- To translate the fn into a NN: $\sum$ weights +1, -1
- To translate the score $\in (-\infty, +\infty)$ into a prob:
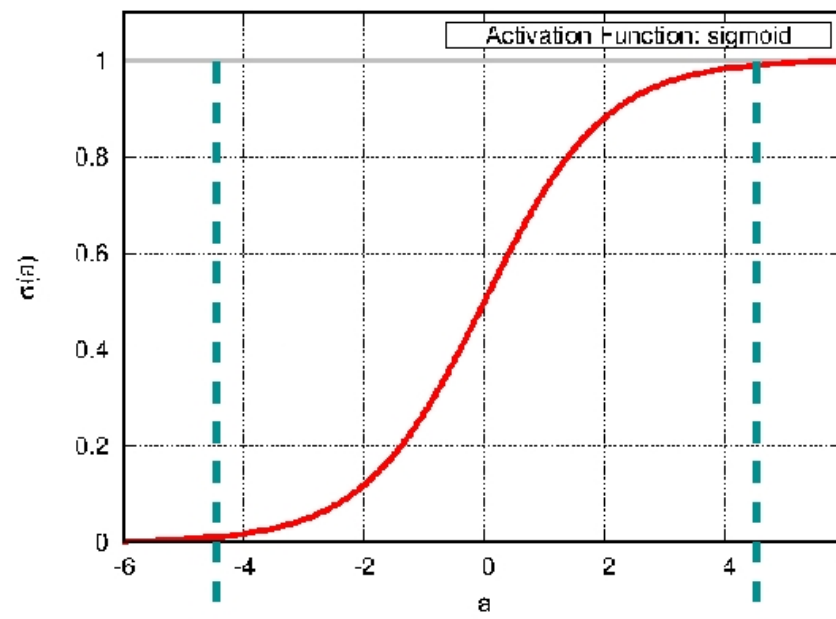
$$h(a) = \frac{1}{1+e^{-a}}$$

