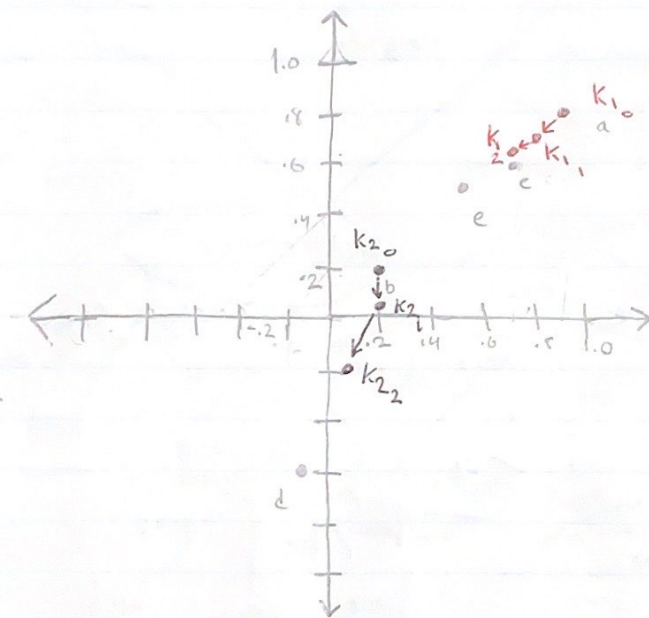


K-means HW

Pattern	x	y
a	.9	.8
b	.2	.2
c	.7	.6
d	-.1	-.6
e	.5	.5

$K=2$



Iteration 0

$$k_1 = (.9, .8) \quad k_2 = (.2, .2)$$

classifications

$$\text{dist}(a, k_1) = |.9 - .9| + |.8 - .8| = 0$$

$$a = k_1$$

$$\text{dist}(b, k_1) = |.9 - .2| + |.8 - .2| = 1.3, \text{dist}(b, k_2) = |.2 - .2| + |.2 - .2| = 0$$

$$b = k_2$$

$$\text{dist}(c, k_1) = |.9 - .7| + |.8 - .6| = .4, \text{dist}(c, k_2) = |.2 - .7| + |.2 - .6| = .9$$

$$c = k_1$$

$$\text{dist}(d, k_1) = |.9 - (-.1)| + |.8 - (-.6)| = 2.4, \text{dist}(d, k_2) = |.2 - (-.1)| + |.2 - (-.6)| = 1.1$$

$$d = k_2$$

$$\text{dist}(e, k_1) = |.9 - .5| + |.8 - .5| = .7, \text{dist}(e, k_2) = |.2 - .5| + |.2 - .5| = .6$$

$$e = k_2$$

$$\text{new } k_1 = \left(\frac{.9 + .7}{2}, \frac{.8 + .6}{2} \right) = (.8, .7)$$

$$\text{new } k_2 = \left(\frac{.2 + (-.1) + .5}{3}, \frac{.2 + (-.6) + .5}{3} \right) = (.2, .03)$$

Iteration 1

$$k_1 = (.8, .7)$$

$$k_2 = (.2, .03)$$

classifications

$$\text{dist}(a, k_1) = |.8 - .9| + |.7 - .8| = .2, \text{dist}(a, k_2) = |.2 - .9| + |.03 - .8| = 1.43$$

$$a = k_1$$

$$\text{dist}(b, k_1) = |.8 - .2| + |.7 - .2| = 1.1, \text{dist}(b, k_2) = |.2 - .2| + |.03 - .2| = .17$$

$$b = k_2$$

$$\text{dist}(c, k_1) = |.8 - .7| + |.7 - .6| = .2, \text{dist}(c, k_2) = |.2 - .7| + |.03 - .6| = 1.07$$

$$c = k_1$$

$$\text{dist}(d, k_1) = |.8 - (-.1)| + |.7 - (-.6)| = 2.4, \text{dist}(d, k_2) = |.2 - (-.1)| + |.03 - (-.6)| = .96$$

$$d = k_2$$

$$\text{dist}(e, k_1) = |.8 - .5| + |.7 - .5| = .5, \text{dist}(e, k_2) = |.2 - .5| + |.03 - .5| = .77$$

$$e = k_1$$

$$\text{new } k_1 = \left(\frac{.9 + .7 + .5}{3}, \frac{.8 + .6 + .5}{3} \right) = (.7, .63)$$

$$\text{new } k_2 = \left(\frac{.2 + (-.1)}{2}, \frac{.2 + (-.6)}{2} \right) = (.05, -.2)$$