Christopher Morgan

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 |  | 0.1000 | 0.1000 | 0.1000 |  |  |  |  |  |  |  |  | 0.3000 |
| 1.0000 | 0.0000 | 0.1000 | 0.1000 | 0.1000 | 0.5250 | 0.5131 | 1.0000 | 0.1216 | 0.0192 | 0.0030 | 0.0009 | 0.0000 |  |
| Update Weights | | 0.1009 | 0.1000 | 0.1192 |  |  |  |  |  |  |  |  |  |
| 0.0000 | 1.0000 | 0.1009 | 0.1000 | 0.1192 | 0.5250 | 0.5156 | 0.0000 | -0.1288 | -0.0203 | -0.0038 | 0.0000 | -0.0011 |  |
| Update Weights | | 0.1009 | 0.0989 | 0.0989 |  |  |  |  |  |  |  |  |  |
| 1.0000 | 0.0000 | 0.1009 | 0.0989 | 0.0989 | 0.5252 | 0.5130 | 1.0000 | 0.1217 | 0.0192 | 0.0030 | 0.0009 | 0.0000 |  |
| Update Weights | | 0.1018 | 0.0989 | 0.1180 |  |  |  |  |  |  |  |  |  |
| 0.0000 | 1.0000 | 0.1018 | 0.0989 | 0.1180 | 0.5247 | 0.5155 | 0.0000 | -0.1287 | -0.0203 | -0.0038 | 0.0000 | -0.0011 |  |
| Update Weights | | 0.1018 | 0.0977 | 0.0978 |  |  |  |  |  |  |  |  |  |
| 1.0000 | 0.0000 | 0.1018 | 0.0977 | 0.0978 | 0.5254 | 0.5128 | 1.0000 | 0.1217 | 0.0192 | 0.0030 | 0.0009 | 0.0000 |  |
| Update Weights | | 0.1027 | 0.0977 | 0.1170 |  |  |  |  |  |  |  |  |  |
| 0.0000 | 1.0000 | 0.1027 | 0.0977 | 0.1170 | 0.5244 | 0.5153 | 0.0000 | -0.1287 | -0.0202 | -0.0038 | 0.0000 | -0.0011 |  |

**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 – tanh2(x)).**