$(\bar{D} - HX)^T$ $(\bar{D} - XX)$

$C = I$

$$C = \begin{bmatrix} C_{11} & & \\ & C_{ij} & \\ & & C_{ij} \end{bmatrix} = I$$

$$\hat{X} = (H^T C^{-1} H)^{-1} H^T C^{-1} \bar{D}$$

$C^{-1} = I$

e.g.

$\bar{D} - H \cdot X$

$D = H \cdot X$ $\qquad D_{ij} = X_i - X_j$

$$W_{12} = (\bar{D}_{12} - D_{12})^T C_{12}^{-1} (\bar{D}_{12} - D_{12})$$
$$= \mathcal{E}_{12}^T \cdot C_{12}^{-1} \cdot \mathcal{E}_{12}$$

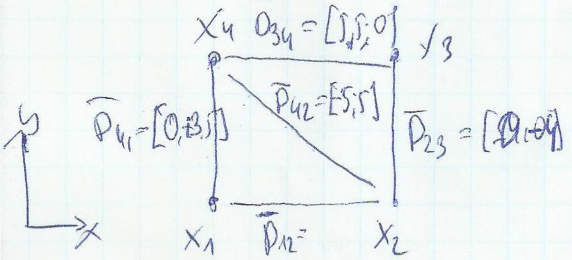
$\cancel{\mathcal{E}_{12} = \bar{D}_{12} - X_1 - X_2}$

$\mathcal{E}_{12} = \bar{D}_{12} - D_{12}$

$$\mathcal{E}_{12} = \begin{bmatrix} -5 \\ 0 \end{bmatrix} - \begin{bmatrix} X_1^x - X_2^x \\ X_1^y - X_2^y \end{bmatrix}$$

$$\mathcal{E}_{12} = \begin{bmatrix} -5 \\ 0 \end{bmatrix} - \begin{array}{c} \begin{matrix} x_1^x & x_1^y & x_2^x & x_2^y & x_3^x & x_3^y & x_4^x & x_4^y \end{matrix} \\ \begin{bmatrix} 1 & 0 & -1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & -1 & 0 & 0 & 0 & 0 \end{bmatrix} \end{array} \cdot X$$

$$X' = \begin{bmatrix} x_1^1 \\ x_1^1 \\ x_2^1 \\ x_2^2 \\ x_3^1 \\ x_3^2 \\ x_4^1 \\ x_4^2 \end{bmatrix}$$



$x_1 - x_2$
$= [-5, 0]$

$$W_{12} = \mathcal{E}_{12}^T \cdot \underbrace{C_{12}^{-1}}_{= I} \cdot \mathcal{E}_{12}$$

$$D_{12} = X_1 - X_2$$
$$= \underset{H_{12}}{\begin{array}{c} \begin{matrix} x_1^x & x_1^y & x_2^x & x_2^y & x_3^x & x_3^y & x_4^x & x_4^y \end{matrix} \\ \begin{bmatrix} 1 & 0 & -1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & -1 & 0 & 0 & 0 & 0 \end{bmatrix} \end{array}} \cdot X = \begin{bmatrix} X_1^x - X_2^x \\ X_1^y - X_2^y \end{bmatrix}$$

$H =$

$$H = \begin{array}{c} \begin{matrix} x_1^x & x_1^y & x_2^x & x_2^y & x_3^x & x_3^y & x_4^x & x_4^y \end{matrix} \\ \begin{bmatrix} 1 & 0 & -1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & -1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & -1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & -1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & -1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & -1 \\ -1 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & -1 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & -1 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & -1 & 0 & 0 & 0 & 1 \end{bmatrix} \end{array} \quad X = \begin{bmatrix} x_1^x \\ x_1^y \\ x_2^x \\ x_2^y \\ x_3^x \\ x_3^y \\ x_4^x \\ x_4^y \\ \cancel{x_3^x} \\ x_3^y \end{bmatrix} \quad H_{12} \quad \bar{D} = \begin{bmatrix} -5 \\ 0 \\ 0 \\ -4 \\ 5.5 \\ 0 \\ 0 \\ 13.5 \\ -5 \\ 5 \end{bmatrix}$$

$$X' = \begin{bmatrix} 1 \\ 1 \\ X_2 \\ X_2 \\ X_3 \\ X_3 \\ X_4 \end{bmatrix}$$

$\min W = \min \mathcal{E}^T \cdot C^{-1} \cdot \mathcal{E}$ – can't be solved ($\cancel{X \text{ is not fixed}}$) reference system not fixed

$$\mathcal{E} = \bar{D} - H \cdot X$$

$$\begin{bmatrix} X_1^x \\ X_1^y \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$$

$$\hat{X}' = [0.0625, 0.5625, 6.25, 4.75, 0.9375, 4.9375]^T$$

$\mathcal{E} = \bar{D}$ $\qquad H \cdot X = X_1^x \cdot H_{\cdot 1} + X_1^y \cdot H_{\cdot 2} + H_{\cdot 3:8} \cdot X_{3:8}$

