



(EWMA) (Shewhart), (CUSUM), 가  
 Roberts (1959) 가  
 가 Crowder (1987,  
 1989), Lucas Saccucci (1990) 가  
 가

2.

가 T λ  
 n

$$T \quad R(T) \quad \widehat{R(T)} = \frac{n-r}{n}$$

$$\lambda \quad R(T) \quad R(T) = \exp(-\lambda T)$$

$$\hat{\lambda}$$

$$\hat{\lambda} = \frac{-\ln \frac{n-r}{n}}{T}, \quad r = 0, 1, \dots, n$$

(2.1)

$$T \quad r \quad \lambda n T$$

$$\lambda \quad \hat{\lambda} \quad r \quad \lambda n T$$

$$\hat{\lambda} = \frac{r}{nT}, \quad r = 0, 1, \dots$$

(2.2)

3.

가  
가

3.1

Grosh, Doris Lloyd (1989)                      5D                       $R(T)$                        $100(1 - 2\alpha)\%$

$$(R_L(2\alpha, n, r), R_U(2\alpha, n, r))$$

$$R_L(2\alpha, n, r) = \frac{1}{1 + \frac{r+1}{n-r} F_\alpha(2r+2, 2n-2r)}$$

$$R_U(2\alpha, n, r) = \frac{F_\alpha(2n-2r+2, 2r)}{F_\alpha(2n-2r+2, 2r) + \frac{r}{n-r+1}}$$

$$F_\alpha(\nu_1, \nu_2) \quad F \quad 100(1 - \alpha)\%$$

$$\lambda \quad 100(1 - 2\alpha)\%$$

$$\left(0, \frac{-\ln R_L(2\alpha, n, r)}{T}\right)$$

(2.1)

$$CL \quad UCL, \quad LCL$$

$$UCL = - \frac{\ln R_L(2\alpha, n, r_0)}{T}$$

$$CL = \lambda_0$$

$$LCL = 0$$

가

$$(ARL) = \frac{1}{1 - L(\lambda)} \quad (3.1)$$

$$\begin{aligned} L(\lambda) &= P(0 \leq \hat{\lambda} \leq UCL \mid \lambda) \\ &= P(-T \cdot UCL \leq \ln \frac{n-r}{n} \leq 0 \mid \lambda) \\ &= P(e^{-T \cdot UCL} \leq 1 - \frac{r}{n} \leq 1 \mid \lambda) \\ &= P(0 \leq \frac{r}{n} \leq 1 - e^{-T \cdot UCL} \mid \lambda) \\ &= P(0 \leq r \leq n[1 - e^{-T \cdot UCL}] \mid \lambda) \end{aligned}$$

### 3.2

$$\lambda = 100(1 - 2\alpha)\%$$

$$\left(0, \frac{\chi^2_{\alpha}(2r+2)}{2nT}\right)$$

$$(2.2)$$

$\alpha$

$$UCL = \frac{\chi^2_{\alpha}(2r_0+2)}{2nT}$$

$$CL = \lambda_0$$

$$LCL = 0$$

### 3.1

$$(3.1)$$

$$\begin{aligned} L(\lambda) &= P(0 \leq \hat{\lambda} \leq UCL \mid \lambda) \\ &= P(0 \leq r \leq nT \cdot UCL \mid \lambda) \end{aligned}$$

가  
 $\lambda$ 가 0.05  
 $T$ 가 10  
 $n$  50, 100, 200  
 $\bar{r}$   
 $r$   
 IMSL STAT/LIBRARY BINDF, POIDF  
 200  
 가  
 $L(\lambda)$   
 200  
 가  
 $r$   
 < 1> - < 6>  
 가

1. (n=50)

$\lambda$	$r=28$	$r=29$
0.05	171.8213	400.0000
0.06	21.7391	40.8163
0.07	5.7723	9.0777
0.08	2.5404	3.4551
0.09	1.5751	1.9111
0.10	1.2204	1.3623

2. (n=100)

$\lambda$	$r=51$	$r=52$
0.05	144.5087	257.7320
0.06	9.9900	14.4259
0.07	2.4477	3.0017
0.08	1.3093	1.4330
0.09	1.0593	1.0899
0.10	1.0084	1.0143

3.		(n=200)	
$\lambda$	$r=96$	$r=97$	
0.05	188.3239	285.7143	
0.06	5.3573	6.6194	
0.07	1.3833	1.4844	
0.08	1.0273	1.0379	
0.09	1.0008	1.0013	
0.10	1.0000	1.0000	

4.		(n=50)	
$\lambda$	$r=38$	$r=39$	
0.05	175.7469	290.6977	
0.06	15.4226	21.6216	
0.07	3.6907	4.5494	
0.08	1.7124	1.9193	
0.09	1.1997	1.2632	
0.10	1.0497	1.0690	

5.		(n=100)	
$\lambda$	$r=68$	$r=69$	
0.05	160.2564	230.9469	
0.06	7.2998	8.9445	
0.07	1.7756	1.8129	
0.08	1.1073	1.1346	
0.09	1.0095	1.0129	
0.10	1.0004	1.0007	

