

Sigmoid

$$f(x) = \frac{1}{1 + e^{-x}}$$

For $x > 0$, e^{-x} is always less than 1.

$$g(x) = \frac{1}{1 + x}$$

For $x < 1$ the this term has an expansion which follows like this.

$$\frac{1}{1 + x} = 1 - x + x^2 - x^3 + \dots$$

$$\frac{1}{1 + e^{-x}} = 1 - e^{-x} + e^{-2x} - e^{-3x} + \dots$$

$$= 1 - e^{-x}(1 - e^{-x}(1 - e^{-x}(1 - \dots)))$$

You just have to calculate the e^{-x} once instead of division or other operators. Every other old paper has abt 5 – 10% error in calculating the sigmoid value. This I believe will be far more accurate.

$e^{-x} = 2^{-x \log_2 e}$ We can get this approximation for the e^{-x} instead of doing piecewise linear approximation with a very bad error rate.