ä½ å¥½ï¼Œæˆ'æ˜¯æœ±ç»'å¯¹ã€‚æ¬¢è¿Žä½ ç»§ç»è·Ÿæˆ'å¦ä¹ ç º¿æ€§ä»£æ•°ï¼Œä»Šå¤©æˆ'ä»¬è¦è®²çš„å†…å®¹æ˜¯å€œç º¿æ€§æ— å…³ã€‚

ä¸Šä¸€èŠ‚è¯¾ä¸ï¼Œæˆ'ä»¬è®²çš„æ˜¯ç º¿æ€§ç©ºé—´çš„åŸºæœ¬æ¦‚å¿µï¼Œæˆ'ä»¬ä»Žæœ€ç®€å•çš„å'é‡ç©ºé—´å¼€å§‹ï¼Œä»¥ç º¿æ€§ç©ºé—´çš„åŸºå'Šå†…å®¹ã€‚

ç º¿æ€§ç»„å'Œæ˜¯ç º¿æ€§ä»£æ•°å¾ˆé‡è¦çš„ä¸€ä¸ªæ¦‚å¿µ

åœ¨æ£å¼å¼€å§‹è®²è§£ä¹‹å‰ï¼Œæˆ'ä»¬å…ˆæ¥çœ‹ä¸€ä¸ªä¾‹åã€‚

åˆè®¾ï¼Œä»¥ç¬¬ä¸€ä¸ªå'é‡ä¸ºä¾‹ï¼ŒYï¼ŒYï¼Œ $x_{1}, x_{2}, \ldots, x_{n}$ï¼Œé€£æˆ‘ä»¬ Y å…¬å¼ $Y_{i}=a_{0}+a_{1} x_{1}+a_{2} x_{2}+\cdots+a_{n} x_{n}$ã€‚

è¿™æ ·ä¸€ä¸ªç º¿æ€§æ–¹ç¨‹ï¼Œå®ƒçš„ç³»æ•° a è¡¨ç¤ºè¿™ä¸ªå˜é‡ï¼Œa_{0} æ˜¯å¸¸æ•°é¡¹ã€‚è¿™é‡Œçš„ç º¿æ€§ç»„å'Œæ˜¯ç º¿æ€§ä»£æ•°çš„é‡è¦å†…å®¹ï¼Œç º¿æ€§ç»„å'Œ…

ç º¿æ€§ç»„å'ˆ

åœ¨ä¸‹é¢ï¼Œæˆ'ä»¬å…ˆçœ‹ç º¿æ€§ç»„å'ˆçš„å®šä¹‰ï¼ŒV å'Œ $x_{1}, x_{2}, \ldots, x_{k}$ï¼Œ$v=\lambda_{1} x_{1}+\lambda_{2} x_{2}+\cdots+\lambda_{k} x_{k}=\sum_{i=1}^{k} \lambda_{i} x_{i}$ã€‚

é‚£ä¹ˆï¼Œv å°±æ˜¯å'é‡ $x_{1}, x_{2}, \ldots, x_{k}$ çš„ç º¿æ€§ç»„å'ˆã€‚

æˆ'ä»¬ç»§ç»çœ‹ç º¿æ€§æ— å…³çš„å®šä¹‰ï¼ŒV å'Œ $x_{1}, x_{2}, \ldots, x_{k}$ï¼Œ$0=\lambda_{1} x_{1}+\lambda_{2} x_{2}+\cdots+\lambda_{k} x_{k}=\sum_{i=1}^{k} \lambda_{i} x_{i}$ã€‚$\lambda_{1}=\ldots=\lambda_{k}=0$ï¼Œ$x_{1}, x_{2}, \ldots, x_{k}$ æ˜¯ç º¿æ€§æ— å…³çš„ã€‚

