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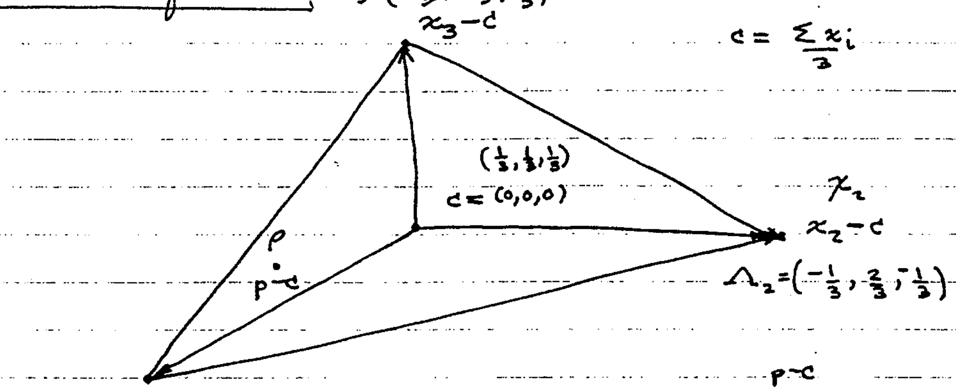
Calculation of λ's

$\Lambda_3 = (-\frac{1}{3}, -\frac{1}{3}, \frac{2}{3})$

$c = \frac{\sum x_i}{3}$



χ_1 $\quad x_1 - c$

$\Lambda_1 = (\frac{2}{3}, -\frac{1}{3}, -\frac{1}{3})$

$$\begin{bmatrix} -\chi_1- \\ -\chi_2- \end{bmatrix} \begin{bmatrix} a_1 \\ a_2 \end{bmatrix} = \underbrace{\begin{bmatrix} \rho_1 \\ \rho_2 \end{bmatrix}}_{p-c}$$

$-\chi_3-$

$\vec{a} = \chi^{-1} \vec{\rho}$

$$\lambda_1 = a_1 \Lambda_{11} + a_2 \Lambda_{21} + \frac{1}{3} + \cancel{\frac{2}{3}}$$

$$\lambda_2 = a_1 \Lambda_{12} + a_2 \Lambda a_{22} + \frac{1}{3} + \cancel{\frac{2}{3}}$$

$$\lambda_3 = a_1 \Lambda_{13} + a_2 \Lambda a_{23} + \frac{1}{3} + \frac{1}{3}$$

$$\vec{\lambda} = \Lambda \vec{a} + \frac{1}{3}[\vec{1}] \qquad \Lambda = \begin{bmatrix} | & | \\ \Lambda_1 & \Lambda_2 \\ | & | \end{bmatrix}$$

ex: $p = x_1 \qquad a_1 = 1 \qquad a_2 = 0$

$$\lambda_1 = 1 \cdot \underbrace{\frac{2}{3}}_{\Lambda_{11}} + 0 \cdot \underbrace{-\frac{1}{3}}_{\Lambda_{21}} + \frac{1}{3} + \cancel{\frac{2}{3}} = 1 \checkmark$$

$$\lambda_2 = 1 \cdot -\frac{1}{3} + 0 \cdot \frac{2}{3} + \frac{1}{3} = 0 \checkmark$$

$$\lambda_3 = 1 \cdot -\frac{1}{3} + 0 \cdot -\frac{1}{3} + \frac{1}{3} = 0 \checkmark$$

In general $\vec{\Lambda}_i = (0, \ldots, 0, 1, 0, \ldots 0) - \frac{1}{n}(1, 1, \ldots, 1)$

$$\vec{a} = \chi^{-1} \vec{\rho} \qquad \vec{\chi}_i = \vec{x}_i - \vec{c} \qquad \vec{c} = \frac{1}{n} \sum \vec{x}_i$$

$$\vec{\lambda} = \Lambda \vec{a} + \frac{1}{n} \vec{1} \qquad \chi = \begin{bmatrix} -x_1- \\ \vdots \\ -x_{n-1}- \end{bmatrix}$$

$$\Lambda = \begin{bmatrix} | & & | \\ \Lambda_1 & \ldots & \Lambda_{n-1} \\ | & & | \end{bmatrix}$$

Should always be well conditioned