$$e^{4.6} \approx 100$$

$$a = -4.6 : h(a) \approx 0.01$$

$$a = +4.6 : h(a) \approx 0.99$$
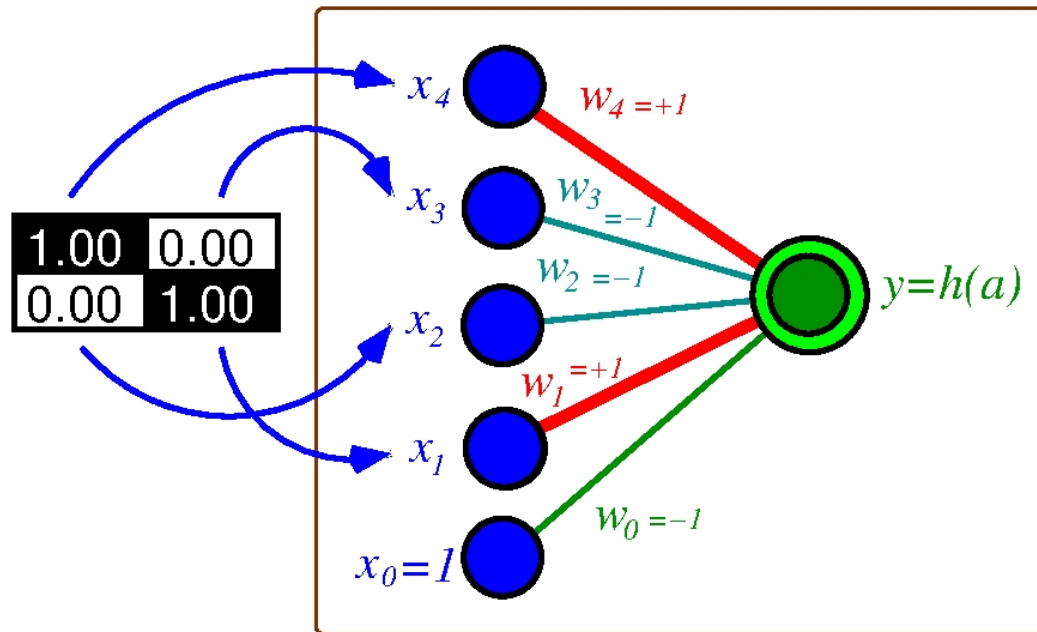
- $a = 1.00(+1) + 0.00(-1) + 0.00(-1) + 1.00(+1) + 1(-1) = +1.00$
- $\sigma(+1.00) = 0.73$
- $\sigma(\cdot) : \uparrow \# \rightarrow \uparrow prob$
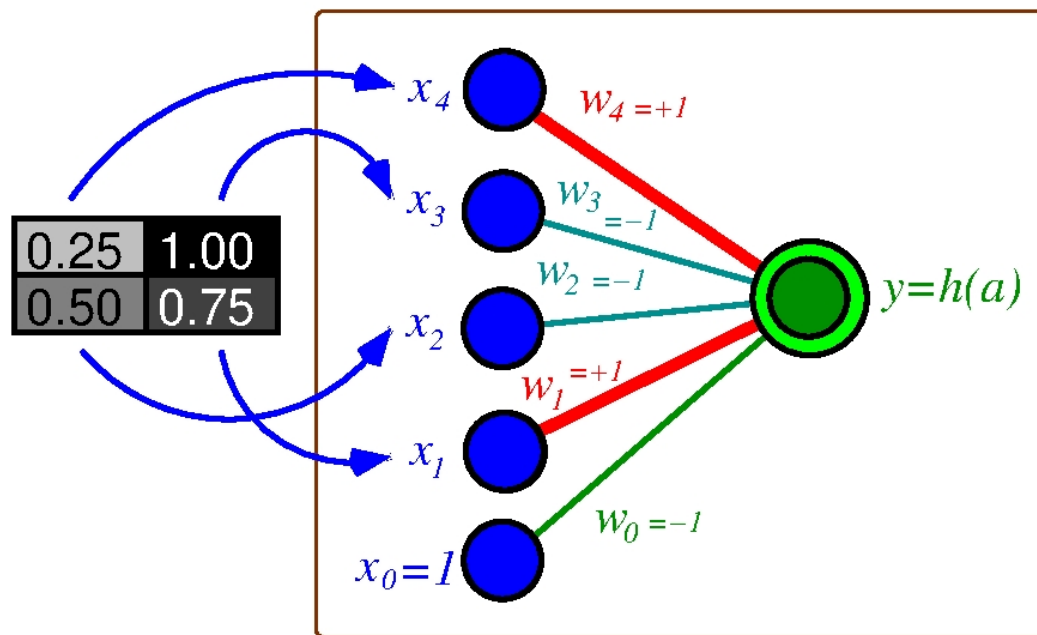
- $a = 0.25(+1) + 1.00(-1) + 0.50(-1) + 0.75(+1) + 1(-1) = -0.50$
- $\sigma(-1.50) = 0.37$
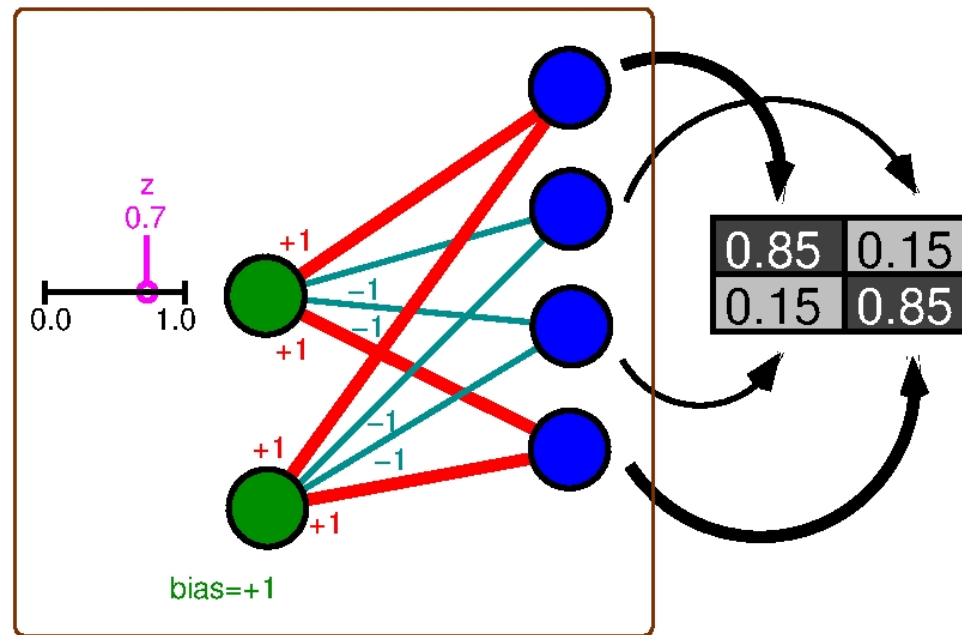- $\sigma(\cdot) : \downarrow \# \rightarrow \downarrow prob$