æ³¨æ„ï¼Œè¿™é‡Œæœ‰ä¸€ä¸ªæ–¹ç¨‹ $Ax=0$ ä¸çš„ $x=0$ åªæœ‰é›¶è§£ã€‚

ç Žåœ¨ï¼Œæˆ'ä»¬é€šè¿‡ä¸€ä¸ªä¾‹åæ¥ç†è§£ã€‚

å‡è®¾ä½ æƒ³ä»Žä¸Šæµ·å‡ºå'ï¼Œè¡Œé©¶ 84.9 å…¬é‡Œåˆ°è¾¾è‹å·žï¼Œå†ä»Žè‹å·žå‡ºå'ï¼Œè¡Œé©¶ 120.14 å…¬é‡Œåˆ°è¾¾æå·žï¼Œä¸Žä»Žä¸Šæµ·å‡ºå'ï¼Œè¡Œé©¶ 164.7 å…¬é‡Œç›´æŽ¥åˆ°è¾¾æå·žã€‚

æˆ'ä»¬å¯ä»¥æŠŠå'é‡ $v1$ï¼Œ$v2$ å'Œ $v3$ï¼Œ$v1$ å'Œ $v2$ æ˜¯ç º¿æ€§æ— å…³çš„ï¼Œè€Œ $v3$ å¯ä»¥è¡¨ç¤ºä¸º $v1$ å'Œ $v2$ çš„ç º¿æ€§ç»„å'ˆï¼Œæ‰€ä»¥ $v1$ã€$v2$ å'Œ $v3$ æ˜¯ç º¿æ€§ç›¸å…³çš„ã€‚

ç º¿æ€§æ— å…³çš„åˆ¤æ–

ç º¿æ€§æ— å…³çš„åˆ¤æ–ï¼Œåˆ¤æ–ä¸€ç»„å'é‡æ˜¯å¦ç º¿æ€§æ— å…³ï¼Œæˆ'ä»¬æœ‰ä»¥ä¸‹å‡ ç§æ–¹æ³•ï¼š

1. kå'é‡ä¸ç º¿æ€§æ— å…³ï¼Œç º¿æ€§ç»„å'ˆç³»æ•°å…¨ä¸º0ã€‚
2. å¦‚æžœå'é‡ç»„ $x_{1}, x_{2}, \ldots, x_{k}$ ä¸æœ‰ä¸€ä¸ªæ˜¯ 0 å'é‡ï¼Œé‚£ä¹ˆæ˜¯ç º¿æ€§ç›¸å…³çš„ã€‚
3. å¦‚æžœæœ‰å'é‡ $x_{1}, x_{2}, \ldots, x_{k}$ ä¸ï¼Œx_{k} æ˜¯å…¶ä»–å'é‡çš„ç º¿æ€§ç»„å'ˆï¼Œ$x_{i}=\lambda_{j}$ ï¼Œé‚£ä¹ˆå'é‡ç»„ $x_{1}, x_{2}, \ldots,$

x_{k}ï¼$ æ˜¯çº¿æ€§ç›¸å…³çš„ã€‚

ä¹‹å‰çš„æ–¹æ³•æ˜¯é€ä¸ªåˆ¤æ–ï¼Œè€Œæ›´ä¸€èˆ¬çš„æ–¹æ³•æ˜¯ï¼šå°†å‘é‡ç»„æž„æˆçŸ©é˜µï¼Œç„¶åŽåˆ©ç”¨çŸ©é˜µçš„ç§©æ¥åˆ¤æ–ã€‚å¦‚æžœçŸ©é˜µçš„ç§©å°äºŽå‘é‡çš„ä¸ªæ•°ï¼Œåˆ™å‘é‡ç»„çº¿æ€§ç›¸å…³ï¼›å¦åˆ™çº¿æ€§æ— å…³ã€‚

çŽ°åœ¨æˆ'ä»¬æ¥çœ‹ä¸€ä¸ªä¾‹åï¼Œåˆ¤æ–ä¸‹åˆ—3ä¸ªå'é‡æ˜¯å¦çº¿æ€§ç›¸å…³ã€‚

$$x_{1}=\left[\begin{array}{c}
1 \\
2 \\
-3 \\
4
\end{array}\right], x_{2}=\left[\begin{array}{l}
1 \\
1 \\
0 \\
2
\end{array}\right], x_{3}=\left[\begin{array}{c}
-1 \\
-2 \\
1 \\
1
\end{array}\right]$$

