

طريقة yule-walker

$$r_{22} = \frac{r_2 - \sum_{j=1}^1 (r_{1,j} \times r_{2,j})}{1 - \sum_{j=1}^1 (r_{1,j} \times r_j)} =$$

$j=1$

$$= \frac{r_2 - r_{1,1} \times r_1}{1 - r_{1,1} \times r_1}$$

$$r_{1,1} = r_m = r_n$$

~~$r_{1,1} = r_m = r_n$~~

$$r_{22} = \frac{r_2 - r_1^2}{1 - r_1^2}$$

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$$\hat{\phi}_{ii} = r_{ii} = \frac{r_i - \sum_{j=1}^{i-1} (r_{i-1,j} \times r_{i-j})}{1 - \sum_{j=1}^{i-1} (r_{i-1,j} \times r_j)}$$

$$i = 2, 3, \dots, h$$

$$r_{ij} = r_{i-1,j} - r_{ii} r_{i-1,i-j}$$

$$j = 1, 2, \dots, i-1$$

$$r_{i,i} = r_{ii}$$

$$r_{21} = r_1 - \frac{r_2 - r_1^2}{1 - r_1^2} r_1$$

$$r_{21} = \frac{r_1 (1 - r_2)}{1 - r_1^2}$$

المتوسط القياسي  $r_{21}$  -  $r_{22}$  حيث  $r_{33}$

$$r_{33} = \frac{r_3 - \left[ \frac{r_1(1-r_2)}{1-r_1^2} \times r_2 + \frac{r_2 - r_1^2}{1-r_1^2} \times r_1 \right]}{1 - \left[ \frac{r_1(1-r_2)}{1-r_1^2} r_1 + \frac{r_2 - r_1^2}{1-r_1^2} r_2 \right]}$$

$$r_{33} = \frac{r_1^3 - r_1 r_2 (2 - r_2) + r_3 (1 - r_1^2)}{1 - r_2^2 - 2 r_1^2 (1 - r_2)}$$

$r_{33}$  . *Chap*

$$r_{33} = \frac{r_3 - \sum_{j=1}^2 (r_{2,j} \times r_{3-j})}{1 - \sum_{j=1}^2 (r_{2,j} \times r_j)}$$

$j=1, 2$

$$r_{33} = \frac{r_3 - [(r_{2,1} \times r_2) + (r_{2,2} \times r_1)]}{1 - [(r_{2,1} \times r_1) + (r_{2,2} \times r_2)]}$$

$$r_{1,1} = r_{11} = r_1 \quad , \quad r_{2,2} = r_{22} = \frac{r_2 - r_1^2}{1 - r_1^2}$$

$$r_{ij} = r_{i-1,j} - r_{i-1,i} \times r_{i-1,i-j}$$

$$r_{21} = r_{11} - r_{22} r_{11}$$

$$r_{21} = r_1 - r_{22} r_1$$

$$V_{33} = \frac{V_3 - \sum_{j=1}^2 (V_{2,j} \times V_{3,j})}{1 - \sum_{j=1}^2 (V_{2,j} \times V_j)}$$

$$V_{33} = \frac{V_3 - [(V_{2,1} \times V_1) + (V_{2,2} \times V_2)]}{1 - [(V_{2,1} \times V_1) + (V_{2,2} \times V_2)]}$$

$$V_{2,1} = V_{1,1} - V_{22} \times V_{1,1}$$

$$= 0,539 - 0,0135 \times 0,539$$

$$V_{2,1} = 0,54$$

$$V_{33} = \frac{-0,215 - [0,54 \times 0,275 + (-0,0135 \times 0,539)]}{1 - [0,54 \times 0,539 + (-0,0135 \times 0,275)]}$$

$$= \frac{-0,3559}{0,746065} \Rightarrow V_{33} = -0,477$$

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مثال =

| الفترة | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 |
|--------|----|----|----|----|----|----|----|----|----|----|
| مبيعات | 22 | 29 | 25 | 28 | 23 | 28 | 30 | 23 | 22 | 32 |

إذا كانت معاملات الارتباط الذاتية

$$V_5 = -0,362 \quad V_4 = 0,24 \quad V_3 = 0,215 \quad V_2 = 0,275 \quad V_1 = 0,539$$

$$V_6 = -0,278$$

حساب  $V_{44}$ ,  $V_{55}$ ,  $V_{22}$ ,  $V_{11}$

$$V_{11} = V_1 = 0,539 \quad \text{لأن } N = 1$$

$$V_{ii} = \frac{V_i - \sum_{j=1}^{i-1} (V_{i-1,j} \times V_{i-j})}{1 - \sum_{j=1}^{i-1} (V_{i-1,j} \times V_j)}$$

$$V_{22} = \frac{V_2 - V_{11} \times V_1}{1 - V_{11} \times V_1}$$

$$V_{22} = \frac{V_2 - V_1^2}{1 - V_1 V_2} \Rightarrow V_{22} = \frac{0,275 - 0,539^2}{1 - 0,539 \times 0,275}$$

$$V_{22} = -0,0135$$

$$V_{44} = \frac{v_4 - \sum_{j=1}^3 (V_{3,j} \times V_{4-j})}{1 - \sum_{j=1}^3 (V_{3,j} \times V_j)}$$

$$V_{44} = \frac{v_4 - [(V_{3,1} \times V_3) + (V_{3,2} \times V_2) + (V_{3,3} \times V_1)]}{1 - [(V_{3,1} \times V_1) + (V_{3,2} \times V_2) + (V_{3,3} \times V_3)]}$$

$$V_{3,1} = V_{2,1} - V_{33} \cdot V_{2,2}$$

$$= 0,54 - (-0,477 \times -0,0135)$$

$$V_{3,1} = 0,53$$

$$V_{44} = \frac{-0,24 - [(0,53 \times -0,477) + (0,24 \times 0,275) + (-0,477 \times 0,539)]}{1 - [(0,53 \times 0,539) + (0,24 \times 0,275) + (-0,477 \times 0,275)]}$$

$$V_{3,2} = V_{2,2} - V_{33} \cdot V_{2,1}$$

$$V_{3,2} = -0,0135 - (-0,477) \cdot 0,54$$

$$V_{3,2} = 0,24$$

$$V_{44} = \frac{-0,24 - (-0,25 \times 0,066 + -0,257)}{1 - (0,285 \times 0,066 + -0,1)}$$

$$V_{44} = \frac{0,201}{0,749} \Rightarrow V_{44} = 0,268$$