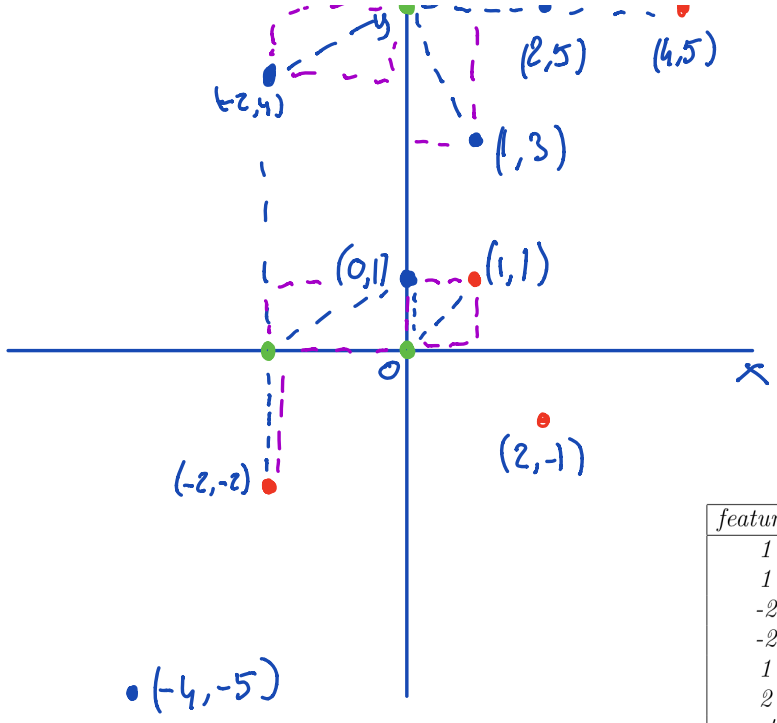

	types
●	a
●	b
●	to classify

feature x	*feature y*	*label*
1	*0*	*a*
1	*1*	*b*
-2	*4*	*a*
-2	*-2*	*b*
1	*3*	*a*
2	*5*	*a*
-4	*-5*	*a*
4	*5*	*b*
2	*-1*	*b*

K = 3

- $(0,1) \rightarrow \sqrt{(0-0)^2+(1-0)^2} = \sqrt{1}$
- $(-1,-1) \rightarrow \sqrt{(-1-0)^2+(-1-0)^2} = \sqrt{2}$ ⇒ two labels "b" closer
- $(-2,-2) \rightarrow \sqrt{(-2-0)^2+(-2-0)^2} = \sqrt{8} = 2\sqrt{2}$ for K = 3 → label b

K = 2

- $(0,1) \rightarrow \sqrt{(0--2)^2+(1-0)^2} = \sqrt{5}$ $2 < \sqrt{5}$
- $(-2,-2) \rightarrow \sqrt{(-2+(2))^2+(0+(2))^2} = \sqrt{4} = 2$ → label b

K = 4

- $(5,5) \rightarrow \sqrt{(5-(-2))^2+(5-4)^2} = \sqrt{50} = 5\sqrt{2}$
- $(5,5) \rightarrow \sqrt{(5-1)^2+(5-3)^2} = \sqrt{20} = 2\sqrt{5}$
- $(5,5) \rightarrow \sqrt{(5-2)^2+(5-5)^2} = \sqrt{9} = 3$
- $(5,5) \rightarrow \sqrt{(5-4)^2+(5-5)^2} = \sqrt{1} = 1$

→ 3 "a" neighbors closes to the point → a label

Manhattan

K = 3

- (0,1) → $|0-0| + |0-1| = 1$
- (1,1) → $|0-1| + |0-1| = 2$ label b
- (2,-1) → $|0-2| + |0-(-1)| = 3$

K = 3

- (0,1) → $|1-(-2)| + |1-0| = 4$
- (1,1) → $|1-(-2)| + |1-0| = 4$ label b for K=3
- (-2,-2) → $|-2-(-2)| + |-2-0| = 6$

K = 3

- (-2,4) → $|-2-5| + |4-5| = 8$
- (1,3) → $|1-5| + |3-5| = 6$ label a for K=3
- (2,5) → $|2-5| + |5-5| = 3$

Chessboard

K = 4

- (0,1) → $\max(|0-0|, |1-0|) = 1$
- (1,1) → $\max(|0-1|, |0-1|) = 1$
- (2,-1) → $\max(|0-2|, |0-(-1)|) = 2$

label b for K=4

- $(2,-2) \rightarrow \max(|0--2|, |0--2|) = 2$

K = 3

- $(0,1) \rightarrow \max(|0--2|, |1-0|) = 2$
- $(1,1) \rightarrow \max(|1--2|, |1-0|) = 3$
- $(-2,-2) \rightarrow \max(|-2--2|, |-2-0|) = -2$

label b for K = 3

K = 5

- $(-2,4) \rightarrow \max |-2-5|, |4-5| = 7$
- $(1,3) \rightarrow \max |1-5|, |3-5| = 4$
- $(2,5) \rightarrow \max |2-5|, |5-5| = 3$
- $(4,5) \rightarrow \max |4-5|, |5-5| = 1$
- $(0,1) \rightarrow \max |0-5|, |1-5| = 5$

label a for K = 5

2.4

The separation becomes clearer as noise is reduced. This means that it will be smoother but may imply more biases as K increases.