é¦–å…ˆï¼Œæˆ'ä»¬æŠŠå®ƒä»¬ç»„åˆæˆä¸€ä¸ªçº¿æ€§ç»„åˆï¼Œç„¶åŽä»¤å…¶ç‰äºŽé›¶å'é‡ã€‚

$$\lambda_{1} x_{1}+\lambda_{2} x_{2}+\lambda_{3} x_{3}=\lambda_{1}\left[\begin{array}{c}
1 \\
2 \\
-3 \\
4
\end{array}\right]+\lambda_{2}\left[\begin{array}{c}
1 \\
1 \\
0 \\
2
\end{array}\right]+\lambda_{3}\left[\begin{array}{c}
-1 \\
-2 \\
1 \\
1
\end{array}\right]=0$$

æŽ¥ç€ï¼ŒæŠŠå'é‡ç»„å†™æˆçŸ©é˜µçš„å½¢å¼ï¼Œè¿›è¡Œè¡Œå˜æ¢ï¼ŒåŒ–ç®€ä¸ºè¡Œé˜¶æ¢¯å½¢ã€‚

$$\left[\begin{array}{ccc}
1 & 1 & -1 \\
2 & 1 & -2 \\
-3 & 0 & 1 \\
4 & 2 & 1
\end{array}\right] \cdots\left[\begin{array}{ccc}
1 & 1 & -1 \\
0 & 1 & 0 \\
0 & 0 & 1 \\
0 & 0 & 0
\end{array}\right]$$

è¿™é‡Œï¼ŒçŸ©é˜µä¸€å…±æœ‰ä¸‰ä¸ªä¸»å…ƒï¼Œå®ƒçš„ç§©ä¸º3ï¼Œæ‰€ä»¥åªæœ‰é›¶è§£ï¼Œå³ $\lambda_{1}=0ï¼Œ\lambda_{2}=0ï¼Œ\lambda_{3}=0$çš„æƒ…å†µä¸‹ï¼Œç‰å¼æ‰æˆç«‹ã€‚å› æ¤ï¼Œæˆ'ä»¬å¯ä»¥è¯´å'é‡$ï¼x_{1}, x_{2}, x_{k}ï¼$ æ˜¯çº¿æ€§æ— å…³çš„ã€‚

æ›´æ™®éçš„æƒ…å†µçº¿æ€§ç›¸å…³æ€§

çŽ°åœ¨æˆ'ä»¬ä¸è€ƒè™‘å…·ä½"å'é‡ï¼Œè€Œæ˜¯çœ‹ä¸€ä¸ªæ›´ä¸€èˆ¬çš„æƒ…å†µï¼šå‡è®¾æœ‰kä¸ªçº¿æ€§æ— å…³çš„å'é‡$ï¼b_{1}, b_{2}, \ldots, b_{k}ï¼$ï¼Œä»¥åŠ$m$ä¸ªçº¿æ€§ç»„åˆçš„æƒ…å†µï¼š

$$
\begin{aligned}
x_{1} &=\sum_{i=1}^{k} \lambda_{i 1} b_{i} \\
x_{2} &=\sum_{i=1}^{k} \lambda_{i 2} b_{i} \\
\cdot & \\
\cdot & \\
\cdot & \\
x_{m} &=\sum_{i=1}^{k} \lambda_{i m} b_{i}
\end{aligned}
$$

å¦‚æžœæŠŠè¿™kä¸ªçº¿æ€§æ— å…³çš„å'é‡ç»„åˆæˆçŸ©é˜µBï¼Œ$B=\left[\begin{array}{lll}b_{1} & \ldots & b_{k}\end{array}\right]$ ï¼Œæˆ'ä»¬å°±å¯ä»¥æŠŠä¸Šé¢çš„å¼åæ”¹å†™ä¸ºï¼š

$$x_{j}=B \lambda_{i}, \lambda_{j}=\left[\begin{array}{c}
\lambda_{1 j} \\
\cdot \\
\cdot \\
\cdot \\
\lambda_{kj}
\end{array}\right], j=1, \ldots, m$$

è¿™æ ·ï¼Œå¦‚æžœå'é‡$ï¼x_{1}, x_{2}, \ldots, x_{m}ï¼$ æ˜¯çº¿æ€§ç›¸å…³çš„ï¼Œé£Žå…ˆï¼Œæˆ'ä»¬å¯ä»¥æ‰¾åˆ°ä¸€ç»„ä¸å…¨ä¸ºé›¶çš„ç³»æ•°$\sum_{i=1}^{m} \varphi_{j} x_{j}=\sum_{i=1}^{m} \varphi_{j} B \lambda_{j}=B \sum_{i=1}^{m} \varphi_{j} \lambda_{j}=0$ã€‚

