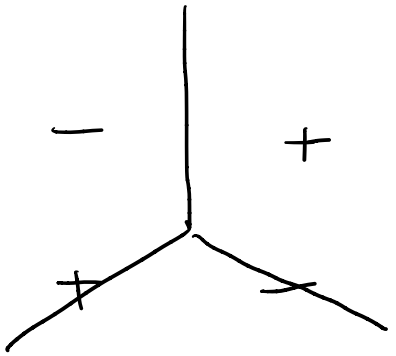
Neural Nets

	g	b	n
good	1	0	0
bad	0	1	0
not good	1	0	1
not bad	0	1	1



NNs: transform the data into a latent feature space

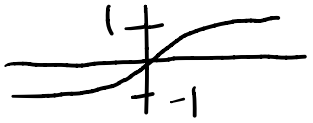
$\bar{w}^T f(\bar{x})$ replace $f(\bar{x})$ with a nonlinear function of the original $f(\bar{x})$

Define $\bar{z} = g(V f(\bar{x}))$. Classify with $\bar{w}^T \bar{z}(\bar{x})$

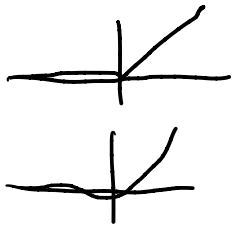
g: nonlinearity; V: dxn matrix; $f(\bar{x})$: n-dimensional feat vector

How can $V \circ g$ give us useful latent features?

$g = \tanh$



$g = \text{ReLU}$



NN example

Suppose $V = \begin{bmatrix} 1 & 0 \\ 0 & 1 \\ 1 & 1 \end{bmatrix}$

$g = \tanh$

$\tanh(0) = 0$, $\tanh(1) \approx 1$

$\tanh(2) \approx 1$

$\bar{z} = [\tanh(x_1), \tanh(x_2), \tanh(x_1 + x_2)]$

$\bar{z} = g(V f(\bar{x}))$

(x_1, x_2)