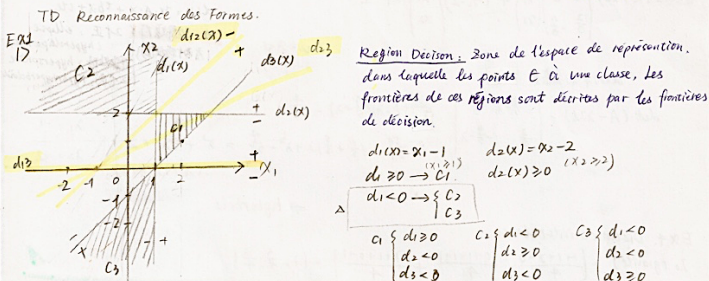
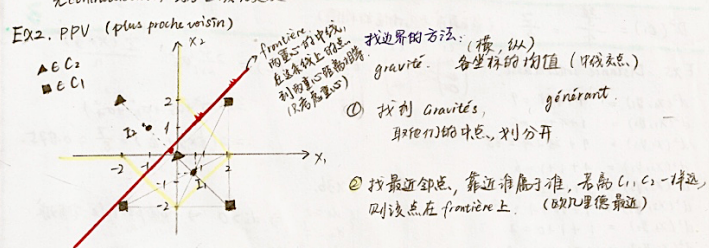


2018.12.3



2) $d_{12}(x) = d_1(x) - d_2(x)$
 $d_{12}(x) = x_1 - x_2 + 1$
 $d_{13}(x) = x_2$
 $d_{23}(x) = -x_1 + x_2 - 1$

Les fonctions de décision
 contradiction, 因为区域无重叠 $C_1' \subset C_1$ $C_2' \subset C_2$ $C_3' \subset C_3$



Ex3. $d(x) = -\frac{1}{2}x_1^2 - \frac{1}{2}x_2^2 + \frac{1}{2}x_1x_2 + 4x_1 - 2x_2 + 1$

1) $P_1 = (-1, 1)$ 代入 $d(x)$ 中:
 $= -\frac{1}{2} - \frac{1}{2} - \frac{1}{2} - 4 - 2 + 1 = -\frac{8}{2} = -4$
 $P_2 = (0, 0)$ 代入 $d(x)$ 中:
 $= 1 \geq 0$
 $\therefore P_2 \in C_1$

2) $d(x) = \frac{1}{2}Ax + \frac{1}{2}Bx + C$ Fonction de décision généralisée.
 position vecteur
 formule nature (行列式)
 position scalaire

$d(x) = (x_1, x_2) \begin{pmatrix} -\frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & -\frac{1}{2} \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \end{pmatrix} + (4, -2) \begin{pmatrix} x_1 \\ x_2 \end{pmatrix} + 1$

$\det(A - \lambda I) = \begin{vmatrix} -\frac{1}{2} - \lambda & \frac{1}{2} \\ \frac{1}{2} & -\frac{1}{2} - \lambda \end{vmatrix} = (\frac{1}{2} + \lambda)(\frac{1}{2} + \lambda) - \frac{1}{4} = \lambda^2 + \lambda + \frac{1}{4} = (\lambda + \frac{1}{2})^2$
 $\lambda_1 = -\frac{1}{2}$
 $\lambda_2 = -\frac{1}{2}$
 \Rightarrow hyperbole

Ex4. Distance interclasse
 I_0 (gravité) = $\frac{1+1+1}{4} + \frac{0+1+1+1}{4} + \frac{1+1+0+1}{4} = 1.75$

$d^2(x_1, x_2) = \frac{(1-1)^2 + (0-1)^2 + (1-1)^2 + ((1-2)^2 + (0+1)^2 + (1-0)^2) + ((1-0)^2 + (0+1)^2 + (1-1)^2)}{3} = 2$

$d^2(x_2, x_1 - \{x_2\}) = \frac{(0+1+0) + (1+0+1) + (1+0+0)}{3} = \frac{4}{3}$

$d^2(x_3, C_1 - \{x_3\}) = \frac{(1+1+1) + (1+0+1) + (4+0+1)}{3} = \frac{10}{3}$

$d^2(x_4, C_1 - \{x_4\}) = \frac{(1+1+0) + (1+0+0) + (4+0+1)}{3} = \frac{7}{3}$

$D^2(C_1) = \frac{3^2}{4} = \frac{9}{4}$ (最后求各点值的均值)

Ex5. Distance interclasse.
 $d^2(x_1, y_1) = 4+4+1 = 9$
 $d^2(x_1, y_2) = 1+4+0 = 5$
 $d^2(x_1, y_3) = 9+25+4 = 38$
 $d^2(x_2, y_1) = 4+1+1 = 6$
 $d^2(x_2, y_2) = 1+1+0 = 2$
 $d^2(x_2, y_3) = 9+16+4 = 29$
 $d^2(x_3, y_1) = 1+1+0 = 2$
 $d^2(x_3, y_2) = 0+1+1 = 2$
 $d^2(x_3, y_3) = 4+16+1 = 21$
 $d^2(x_4, y_1) = 9+1+1 = 11$
 $d^2(x_4, y_2) = 4+1+0 = 5$
 $d^2(x_4, y_3) = 16+16+4 = 36$

Ex6. $D^2(C) = \frac{2}{n} \sum_{k=1}^n \sigma_k^2 = \frac{2}{8} (\sigma_1^2 + \sigma_2^2 + \sigma_3^2 + \sigma_4^2) = 2(\frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8}) = \frac{1}{2} \approx 0.875$

Ex3b. $\begin{cases} d_1 = 2 \\ d_2 = \frac{1}{2} \\ d_3 = \frac{3}{2} \end{cases} \Rightarrow d_i > 0 \Rightarrow$ ellipsoïde, 椭球.

Ex6. la distance intraclasse vaut 2 fois la somme des variances sur chaque composante des formes
 $d = 2(\frac{1}{8} + \frac{1}{8}) = \frac{1}{2} \approx 0.875$