æŽ¥ç€ï¼Œä»Žè¿™æ ·çš„å¼åä¸Šå°±å¯ä»¥çœ‹å‡ºï¼Œå'é‡$ï¼\lambda_{1}, \lambda_{2}, \ldots, \lambda_{m}ï¼$çº¿æ€§ç›¸å…³ï¼Œ$ï¼x_{1}, x_{2}, \ldots, x_{m}ï¼$ æ‰æ˜¯çº¿æ€§ç›¸å…³çš„ã€‚

è¿˜æ˜¯è€ƒè™‘ä¸€ä¸ªå…·ä½"çš„ä¾‹åï¼Œå‡è®¾ï¼Œæœ‰ä¸€ç»„çº¿æ€§æ— å…³çš„å'é‡ $ï¼b_{1}, b_{2}, b_{3}, b_{4}ï¼$ï¼Œå'Œ4ä¸ªçº¿æ€§ç»„åˆã€‚

$$\left\{\begin{aligned}
x_{1} &=b_{1}-2 b_{2}+b_{3}-b_{4} \\
x_{2} &=-4 b_{1}-2 b_{2}+4 b_{4} \\
x_{3} &=2 b_{1}+3 b_{2}-b_{3}-3 b_{4} \\
x_{4} &=17 b_{1}-10 b_{2}+11 b_{3}+b_{4}
\end{aligned}\right.$$

æŽ¥ä¸‹æ¥æˆ'ä»¬è¦æ£€éªŒå'é‡$ï¼x_{1}, x_{2}, x_{3}, x_{4}ï¼$æ˜¯å¦æ˜¯çº¿æ€§æ— å…³çš„ï¼ŸæŒ‰ç…§ä¹‹å‰çš„æ–¹æ³•ï¼Œæˆ'ä»¬éœ€è¦å…ˆæ‰¾åˆ°λå'é‡ï¼Œé€šè¿‡λå'é‡ç»„åˆæˆçŸ©é˜µï¼š

$$\left[\begin{array}{cccc}
1 & -4 & 2 & 17 \\
-2 & -2 & 3 & -10 \\
1 & 0 & -1 & 11 \\

-1 & 4 & -3 & 1
\end{array}\right]$$

æŽ¥ç€ï¼Œä½¿ç”¨é«˜æ–¯æ¶ˆå…ƒæ³•ï¼Œä¸€ç›´åˆ°å½¢æˆè¡Œé˜¶æ¢¯åž‹çŸ©é˜µä¸ºæ¢ã€‚é«˜æ–¯æ¶ˆå…ƒæ³•çš„ç”¨æ³•å·²ç»åœ¨ç¬¬å››èŠ‚è¯¾ä¸ç»™å‡ºäº†è¯¦ç»†çš„æ¥éª¤ï¼Œè¿™é‡Œç›´æŽ¥å†™å‡ºæœ€åŽçš„ç»“æžœï¼š

$$
\left[\begin{array}{cccc}
1 & 0 & 0 & -7 \\\
0 & 1 & 0 & -15 \\\
0 & 0 & 1 & -18 \\\
0 & 0 & 0 & 0
\end{array}\right]
$$

çŸ©é˜µçš„æœ€åŽä¸€åˆ—ä¸æ˜¯ä¸»å…ƒåˆ—ï¼Œè€Œä¸”ä½ å¯ä»¥å¾ˆå®¹æ˜“åœ°å‘现 $x_{4}=-7 x_{1}-15 x_{2}-18 x_{3}$ï¼Œæ‰€ä»¥ï¼Œæˆ‘ä»¬å¯ä»¥åˆ¤æ– $ï½x_{1}, x_{2}, x_{3}, x_{4}ï½$æ˜¯çº¿æ€§ç›¸å…³çš„ï¼Œ$x_{4}$ èƒ½ç”± $ï½x_{1}, x_{2}, x_{3}ï½$ çš„çº¿æ€§ç»„åˆæ¥è¡¨ç¤ºã€‚