GANs–10

Building the Generator ▌

- High (+1) wt: main diag (#1, #4), Low (-1): other▌

$$\rightarrow a_4 = 0.70(+1) + 1.00(+1) = +1.7\,▌$$

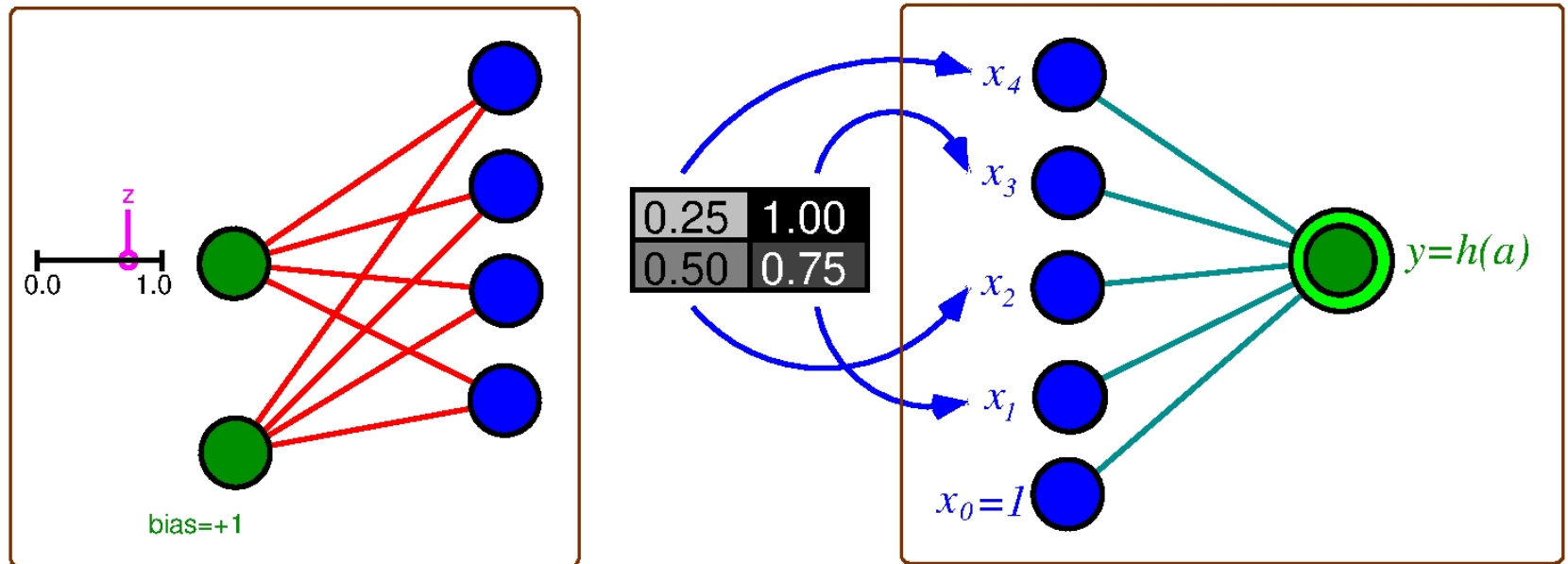$$\rightarrow a_3 = 0.70(-1) + 1.00(-1) = -1.7\,▌$$

