Interaction Between Variables

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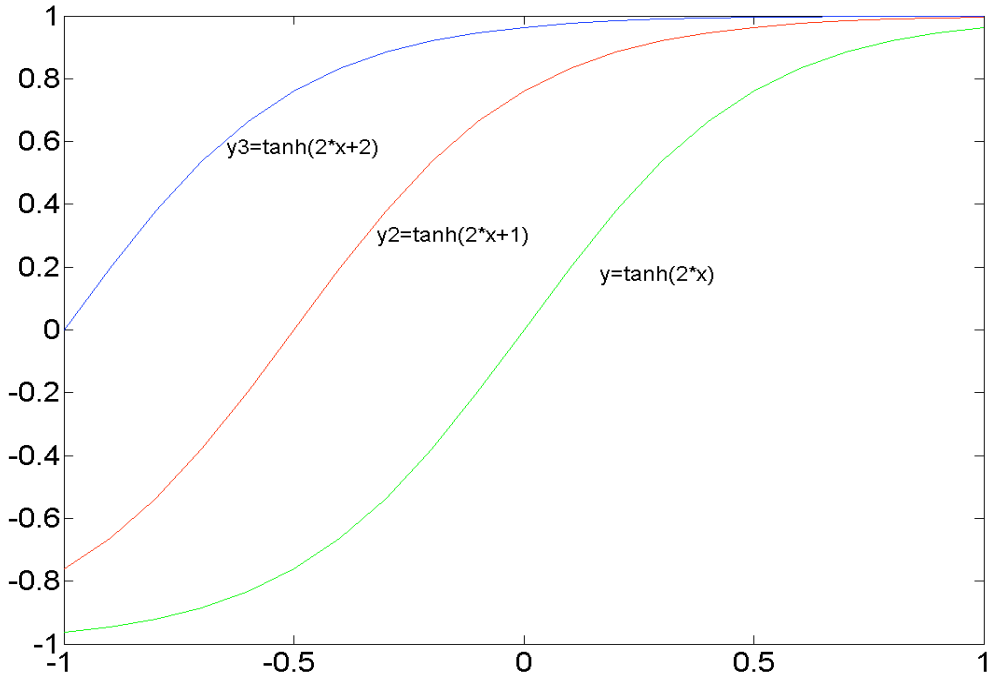
This is to illustrate how, in a non-linear function of the kind used in a neural network, interactions between the inputs are captured. Several hyperbolic tangent functions are presented, each with a different value of x_1 – the diagram shows that changing this gives, in each case, a different dependence of the output on x_2.

Find the shape of $\tanh(w_1^{(1)}x_1 + w_2^{(2)}x_2 + \theta)$.

For simplicity, let $w_1 = 1,\ w_2 = 2,\ \theta = 0$

1) $y_2 = \tanh(1\times 1 + 2x_2 + 0) = \tanh(2x_2 + 1)$
2) $y_3 = \tanh(1\times 2 + 2x_2 + 0) = \tanh(2x_2 + 2)$



* The picture was drawn with the help of Guo Lei.