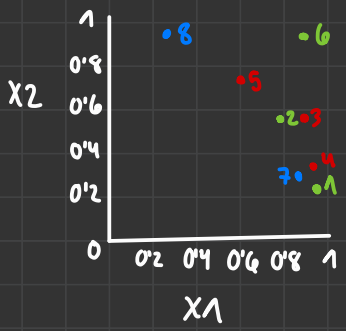
Problema 4

	X_1	X_2	Classe
1	0'97	0'22	+
2	0'79	0'59	+
3	0'85	0'47	-
4	0'95	0'37	-
5	0'61	0'77	-
6	0'91	0'89	+
7	0'93	0'32	?
8	0'36	0'94	?

A2) K=1, K=3, K=5 amb Manhattan i Euclidiana



a) Distància de Manhattan

$$d_i(p,q) = \|p-q\|_1 = \sum_{i=1}^{n} |p_i - q_i|_1$$

$$d_m(P_1,P_2) = |x_1 - x_2| + |y_1 - y_2| \longrightarrow P_1 = (x_1, y_1) \text{ i } P_2 = (x_2, y_2)$$

$d_m(7,1) = |0'93 - 0'97| + |0'32 - 0'22| = 0'14$ +
$d_m(7,2) = |0'93 - 0'79| + |0'32 - 0'59| = 0'41$ +
$d_m(7,3) = |0'93 - 0'85| + |0'32 - 0'47| = 0'23$ -
$d_m(7,4) = |0'93 - 0'95| + |0'32 - 0'37| = 0'07$ -
$d_m(7,5) = |0'93 - 0'61| + |0'32 - 0'77| = 0'77$ -
$d_m(7,6) = |0'93 - 0'91| + |0'32 - 0'89| = 0'59$ +

- K=1 → - (dm(7,4))
- K=3 → - (dm(7,4), (7,1), (7,3))
- K=5 → + (dm(7,4), (7,1), (7,3), (7,2), (7,6))

$d_m(8,1) = |0'36 - 0'97| + |0'94 - 0'22| = 1'33$ +
$d_m(8,2) = |0'36 - 0'79| + |0'94 - 0'59| = 0'78$ +
$d_m(8,3) = |0'36 - 0'85| + |0'94 - 0'47| = 0'96$ -
$d_m(8,4) = |0'36 - 0'95| + |0'94 - 0'37| = 1'16$ -
$d_m(8,5) = |0'36 - 0'61| + |0'94 - 0'77| = 0'42$ -

$d_m(8,6) = |0'36 - 0'91| + |0'94 - 0'32| = 1'17$ +

- K=1 → - $d_m(8,5)$
- K=3 → - $d_m(8,5), (8,2), (8,3)$
- K=5 → - $d_m(8,5), (8,2), (8,3), (8,4), (8,6)$

b) Distància Euclidiana

$$d(P,q) = \sqrt{(P_1 - P_1)^2 + (P_2 - P_2)^2}$$

$de(7,1) = \sqrt{(0'93 - 0'97)^2 + (0'32 - 0'22)^2} = 0'10$ +

$de(7,2) = \sqrt{(0'93 - 0'79)^2 + (0'32 - 0'59)^2} = 0'3$ +

$de(7,3) = \sqrt{(0'93 - 0'85)^2 + (0'32 - 0'49)^2} = 0'17$ -

$de(7,4) = \sqrt{(0'93 - 0'95)^2 + (0'32 - 0'39)^2} = 0'05$ -

$de(7,5) = \sqrt{(0'93 - 0'81)^2 + (0'32 - 0'77)^2} = 0'55$ -

$de(7,6) = \sqrt{(0'93 - 0'91)^2 + (0'32 - 0'89)^2} = 0'57$ +

- K=1 → - $d(7,4)$
- K=3 → - $d(7,4), d(7,1), d(7,3)$
- K=5 → - $d(7,4), d(7,1), d(7,3), d(7,2), d(7,5)$

