

1(a). Model A

1(b). You need the final value to be both pos/neg instead of softmaxed
Model B is really inefficient for having a same ReLU value
stacks in the middle.

2(a).

$$\sqrt{(0-0)^2 + (0-2)^2} = 2$$
$$\|x_2 - c_1\| = 0$$
$$\|x_3 - c_1\| = \sqrt{(4-0)^2 + (0-2)^2} = \sqrt{20}$$
$$\|x_4 - c_1\| = \sqrt{(4-0)^2 + (2-2)^2} = 4$$

$$c_1 = \frac{1}{2} (x_1 + x_2) = (0, 1)$$

$$\|x_1 - c_1\| = \sqrt{0+1^2} = 1$$
$$\|x_2 - c_1\| = \sqrt{0+1^2} = 1$$
$$\|x_3 - c_1\| = \sqrt{4^2+1^2} = \sqrt{17}$$
$$\|x_4 - c_1\| = \sqrt{4^2+1^2} = \sqrt{17}$$

$$\|x_1 - c_2\| = \sqrt{4^2+0} = 4$$

$$\|x_2 - c_2\| = \sqrt{4^2+2^2} = \sqrt{20}$$

$$\|x_3 - c_2\| = 0$$

$$\|x_4 - c_2\| = \sqrt{0+2^2} = 2$$

$$c_2 = \frac{1}{2} (x_3 + x_4) = (4, 1)$$

$$\|x_1 - c_2\| = \sqrt{4^2+1^2} = \sqrt{17}$$

$$\|x_2 - c_2\| = \sqrt{4^2+1^2} = \sqrt{17}$$

$$\|x_3 - c_2\| = \sqrt{0+1^2} = 1$$

$$\|x_4 - c_2\| = \sqrt{0+1^2} = 1$$

converged; final clusters : $K_1 : \{x_1, x_2\}$

$K_2 : \{x_3, x_4\}$

$$c_1 : (0, 1)$$

$$c_2 : (4, 1)$$

2(b). $\|x_{\text{new}} - c_1\| = \sqrt{3^2+0} = 3$

$$\|x_{\text{new}} - c_2\| = \sqrt{1^2+0} = 1$$

closer to K_1 .

(assigned).

3.

cluster 1 \rightarrow 0.054

cluster 2 \rightarrow 0.669

Cluster 2 ; the value is bigger.