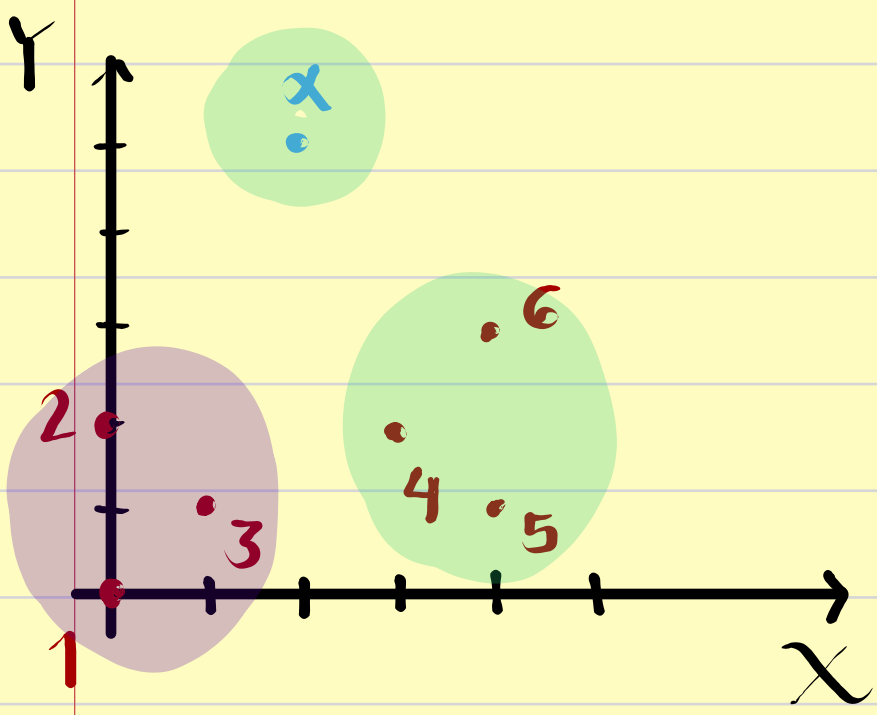


Übung: Gegeben ist die Position von 6 Weinen mit [X,Y] Koordinaten.

1) Bitte mit K-Means Clustering die Gruppen in 2 Kategorien teilen.

2) Bitte mit Rule1 entscheiden zur welchen Gruppe Wein x gehört?

W	1	2	3	4	5	6	x
X	0	0	1	3	4	4	2
Y	0	2	1	2	1	3	5

1) $G_1(W1, W2)$ $G_2(W3, W4, W5, W6)$

$Z_1 = \left[\frac{0+0}{2}, \frac{0+2}{2}\right] = [0, 1]$ $Z_2 = \left[\frac{1+3+4+4}{4}, \frac{1+2+1+3}{4}\right] = [3, 1'7]$

$d_{1,Z1} = \sqrt{(0-0)^2+(0-1)^2} = 1 < d_{1,Z2} = \sqrt{(0-3)^2+(0-1'75)^2} = 3'47$

$d_{2,Z1} = \sqrt{(0-0)^2+(2-1)^2} = 1 < d_{2,Z2} = \sqrt{(0-3)^2+(2-1'75)^2} = 3'01$

$d_{3,Z1} = \sqrt{(1-0)^2+(1-1)^2} = 1 < d_{3,Z2} = \sqrt{(1-3)^2+(1-1'75)^2} = 2'17$

$d_{4,Z1} = \sqrt{(3-0)^2+(2-1)^2} = 3'16 > d_{4,Z2} = \sqrt{(3-3)^2+(2'1'75)^2} = 0'25$

$d_{5,Z1} = \sqrt{(4-0)^2+(1-1)^2} = 4 > d_{5,Z2} = \sqrt{(4-3)^2+(1-1'75)^2} = 1'25$

$d_{6,Z1} = \sqrt{(4-0)^2+(3-1)^2} = 4'47 > d_{6,Z2} = \sqrt{(4-3)^2+(3-1'75)^2} = 1'6$

Neue Gruppen $G_1^*[w_1, w_2, w_3]$ $G_2^*[w_4, w_5, w_6]$

$Z_1^* = \left[\frac{0+0+1}{3}, \frac{0+2+1}{3}\right] = \left[\frac{1}{3}, 1\right]$ $Z_2^* = \left[\frac{3+4+4}{3}, \frac{2+1+3}{3}\right] = [3\frac{1}{3}, 2]$

$d_{1,z_1^*} = \ldots = 1'05 < d_{1,z_2^*} = \ldots = 4'18$

$d_{2,z_1^*} = \ldots = 1'05 < d_{2,z_2^*} = \ldots = 3'67$

$d_{3,z_1^*} = \ldots = 1'05 < d_{3,z_2^*} = \ldots = 2'55$

$d_{4,z_1^*} = \ldots = 2'54 > d_{4,z_2^*} = \ldots = 0'67$

$d_{5,z_1^*} = \ldots = 3'67 > d_{5,z_2^*} = \ldots = 1'05$

$d_{6,z_1^*} = \ldots = 4'18 > d_{6,z_2^*} = \ldots = 1'05$

Kehl...