å‹æƒ…æé†’ï¼šåœ¨ä¸€ä¸ªå‘é‡ç©ºé—´Vä¸ï¼Œæœ‰kä¸ªå‘é‡ $ï½x_{1}, x_{2}, \ldots, x_{k}ï½$å’Œ$m$ä¸ªçº¿æ€§ç»„åˆï¼Œå¦‚æžœ$m>k$ï¼Œé£ä¹ˆæˆ‘ä»¬å°±ä¸€å®šèƒ½è¯´ï¼Œè¿™kä¸ªå‘é‡ $ï½x_{1}, x_{2}, \ldots, x_{k}ï½$ çš„mä¸ªçº¿æ€§ç»„åˆæ˜¯çº¿æ€§ç›¸å…³çš„ã€‚

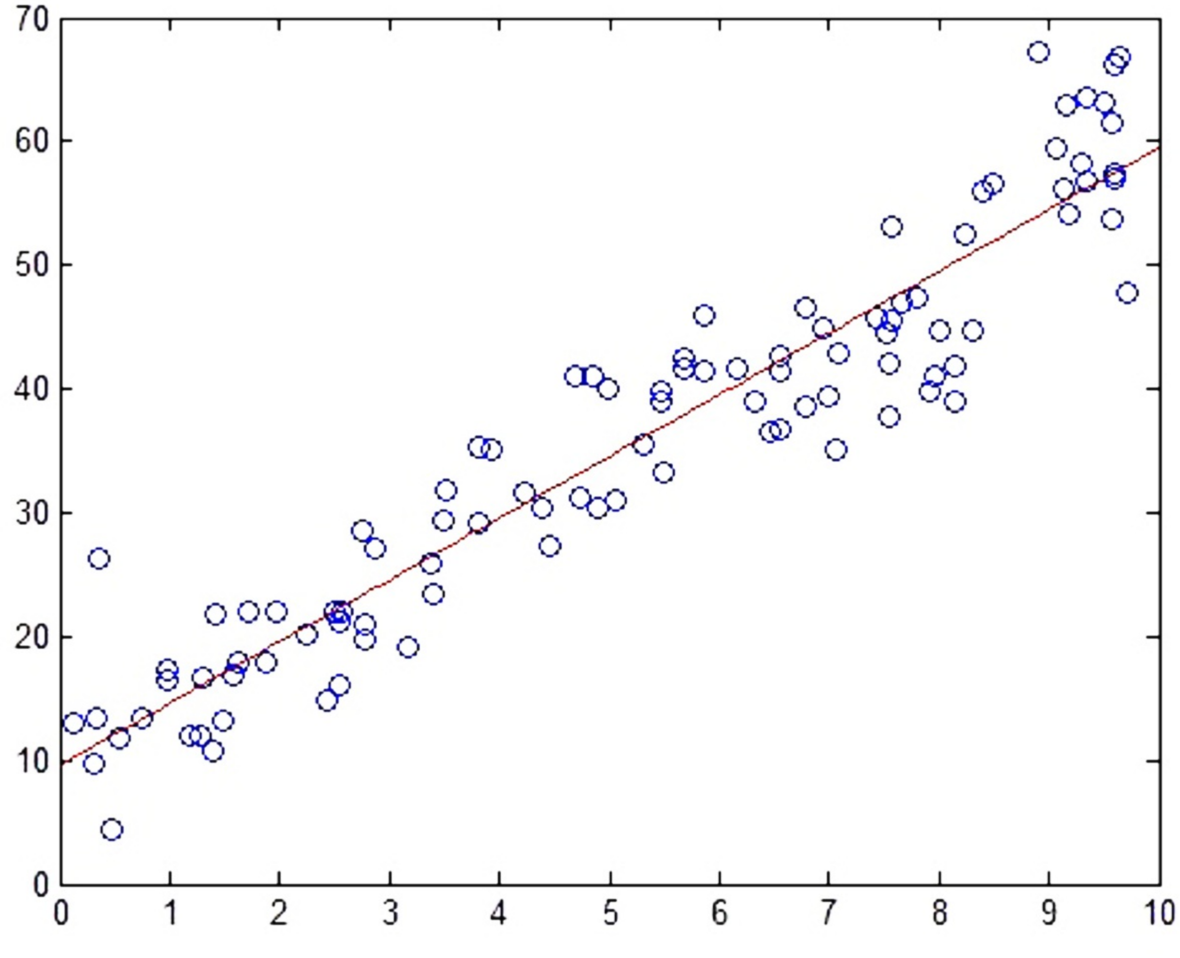
çº¿æ€§ç»„åˆåœ¨æœºå™¨å¦ä¹ ä¸çš„åº”ç”¨

åœ¨äº†è§£äº†çº¿æ€§ç»„åˆçš„æ¦‚å¿µï¼Œä»¥åŠçº¿æ€§ç»„åˆä¸çš„çº¿æ€§ç›¸å…³ï¼Œç‰¹åˆ«æ˜¯çº¿æ€§æ— å…³çš„åˆ¤æ–æ–¹æ³•åŽï¼Œæˆ‘ä»¬æ¥çœ‹ä¸€ä¸ªæœºå™¨å¦ä¹ ä¸çš„å®žè·µä¾‹åï¼Œæ¥äº†è§£ä¸€ä¸‹çº¿æ€§ç»„åˆæ˜¯æ€Žä¹ˆä½“çŽ°åœ¨æœºå™¨å¦ä¹ ä¸çš„ã€‚