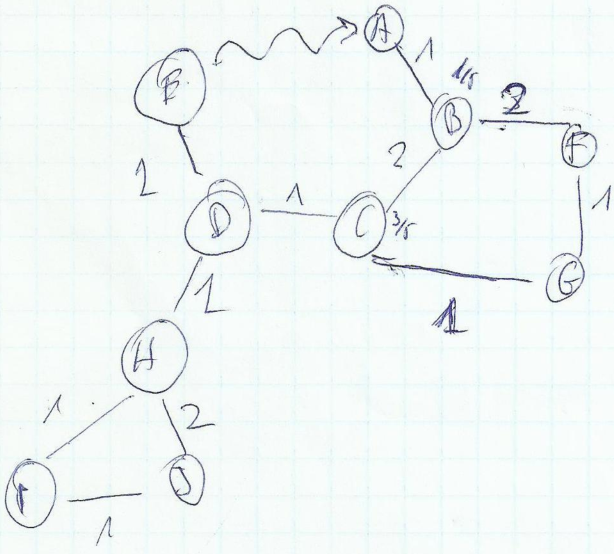
$\cancel{HX_1} =$

$$H \cdot X = 1 \cdot \begin{bmatrix} 1 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ -1 \\ 0 \\ 0 \\ 0 \end{bmatrix} + 1 \cdot \begin{bmatrix} 0 \\ 1 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ -1 \\ 0 \\ 0 \end{bmatrix} +$$

$$\mathcal{E} = \underbrace{\bar{D} - X_1^x \cdot H_{\cdot 1} - X_1^y \cdot H_{\cdot 2}}_{\bar{D}'} + \underbrace{H_{\cdot 3:8}}_{H'} \cdot \underbrace{X_{3:8}}_{X'}$$

10

$1/5 - 3/10$

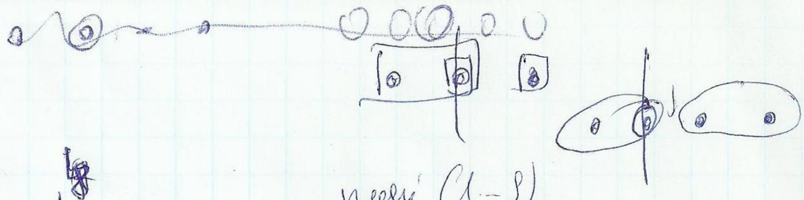


Vertex	Weight
A	0
B	$1/5$
C	$3/5$
D	$4/5$
E	1
F	$1/5 + 2/10 = 2/5$
G	$1/5 + 3/10 = 1/2$
H	$4/5$
I	$4/5$
J	$4/5$