$de(8,1) = \sqrt{(0'36 - 0'97)^2 + (0'94 - 0'22)^2} = 0'94$ +

$de(8,2) = \sqrt{(0'36 - 0'79)^2 + (0'94 - 0'59)^2} = 0'55$ +

$de(8,3) = \sqrt{(0'36 - 0'85)^2 + (0'94 - 0'49)^2} = 0'67$ -

$de(8,4) = \sqrt{(0'36 - 0'95)^2 + (0'94 - 0'39)^2} = 0'82$ -

$de(8,5) = \sqrt{(0'36 - 0'81)^2 + (0'94 - 0'77)^2} = 0'3$ -

$de(8,6) = \sqrt{(0'36 - 0'91)^2 + (0'94 - 0'32)^2} = 0'83$ +

- K=1 → - $d(8,5)$
- K=3 → - $d(8,5), (8,2), (8,3)$
- K=5 → - $d(8,5), (8,2), (8,3), (8,4), (8,6)$

A3) $w = \frac{1}{d^2}$

- K=3

Uscani 7

$C_+ = \frac{1}{0'11^2} = 100$ $\quad C_- > C_+ \rightarrow 7 = C_-$

$C_- = \frac{1}{0'05^2} + \frac{1}{0'17^2} = 434'6$

Uscani 8

$C_+ = \frac{1}{0'55^2} = 3'31$ $\quad C_- > C_+ \rightarrow 8 = C_-$

$C_- = \frac{1}{0'3^2} + \frac{1}{0'67^2} = 13'34$

A4) K=5 per $k_g = 0'01$, $k_g = 0'1$, $k_g = 1$ $\quad w_g(p_1, p_2) = e^{-k_g \cdot d^2}$

$k_g = 0'01$

$C_+ = e^{-0'01 \cdot 0'11^2} + e^{-0'1\ 0'3^2} = 1'99$

$C_- = e^{-0'01 \cdot 0'05^2} + e^{-0'01 \cdot 0'17^2} + e^{-0'01 \cdot 0'55^2} = 2'99$

$C_- > C_+ \rightarrow 7 = C_-$

$C_+ = e^{-0'01 \cdot 0'55^2} + e^{-0'01 \cdot 0'83^2} = 1'99$

$C_- = e^{-0'01 \cdot 0'3^2} + e^{-0'01 \cdot 0'67^2} + e^{-0'01 \cdot 0'82^2} = 2'98$

$C_- > C_+ \rightarrow 8 = C_-$

$K_g = 0'1$

$C_+ = e^{-0'1 \cdot 0'1^2} + e^{-0'1\ 0'3^2} = 1'99$

$C_- = e^{-0'1 \cdot 0'05^2} + e^{-0'1 \cdot 0'17^2} + e^{-0'1 \cdot 0'55^2} = 2'97$

$C_- > C_+ \longrightarrow 7 = C_-$

$C_+ = e^{-0'1 \cdot 0'55^2} + e^{-0'1 \cdot 0'83^2} = 1'9$

$C_- = e^{-0'1 \cdot 0'3^2} + e^{-0'1 \cdot 0'67^2} + e^{-0'1 \cdot 0'82^2} = 2'88$

$C_- > C_+ \longrightarrow 8 = C_-$

$K_g = 1$

$C_+ = e^{-1 \cdot 0'1^2} + e^{-1\ 0'3^2} = 1'9$

$C_- = e^{-1 \cdot 0'05^2} + e^{-1 \cdot 0'17^2} + e^{-1 \cdot 0'55^2} = 2'7$

$C_- > C_+ \longrightarrow 7 = C_-$

$C_+ = e^{-1 \cdot 0'55^2} + e^{-1 \cdot 0'83^2} = 1'24$

$C_- = e^{-1 \cdot 0'3^2} + e^{-1 \cdot 0'67^2} + e^{-1 \cdot 0'82^2} = 2'06$

$C_- > C_+ \longrightarrow 8 = C_-$