Examples and Intuitions I

A simple example of applying neural networks is by predicting x_1 AND x_2, which is the logical 'and' operator and is only true if both x_1 and x_2 are 1.

The graph of our functions will look like:

$$\begin{bmatrix} x_0 \\ x_1 \\ x_2 \end{bmatrix} \rightarrow \left[g(z^{(2)}) \right] \rightarrow h_\Theta(x)$$

Remember that x_0 is our bias variable and is always 1.

Let's set our first theta matrix as:

$$\Theta^{(1)} = \begin{bmatrix} -30 & 20 & 20 \end{bmatrix}$$

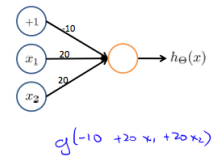
This will cause the output of our hypothesis to only be positive if both x_1 and x_2 are 1. In other words:

$$h_\Theta(x) = g(-30 + 20x_1 + 20x_2)$$

$x_1 = 0 \ \ and \ \ x_2 = 0 \ \ then \ \ g(-30) \approx 0$
$x_1 = 0 \ \ and \ \ x_2 = 1 \ \ then \ \ g(-10) \approx 0$
$x_1 = 1 \ \ and \ \ x_2 = 0 \ \ then \ \ g(-10) \approx 0$
$x_1 = 1 \ \ and \ \ x_2 = 1 \ \ then \ \ g(10) \approx 1$

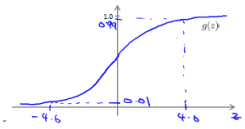
actual AND gate. Neural networks can also be used to simulate all the other logical gates. The following is an example of the logical operator 'OR', meaning either x_1 is true or x_2 is true, or both:

Example: OR function



x_1	x_2	$h_\Theta(x)$
0	0	g(-10) ≈ 0
0	1	g(10) ≈ 1
1	0	≈ 1
1	1	≈ 1

Where g(z) is the following:



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