$$\rightarrow a_2 = 0.70(-1) + 1.00(-1) = -1.7\,▌$$

$$\rightarrow a_1 = 0.70(+1) + ▌\ 1.00(+1) = +1.7\,▌$$

- $\left\{ \begin{array}{l} \sigma(+1.7) = 0.85, \ \sigma(-1.7) = 0.15 \\ \sigma(-1.7) = 0.15, \ \sigma(+1.7) = 0.85 \end{array} \right\}$ ▌
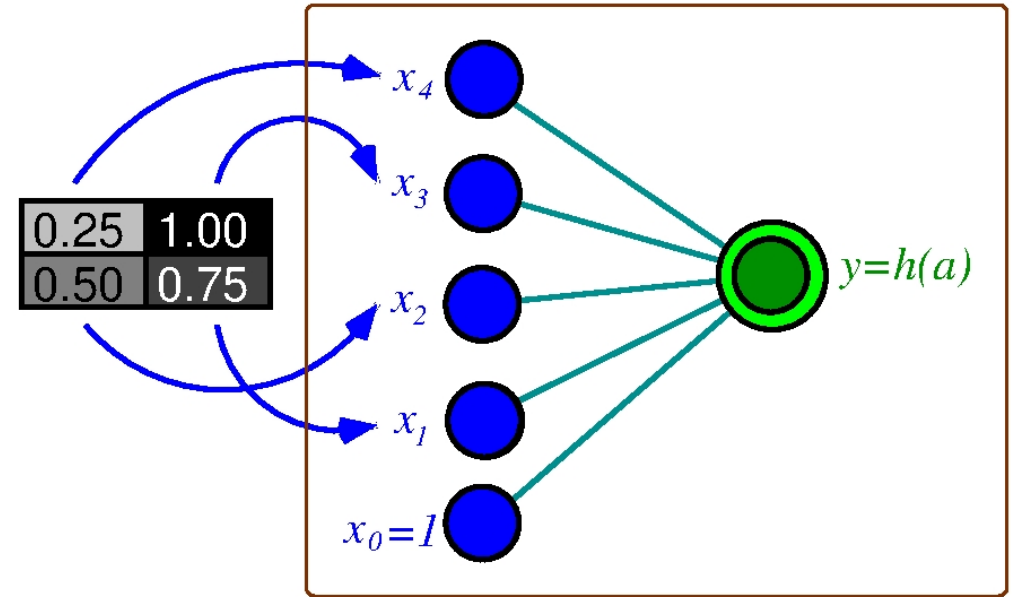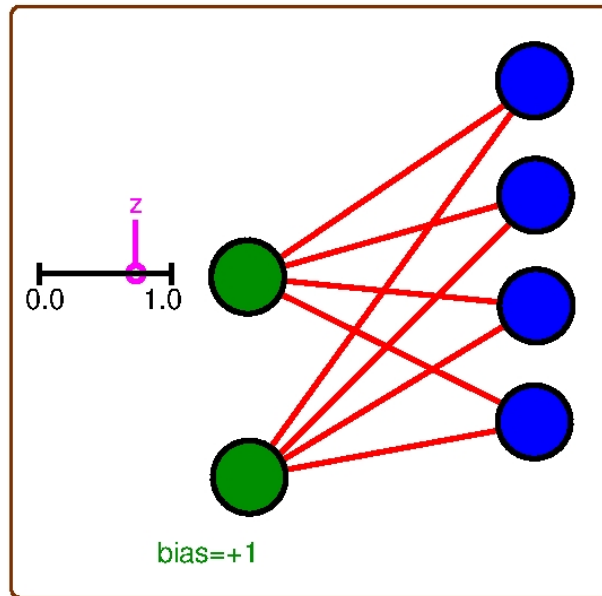
How to Train your ~~Dragon~~/Neuron