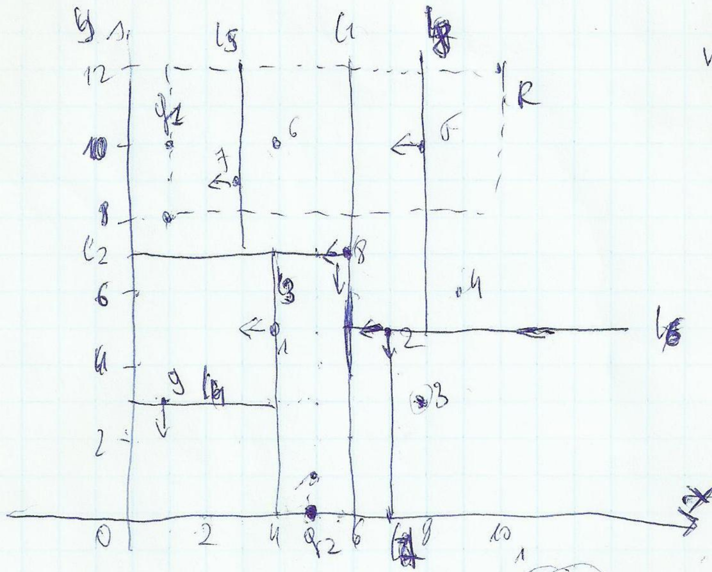
$2/5/4 = 1/10$

Sigmoid

9



nodi (1..8) = 5 1..5 6 1 2 5



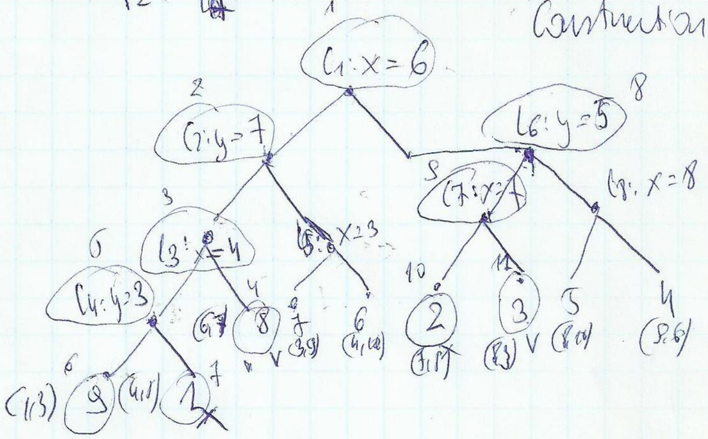
$d_1 < d_2$

$d_1^2 < d_2^2$

List

1	(4,0)
2	(7,0)
3	(8,3)
4	(9,6)
5	(8,10)
6	(4,10)
7	(3,9)
8	(6,7)
9	(1,3)

Construction:



$4+25 = 29$

$\boxed{q_2 = (5,0)}$

Step:

4: vbest = (8) $\quad dist^2 = 1^2 + 7^2 = 50$

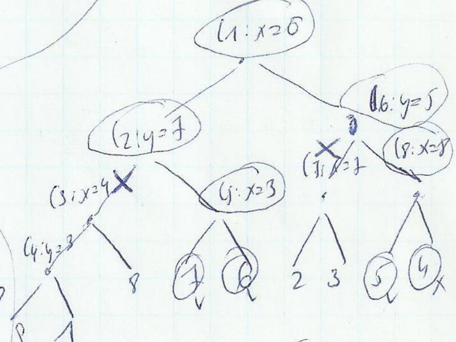
6: vbest = (9) $\quad dist^2 = 4^2 + 3^2 = 16 + 9 = 25$

~~10: vbest = (2) dist² = ...~~

11: vbest = (3) $\quad dist^2 = 3^2 + 3^2 = 18$

vbest = (3) with $dist^2 = 18$

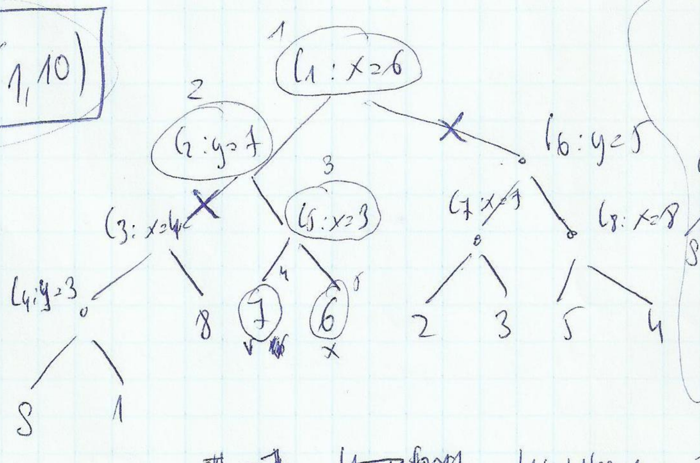
Range search



R = [(1,8),(10,12)]