æœºå™¨å¦ä¹ ä¸ï¼Œæœ€å¸¸è§ç›‘ç£å¦ä¹ ä¹‹ä¸€æ˜¯ä¸€ä¸ªæœ€ç®€å•çš„çº¿æ€§ç»„åˆçš„åº”ç”¨èŽ·å¾—äºŽ**çº¿æ€§å›žå½’**ã€‚çº¿æ€§å›žå½’æ˜¯æ¨¡æ‹Ÿè§„å¾‹ï¼Œä¹Ÿå°±æ˜¯é€šè¿‡ä¸€ç§æ•°æ®é›†æ•°æ®ï¼Œæ¥é¢„æµ‹ä»€ä¹ˆï¼Œæœºå™¨å¦ä¹ ç®—æ³•ï¼Œå®žé™…ä¸Šæ˜¯åˆ©ç”¨æ•°å¦ç†è®ºå¦ä¹ ç®—æ³•çš„æ¨¡åž‹ï¼Œé€šè¿‡è®¡ç®—æœºå»ºæ¨¡ä½¿å…¶èƒ½å¤Ÿè¿›è¡Œé¢„æµ‹ã€‚

çº¿æ€§å›žå½’çš„è¡¨è¾¾å¼ï¼Œæ˜¯é€šè¿‡åº¦é‡çº¿æ€§ç»„åˆçš„ç‰¹å¾ï¼Œå½¢æˆä¸€ä¸ªå›žå½’æ¨¡åž‹ï¼Œä¸Žå®žé™…å€¼çš„æŸå¤±æœ€å°ï¼ˆlossï¼‰ã€‚ä¹Ÿå°±æ˜¯è¯´æ‰¾å‡ºä¸€ä¸ªæœ€ä¼˜çš„å‚æ•°wå’Œbï¼Œä½¿æœºå™¨å¦ä¹ çš„è¾“å‡ºæœ€æŽ¥è¿‘çœŸå®žå€¼ã€‚