- Disc o/p: (Gen, Disc react diff: (detective, forger)
- log-loss: a convenient loss function. Why?
- If label=1, pred=0.1 (bad) high err $-\log(0.1) = 2.3$
- If label=1, pred=0.9 (good) low err $-\log(0.9) = 0.1$
- If label=0, pred=0.1 (good) low err $-\log(0.9) = 0.1$
- If label=0, pred=0.9 (bad) high err $-\log(0.1) = 2.3$

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How to Train your ~~Dragon~~/Neuron

- If label=1, Error= $-\log(prediction)$
- If label=0, Error= $-\log(1-prediction)$
- Gen:[noise], $\sigma(\cdot)$ = 0.68. Disc wants:0 [noise]
- Disc Error: $-\log(1-0.68)$
- Gen always wants Disc=1. Gen Error: $-\log(0.68)$
- Gen loss: $-\log(D(G(z))$: only change Gen wts
- Disc loss: $-\log(1-D(G(z))$: only change Disc wts

GANs–13

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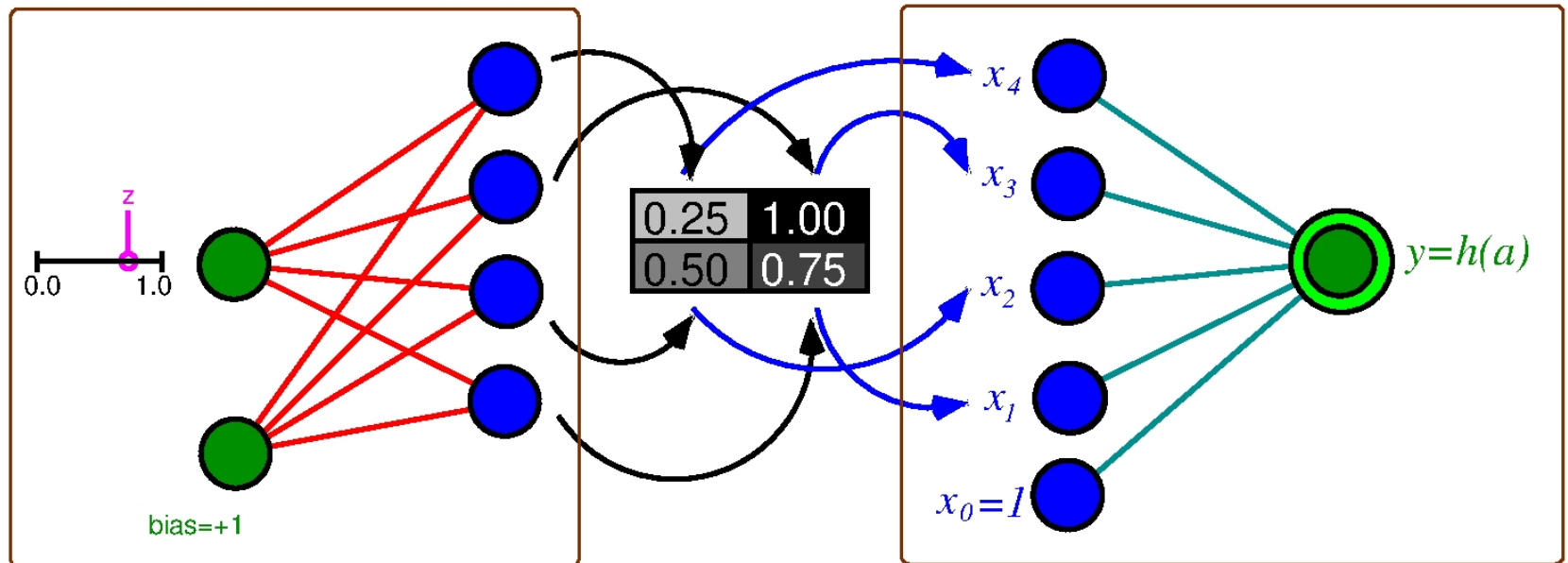
- REPEAT[{Drag/Neur}-on][Time? 'drag on'][Result?]

