

今 | ATA-入I | = 0 得 ATA的特征值为入1=入2=6 入5-2 入4-10 入2 人2 分应的特征向量分别为「0,0,1,0] 【写,0,0,0] 【写,0,0,0] 【写,0,0,0] 【写,0,0,0] 【写,0,0,0] 【写,0,0,0] 【写,0,0,0] 【写,0,0,0]

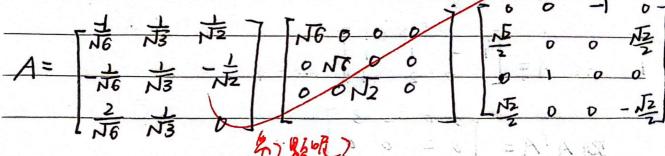


Date

RI OTATAQ = diag {6.6,2,0}

赤加草位局量科

则A的有异值分解为



3. 设 P 的 特征值为 λ ,则 P^2 的 特征值为 λ^2

.. rank (I-P) < n- rank(P) &P rank(I-P)+rank(P)<n

=: $rank(I-P) + rank(P) = \Pi$

设。的代数重级为00,1日7几级重级为01
o的n何重数为go,1的n重重数为gi
P = G = dim(P-1) = rank(I-P) Date
$g_0 = dim(P) = rank(P)$ $\Rightarrow g_0 + g_1 = \Pi$
2: ao+a=n A go ≤ao, g, ≤ai 190=ao
2:18 rank(P)<11 : 18 rank(I-P)<11
文····································
$ P _2 = (P(P^*P))^{\frac{1}{2}} = 1$ $ I - P _2 = (P(I-P)^*(I-P)))^{\frac{1}{2}} = 1$
4: 11P112 = 11I-P112
证明:
A*A(A+b) = A*(AA+)b = A*(A+)*A*b
= (AAtA)*b
=A*b
: min 11 b-AVII2 = 116-AA+b1/2=4(5m-AA+)b1/2
$= Pb = AX _2$
· x和A+b均为最小二乘解
BTATE = TATE
$\therefore A^*(b-Ax) = 0 \exists P A^*Ax = A^*b$
$z \cdot A + b = (AA + A) + b = A + AA + b$
$A^*A(x-A^{\dagger}b)=0$
$\therefore x - A^{\dagger}b \in \ker(A^*A) = \ker(A) = \operatorname{Range}(I_n - A^{\dagger}A)$
: Adec st. x-Atb= (In-AtA)x.
$\mathbb{R}P = A^{\dagger}b + (\mathbb{I}_{n} - A^{\dagger}A) d.$
: Atb \in Range (At) = Range - (In-AtA)
(In AtA) & LATE = (A)
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$$-1|X|_{2}^{2} = ||A^{\dagger}b||_{2}^{2} + ||(I_{1} - A^{\dagger}A)x||_{2}^{2}$$

mind显视2019。11的比量建造久分引

≥ ||A+b||2

: 1|X||2 > 1|A+b||2

(a)

取
$$A = \begin{bmatrix} 1 & 1 \\ 0 & 0 \end{bmatrix}$$
 刚 $A^{\dagger} = \begin{bmatrix} \frac{1}{2} & 0 \\ \frac{1}{2} & 0 \end{bmatrix}$

$$AB = \begin{bmatrix} 1 & -1 \\ 0 & t \end{bmatrix} \qquad (AB)^{\dagger} = \begin{bmatrix} \frac{1}{2} & 0 \\ -\frac{1}{2} & 0 \end{bmatrix}$$

$$B^{\dagger}A^{\dagger} = \begin{bmatrix} \frac{1}{2} & 0 \\ -\frac{1}{2} & 0 \end{bmatrix} \begin{bmatrix} \frac{1}{2} & 0 \\ \frac{1}{2} & 0 \end{bmatrix} = \begin{bmatrix} \frac{1}{4} & 0 \\ -\frac{1}{4} & 0 \end{bmatrix}$$

(b)
$$\mathbb{R} A = \begin{bmatrix} 1 & -1 \\ 0 & 6 \end{bmatrix}$$
 $\mathbb{R} A A + = \begin{bmatrix} \frac{1}{2} & 0 \\ -\frac{1}{2} & 0 \end{bmatrix}$

$$A^{2} = \begin{bmatrix} 1 & -1 \\ 0 & 0 \end{bmatrix} \qquad (A^{2})^{\dagger} = \begin{bmatrix} \frac{1}{2} & 0 \\ -\frac{1}{2} & 0 \end{bmatrix}$$

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(c) 取 A=[] +] 由 A-AI	=0 知A的特征值为1,0
A+=[元] A+的特	征值为之,0
显然此时AT的非界	经特征值的倒数不是A的
特征值	8
	12.9
	2
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