CS231n- Lecture 3

February 21, 2017

1 Optimization

1.1 Computational Graph

We need to see computational graph. It's huge in Convolutional Neural Networks and Neural Turing Machine.
$f(x, y, z) = (x + y)z$
e.g x=-2, y=5, z=-4
$q = x + y$
$\frac{\partial q}{\partial x} = 1$
$\frac{\partial q}{\partial y} = 1$ $f = qz$
$\frac{\partial f}{\partial q} = z$
$\frac{\partial f}{\partial z} = q$

We made a forward pass, now we'll make a backward one $\frac{\partial f}{\partial f} = 1$
$\frac{\partial f}{\partial z} = x + y = 3$
The influence of z on f is three times in positive magnitude
$\frac{\partial f}{\partial q} = z = -4$
if q increases by h, then f decreases by 4 times that magnitude $\frac{\partial f}{\partial y} = \frac{\partial f}{\partial q}\frac{\partial q}{\partial y} = -4 * 1 = -4$
Similarly, $\frac{\partial f}{\partial x} = -4$
Example: $f(w, x) = \frac{1}{1+e^{(-(w_0x_0+w_1x_1+w_2))}}$ $f(x) = e^x$

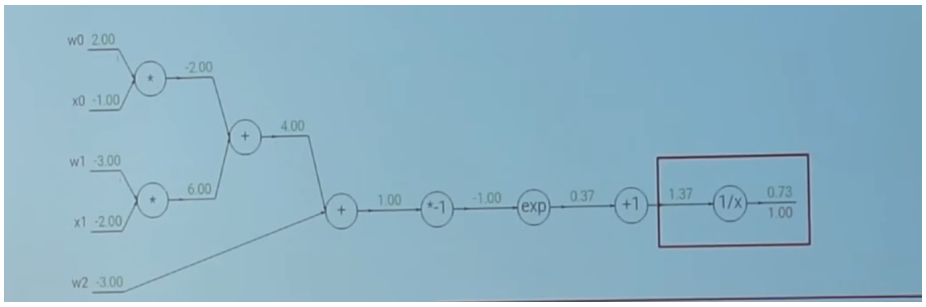

Figure 1: The Computational Graph