1. $z \mapsto G(z) \mapsto D(G(z)) \mapsto$ update G, D wts
2. Real image $\mathbf{x} \mapsto D(\mathbf{x})$ update D wts

How to Train your ~~Dragon~~/Neuron
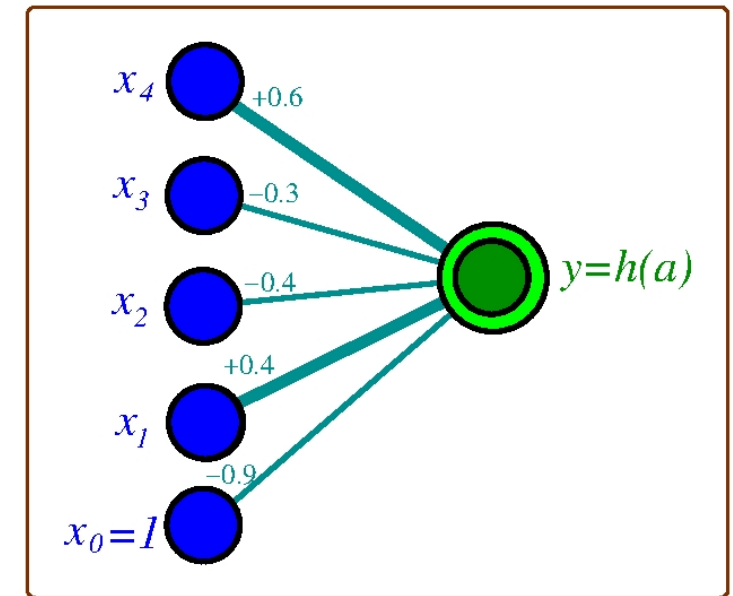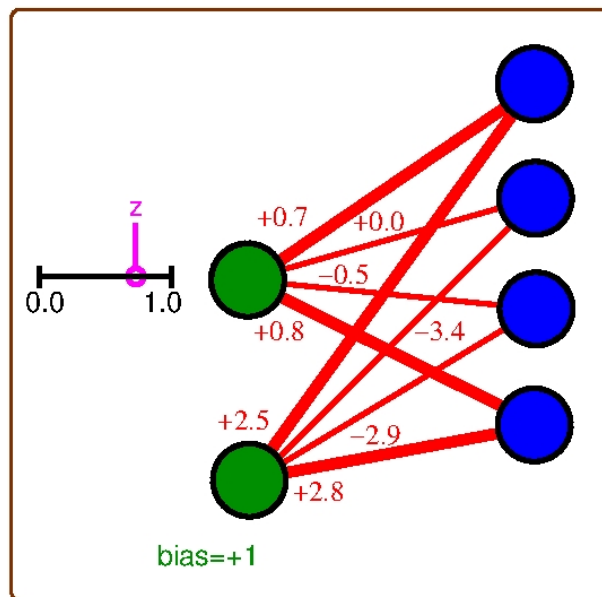
- 'Too many cooks spoil the broth'
- 'Too many books spoil the couth'