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CS478 : Brother Christophe

Sep 25, 2013

**A. Consider the following simple dataset.**

| **A** | **B** | **T** |
| --- | --- | --- |
| 1 | 0 | 1 |
| 0 | 1 | 0 |

**Show your results in the form of a table as we did in class.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | W(A-h) | W(B-h) | W(h-T) | h | t | Target t | E(t) | dW(h-t) | E(h) | dW(A-h) | dW(B-h) | C |
| Init |  | 0.100000 | 0.100000 | 0.100000 |  |  |  |  |  |  |  |  | 0.3000 |
| 1.000000 | 0.000000 | 0.100000 | 0.100000 | 0.100000 | 0.524979 | 0.513121 | 1.000000 | 0.12164 | 0.01916 | 0.00303 | 0.00091 | 0.00000 |  |
| Update Weights | | 0.100910 | 0.100000 | 0.119157 |  |  |  |  |  |  |  |  |  |
| 0.000000 | 1.000000 | 0.100910 | 0.100000 | 0.119157 | 0.524979 | 0.515634 | 0.000000 | -0.12878 | -0.02028 | -0.00383 | 0.00000 | -0.00115 |  |
| Update Weights | | 0.100910 | 0.098852 | 0.098874 |  |  |  |  |  |  |  |  |  |
| 1.000000 | 0.000000 | 0.100910 | 0.098852 | 0.098874 | 0.525206 | 0.512979 | 1.000000 | 0.12167 | 0.01917 | 0.00300 | 0.00090 | 0.00000 |  |
| Update Weights | | 0.101810 | 0.098852 | 0.118045 |  |  |  |  |  |  |  |  |  |
| 0.000000 | 1.000000 | 0.101810 | 0.098852 | 0.118045 | 0.524693 | 0.515479 | 0.000000 | -0.12875 | -0.02027 | -0.00379 | 0.00000 | -0.00114 |  |
| Update Weights | | 0.101810 | 0.097715 | 0.097780 |  |  |  |  |  |  |  |  |  |
| 1.000000 | 0.000000 | 0.101810 | 0.097715 | 0.097780 | 0.525431 | 0.512841 | 1.000000 | 0.12171 | 0.01918 | 0.00297 | 0.00089 | 0.00000 |  |
| Update Weights | | 0.102700 | 0.097715 | 0.116965 |  |  |  |  |  |  |  |  |  |
| 0.000000 | 1.000000 | 0.102700 | 0.097715 | 0.116965 | 0.524409 | 0.515330 | 0.000000 | -0.12871 | -0.02025 | -0.00375 | 0.00000 | -0.00113 |  |

**B. Assume that the units of a neural network are modified so they compute the squashing function tanh (instead of the sigmoid function). What is the resulting backpropagation weight update rule for the output layer? (Note, tanh’(x) = 1 –  (x)).**