$d_{x,w_1} = \sqrt{(2-0)^2+(5-0)^2} = 5'38$ G_1

$d_{x,w_2} = \sqrt{(2-0)^2+(5-2)^2} = 3'68$ G_1

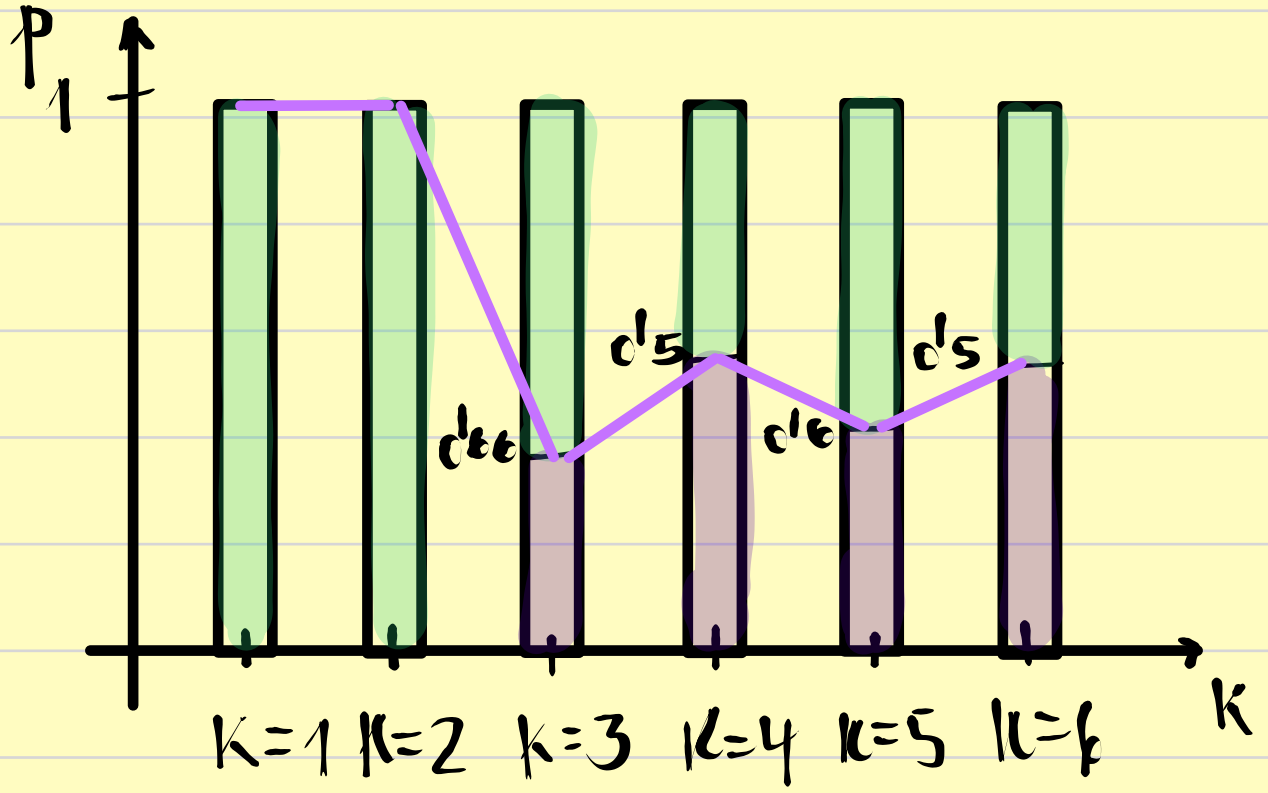
$d_{x,w_3} = \sqrt{(2-1)^2+(5-1)^2} = 4'12$ G_1

$d_{x,w_4} = \sqrt{(2-3)^2+(5-2)^2} = 3'16$ G_2

$$d_{x,w_5} = \sqrt{(2-4)^2+(5-1)^2} = 4{,}47 \quad \hookrightarrow 2$$

$$d_{x,w_6} = \sqrt{(2-4)^2+(5-4)^2} = 2{,}23 \quad \hookrightarrow 2$$

$$d_x \left[w_6 < w_4 < w_2 < w_3 < w_5 < w_1 \right]$$



Bei K=3 erreichen wir die beste Erklärung der Daten.

$$\Delta_3 \equiv 0{,}66 - 0{,}33 = 0{,}33 \quad (1)$$
$$\Delta_4 \equiv 0{,}5 - 0{,}5 = 0$$
$$\Delta_5 \equiv 0{,}6 - 0{,}4 = 0{,}2$$
$$\Delta_6 \equiv 1{,}5 - 0{,}5 = 0$$

Weil wir K=3 nehmen, gehört x zur Gruppe 2

Die Hypothese ist: die Daten sind Euklydisch.