}^2 + \varepsilon}} g_m$

$m = m + \Delta m$

$c = c + \Delta c$

$m - \frac{\eta \sqrt{E_{\Delta m}^2 + \varepsilon}}{\sqrt{E_{\Delta m}^2 + \varepsilon}}$

Step-7: Sample = sample + 1

if (sample $\leq n_s$)

Repeat step 4

else goto next step

Step-8: iter = iter + 1

if (iter ≤ epoh) → step 3

else goto next step

Step-9: m, c MSE, RMSE etc.