6.		(n=200)	
$\lambda$	$r = 126$	$r=127$	
0.05	191.5709	251.2563	
0.06	3.6605	4.0947	
0.07	1.1441	1.1695	
0.08	1.0031	1.0040	
0.09	1.0000	1.0000	
0.10	1.0000	1.0000	

가 , 가 , 가

4. 가

$Y_i$   $i$   $\hat{\lambda}_i (i = 1, 2, \dots)$  가

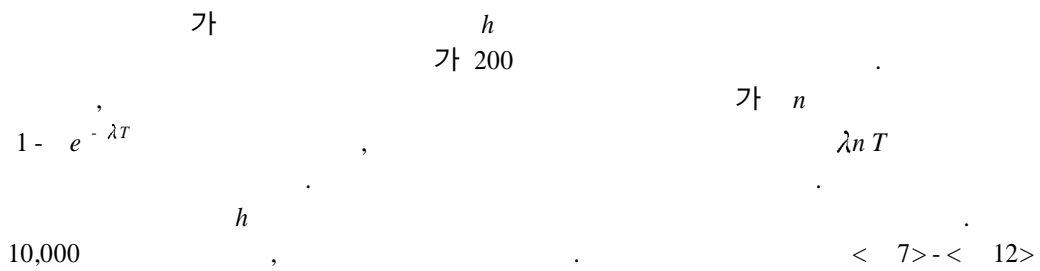
$$Y_i = (1 - w) Y_{i-1} + w \hat{\lambda}_i$$

$$Y_0 = \lambda_0$$

$w$  가 (weight)  $0 < w \leq 1$  .  $Y_0$  가  $\lambda_0$

3 가

- $\lambda_0 = 0.05$  :
- $h$  :
- $n = 50, 100, 200$  :
- $w = 0.1, 0.3, 0.5$  : 가



< 7> - < 12>

7.  
(n=50)

가

shift( $\lambda$ )	$\omega=0.1$	$\omega=0.3$	$\omega=0.5$
	$h=0.056486$	$h=0.063601$	$h=0.069641$
0.05	200.0473	199.9983	199.9877
0.06	9.3957	10.2702	13.1157
0.07	4.2509	3.6915	3.8656
0.08	2.8628	2.2959	2.1935
0.09	2.2288	1.7068	1.5745
0.10	1.8853	1.3831	1.2749

8.

가

(n=100)

shift( $\lambda$ )	$\omega=0.1$	$\omega=0.3$	$\omega=0.5$
	$h=0.054351$	$h=0.059148$	$h=0.063141$
0.05	200.0199	199.9931	199.9931
0.06	5.9352	5.6769	6.4264
0.07	2.9316	2.3995	2.2905
0.08	2.0510	1.5920	1.4362
0.09	1.6151	1.2217	1.1239
0.10	1.2856	1.0621	1.0257

9.

가

(n=200)

shift( $\lambda$ )	$\omega=0.1$	$\omega=0.3$	$\omega=0.5$
	$h=0.052993$	$h=0.056274$	$h=0.059002$
0.05	199.9419	199.9659	200.0323
0.06	4.0186	3.422	3.5101
0.07	2.1224	1.6025	1.4296
0.08	1.5243	1.1153	1.0509
0.09	1.1243	1.0061	1.0014
0.10	1.0101	1.0000	1.0000



10. 가  
(n=50)

shift( $\lambda$ )	$\omega=0.1$	$\omega=0.3$	$\omega=0.5$
	$h=0.054941$	$h=0.060636$	$h=0.065347$
0.05	200.0929	199.9921	199.9488
0.06	7.2791	7.4901	9.0057
0.07	3.4015	2.8707	2.8398
0.08	2.3074	1.8288	1.6871
0.09	1.8203	1.3752	1.2689
0.10	1.4866	1.1461	1.0870

11. 가  
(n=100)

shift( $\lambda$ )	$\omega=0.1$	$\omega=0.3$	$\omega=0.5$
	$h=0.053472$	$h=0.057480$	$h=0.060734$
0.05	199.8730	199.8905	199.9497
0.06	4.8565	4.4733	4.8076
0.07	2.4247	1.9296	1.7627
0.08	1.7293	1.2820	1.1780
0.09	1.2861	1.0478	1.0245
0.10	1.0544	1.0044	1.0018

12. 가  
(n=200)

shift( $\lambda$ )	$\omega=0.1$	$\omega=0.3$	$\omega=0.5$
	$h=0.052450$	$h=0.055226$	$h=0.057491$
0.05	199.9613	199.9837	199.9314
0.06	3.3378	2.8070	2.7091
0.07	1.8181	1.8884	1.1938
0.08	1.1811	1.0179	1.0050
0.09	1.0087	1.0001	1.0000
0.10	1.0001	1.0000	1.0000

가 , 가 , 가 , 가

## 5.

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