

# Voronoi Diagram + Decision Boundary.

DATE:

NO:

Simple Example where  $k=1$ , if  $k>1$ , a bit hard to draw.

In my image, we have labelled 7 partitions,  $P_1$  to  $P_7$ .

or 13 partitions if refer to image below.

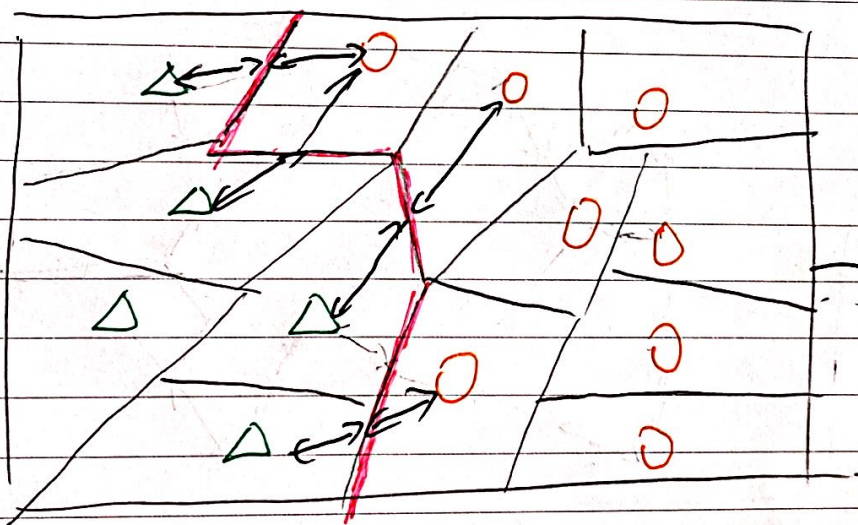
Mathematically,

$$P_i = \{ \text{set of points } x \mid x \text{'s closest neighbour is } x_i \}$$

That is remember, only for 1-NN.

as you see we are only finding closest "one" neighbour.

If 3-NN, then it's a bit more complicated.



Then define boundary to be the set of points

$$\{ x_b \mid \text{where } d(x_i, x_b) = d(x_j, x_b) \}$$

and  $x_i, x_j$  are from class 0 & 1 respectively

That is, all points are equidistant between any  $x_i, x_j$  where  $x_i$  &  $x_j$  are training examples from class 0 & 1 resp.

Note some points I did not draw the  $\longleftrightarrow$  as not needed to show.

2-Class classification ( $k = 1$ , weights = 'uniform')