æˆ‘ä»¬é€šè¿‡ä¸€ä¸ªä¾‹åæ¥çœ‹çº¿æ€§å›žå½’ã€‚



è¿™æ˜¯ä¸€ä¸ªå…¸åž‹çš„ä¸€å…ƒçº¿æ€§å›žå½’æ¨¡åž‹ï¼Œå›¾ä¸çš„çº¢è‰²å›¾å½¢åœ†ç‚¹æ˜¯çœŸå®žæ•°æ®ç‚¹ï¼Œè€Œçº¢è‰²çº¿æ˜¯ä¸€å…ƒçº¿æ€§å›žå½’æ¨¡åž‹ï¼Œæˆ‘ä»¬å¸Œæœ›æ•°æ®ç‚¹ï¼Œä¹Ÿå°±æ˜¯ $y=\omega^{T} x+b$ã€‚æˆ‘ä»¬å¯ä»¥æ ¹æ®ç»™å®šçš„xå€¼é€šè¿‡æ–¹ç¨‹å¼æ¥è®¡ç®—yå€¼ã€‚ä»Žå›¾ä¸çœ‹ï¼Œçº¢è‰²çº¿ä¸Žå›´ç»•çš„çœŸå®žæ•°æ®ç‚¹æ¥çœ‹ï¼Œå…¶å®žæˆ‘ä»¬ä¸èƒ½è¯´çš„å¾ˆå‡ºè‰²ï¼Œè¿™ä¸ªä¸€å…ƒçº¿æ€§å›žå½’æ¨¡åž‹å°±åœ¨ä¸‹é¢ä¸ºä½ è¯¦ç»†ä»‹ç»ã€‚

çº¿æ€§å›žå½’åœ¨çŽ°å®žç”Ÿæ´»ä¸çš„ä¸€ä¸ªå…¸åž‹çš„åº”ç”¨åœºæ™¯æ˜¯å¥è«å¡é«˜ç‰çš„ç‰ƒç‡é¢„æµ‹ï¼Œæ¯”å¦‚è¾“å…¥æ•°æ®æ˜¯å¹´é¾„ã€æ€§åˆ«ã€èº«é«˜ã€ä½“é‡ã€å¹´èº«ä½“æ£€ï¼Œè€Œåº¦é‡æ˜¯å¿ƒè„ç—…ç‰å¯èƒ½å‘ç”Ÿçš„æ¦‚çŽ‡ã€‚

æ€Žä¹ˆ·ï¼Ÿæœºå™¨å¦ä¹ æ˜¯ä¸æ˜¯å¾ˆç®€å•ï¼Ÿ

å…¶å®žï¼Œæœºå™¨å¦ä¹ çš„æœ¬è´¨å°±æ˜¯ç”¨æ•°å¦æ¥è§£å†³çŽ°å®žçš„é—®é¢˜ã€‚è€Œå¾ˆå¤šçœ‹èµ·æ¥ç®€å•çš„æ•°å¦å…¬å¼å¯ä»¥è§£å†³å¾ˆå¤šé—®é¢˜ï¼Œæ¯”å¦‚ï¼Œè¿™é‡Œè´´çš„çº¿æ€§ç»„åˆå°±ç”¨â€”â€”çº¿æ€§å›žå½’ã€‚

æˆ‘æœ€è¿‘è¿˜åœ¨çŽ°ï¼Œæœ‰ä¸€å°‘å¦é¢˜åˆ°é—®é¢˜ï¼Œé«˜æ¸¯æ³³çæ€Žä¹ˆç”¨å¤æ‚çš„æœºå™¨å¦ä¹ ç®—æ³•åŽ»è§£å†³é—®é¢˜ï¼Œç‰¹åˆ«æ˜¯é«˜ç»´åº¦ä¸Šçš„æ·±åº¦å¦ä¹ ã€ç¥žç»ç½‘ç»œç‹¬çš„ã€‚ä½†å…¶å®žå¯¹äºŽæœºå™¨å¦ä¹ æ¥è¯´ï¼Œç®—æ³•ä¸æ˜¯è¶Šå¤æ‚è¶Šå¥½ï¼Œè€Œæ˜¯è¶Šé€‚ç”¨è¶Šå¥½ã€‚ä½ å¯ä»¥å…ˆä»Žç®€å•çš„ç®—æ³•å¼€å§‹å…¥æ‰‹ï¼Œå…ˆè§£æ±ºå®žé™…é—®é¢˜ï¼Œå†é€æ¥è¿›è¡Œä¼˜åŒ–ï¼Œè€Œæ˜¯ç®—æ³•çš„ç®—æ³•ã€‚

æœ¬èŠ‚å°ç»“

å¥½äº†ï¼Œåˆ°è¿™é‡Œçº¿æ€§æ–¹ç¨‹è¿™ä¸€è®²å°±ç»“æŸäº†ï¼Œæœ€åŽæˆ‘æ¥æ€»ç»“ä¸€ä¸‹æœ¬è®²çš„ä¸»è¦å†…å®¹ã€‚