result = {7,6,5}

$\boxed{q_1 = (1,10)}$

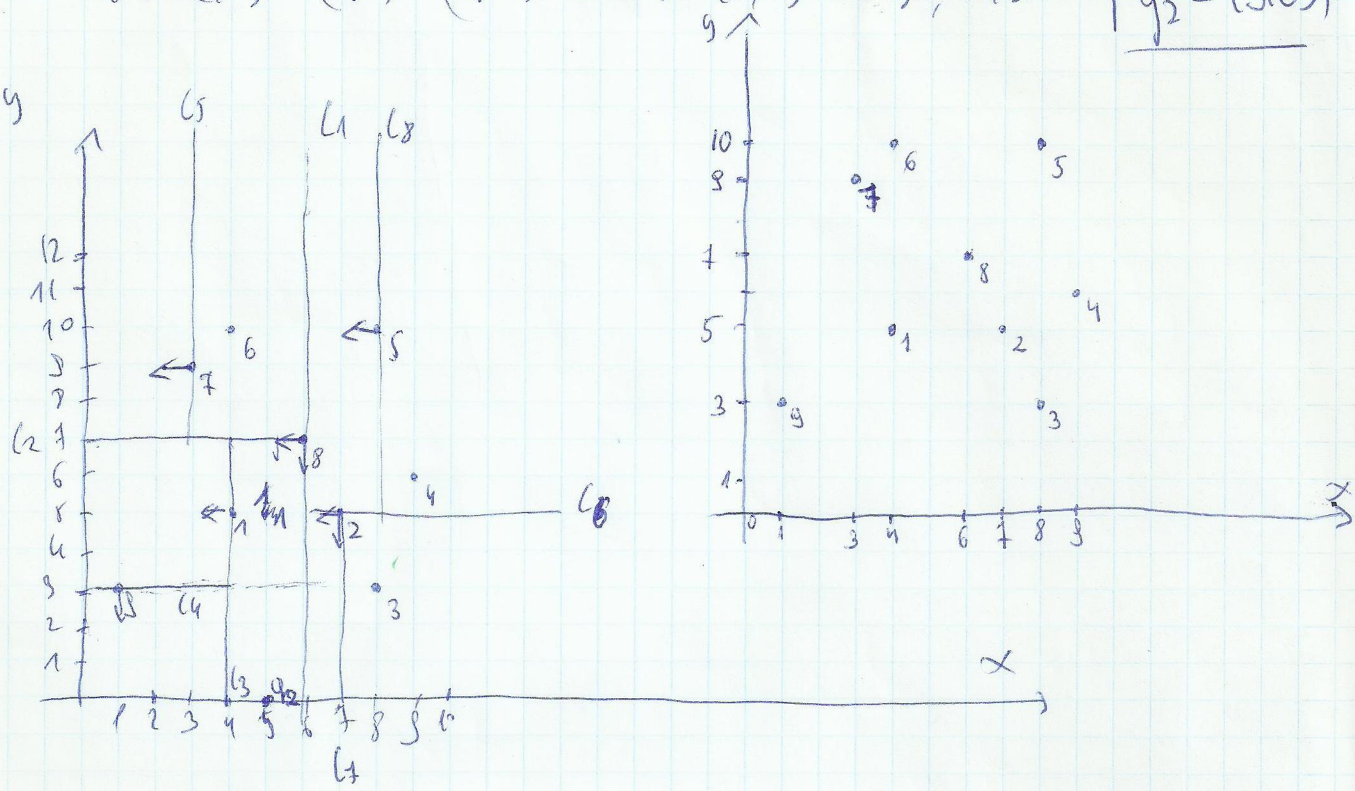


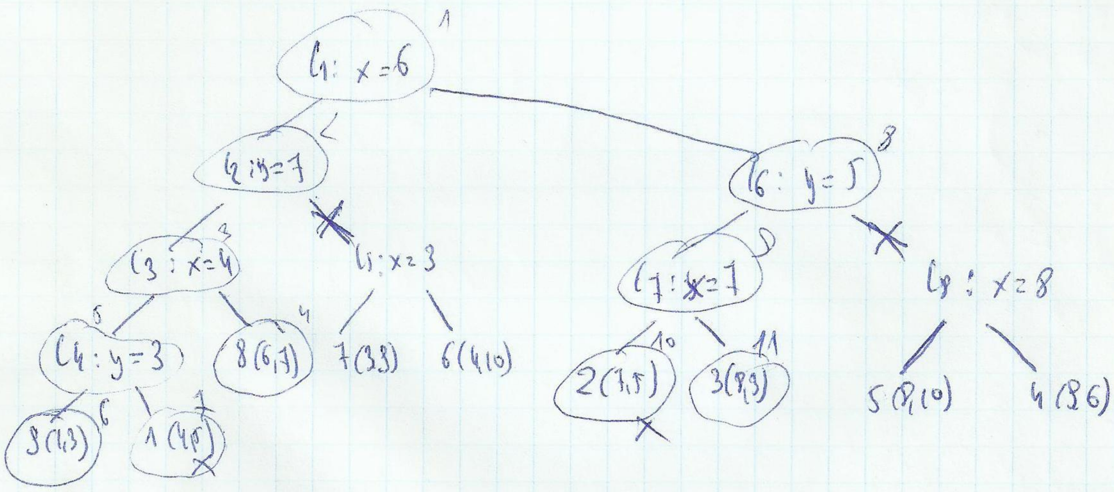
4: vbest = 7 $\quad dist^2 = 5$

1	2	3	4	5	6	7	8	9
(4,5)	(7,5)	(8,3)	(9,6)	(8,10)	(4,10)	(3,9)	(6,7)	(1,3)

Re-tuj:

$\boxed{q_2 = (5,0)}$





$q_2: (5,0)$

Step 4: $v_{best} = 8(6,7)$ $d^2 = 1^2+7^2 = 50$

Step 6: $v_{best} = 9(1,3)$ $d^2 = 4^2+3^2 = 25$

Step 7: $d^2 = 1^2+5^2 = 26 > 25$ ⟸ do not update vbest ×

Step 10: $d^2 = 2^2+5^2 = 29 > 25$ ×

Step 11: $d^2 = 3^2+3^2 = 18$ $v_{best} = 3(8,3)$