å'é‡ç©ºé—´æ˜¯å®žè·µçš„åŸºæœ¬å•ä½ï¼Œä¹‹å‰éƒ½æ˜¯ä»Žå®è§'è§'åº¦å‡ºå'çš„ï¼Œè€Œä»Šå¤©çš„çŸ¥è¯†çš„é‡ç‚¹åœ¨äºŽï¼Œæˆ'ä»Žå¾®è§'è§'åº¦ï¼Œæ·±å…¥è®²è§£äº†çº¿æ€§ç©ºé—´ä¸å…ƒç´ ä¹‹é—´çš„å…³ç³»ï¼Œä¹Ÿå°±æ˜¯çº¿æ€§ç»„åˆï¼Œçº¿æ€§ç»„åˆæœ‰çº¿æ€§ç›¸å…³å'Œçº¿æ€§æ— å…³ï¼Œè€Œçº¿æ€§æ— å…³æ˜¯çº¿æ€§ä»£æ•°ä¸æœ€é‡è¦çš„æ¦‚å¿µä¹‹ä¸€ã€‚æ‰€ä»¥ï¼Œä½ ä¸€å®šè¦æŽŒæ¡çº¿æ€§ç»„åˆçš„æ¦‚å¿µï¼Œä»¥åŠå®ƒåŒ…å«çš„çº¿æ€§ç›¸å…³ï¼Œç‰¹åˆ«æ˜¯çº¿æ€§æ— å…³çš„åˆ¤æ–æ–¹å¼ï¼Œå¸Œæœ›ä½ èƒ½å¤Ÿç»ƒä¹ çº¿æ€§ç»„åˆä¸çš„çº¿æ€§æ— å…³çš„åˆ¤æ–ï¼Œä¸ºå®žè·µæ‰“å¥½åšå®žçš„åŸºç¡€ã€‚

çº¿æ€§ä»£æ•°ç»ƒä¹ åœº

ç»ƒä¹ æ—¶åˆ»åˆ°äº†ï¼Œä»Šå¤©çš„ç»ƒä¹ é¢˜ç®€å•ä¸€äº›ï¼Œå'Œä¹‹å‰ä¸€æ ·ï¼Œä¸¾ä¸ªä¾‹åï¼Œå‡è®¾æˆ'ä»¬æœ‰ä¸€ç»„çº¿æ€§æ— å…³çš„å'é‡$ï½›b_{1}, b_{2}, b_{3}, b_{4}ï½$ï¼Œå'Œ4ä¸ªçº¿æ€§ç»„åˆã€‚

$$\left\{\begin{aligned}
x_{1} &=b_{1}+b_{2}-2 b_{3}-b_{4} \\
x_{2} &=b_{1}+5 b_{2}-3 b_{3}-2 b_{4} \\
x_{3} &=3 b_{1}-b_{2}+b_{3}+4 b_{4} \\
x_{4} &=-2 b_{1}+2 b_{2}+b_{3}-b_{4}
\end{aligned}\right.$$

è¯·ä½ åˆ¤æ–$ï½›x_{1}, x_{2}, x_{3}, x_{4}ï½$æ˜¯çº¿æ€§æ— å…³çš„å—ï¼Ÿ

å‹æƒ…æç¤ºï¼šé€šè¿‡é«˜æ–¯æ¶ˆå…ƒæ³•ï¼Œæˆ'ä»¬èƒ½å¾—åˆ°è¡Œé˜¶æ¢¯åž‹çŸ©é˜µï¼Œé€šè¿‡è¡Œé˜¶æ¢¯åž‹çŸ©é˜µï¼Œå°±å¯ä»¥åˆ¤æ–$ï½›x_{1}, x_{2}, x_{3}, x_{4}ï½$æ˜¯å¦æ˜¯çº¿æ€§æ— å…³çš„ã€‚

æ¬¢è¿Žä½ åœ¨ç•™è¨€åŒºæ™’å‡ºä½ çš„è¿ç®—è¿‡ç¨‹å'Œç»“æžœã€‚å¦‚æžœæœ‰æ”¶èŽ·ï¼Œä¹Ÿæ¬¢è¿Žä½ æŠŠè¿™ç¯‡æ–‡ç« åˆ†äº«ç»™ä½ çš„æœ‹å‹ã€‚