LAMPIRAN

LAMPIRAN 1

DATA PENGAMATAN BERAT MIE PER LINE WEEK 36

Berat standar mie = 60 gram
Batas release berat mie
Batas atas = 1,025 x 60 gr = 61,5 gram
Batas bawah = 0,975 x 60 gr = 58,5 gram

Waktu (t) (jam)	Berat mie (gram)
1	59.7
2	58.9
3	60.1
4	59.8
5	59.7
6	59.4
7	59.8
8	60.3
9	60.1
10	59.3
11	58.8
12	59.8
13	58.9
14	59.7
15	60.2
16	59.5
17	58.6
18	58.6
19	59.2
20	59.4
21	59.3
22	59.1

Departemen Quality Control PT. Indofood Sukses Makmur, Tbk

LAMPIRAN 2

NILAI EWMA Z_t UNTUK BERAT MIE DENGAN $\lambda = 0,2$

t	x_t	Z_t
1	59.7	59.940
2	58.9	59.732
3	60.1	59.806
4	59.8	59.804
5	59.7	59.784
6	59.4	59.707
7	59.8	59.725
8	60.3	59.840
9	60.1	59.892
10	59.3	59.774
11	58.8	59.579
12	59.8	59.623
13	58.9	59.479
14	59.7	59.523
15	60.2	59.658
16	59.5	59.627
17	58.6	59.421
18	58.6	59.257
19	59.2	59.246
20	59.4	59.277
21	59.3	59.281
22	59.1	59.245

LAMPIRAN 3

PERHITUNGAN YANG MENDASARI PEMILIHAN λ

lamda = 0,1

t	X_t	N_t	Z	Z_{t+1}	e_t	y_t	e_t^2
1	59.7	-0.3	2	-0.030	-0.300	0.020	0.090
2	58.9	-1.1	3	-0.137	-1.070	0.091	1.145
3	60.1	0.1	4	-0.113	0.237	0.076	0.056
4	59.8	-0.2	5	-0.122	-0.087	0.081	0.008
5	59.7	-0.3	6	-0.140	-0.178	0.093	0.032
6	59.4	-0.6	7	-0.186	-0.460	0.124	0.212
7	59.8	-0.2	8	-0.187	-0.014	0.125	0.000
8	60.3	0.3	9	-0.138	0.487	0.092	0.237
9	60.1	0.1	10	-0.115	0.238	0.076	0.057
10	59.3	-0.7	11	-0.173	-0.585	0.115	0.343
11	58.8	-1.2	12	-0.276	-1.027	0.184	1.054
12	59.8	-0.2	13	-0.268	0.076	0.179	0.006
13	58.9	-1.1	14	-0.351	-0.832	0.234	0.692
14	59.7	-0.3	15	-0.346	0.051	0.231	0.003
15	60.2	0.2	16	-0.292	0.546	0.194	0.298
16	59.5	-0.5	17	-0.313	-0.208	0.208	0.043
17	58.6	-1.4	18	-0.421	-1.087	0.281	1.183
18	58.6	-1.4	19	-0.519	-0.979	0.346	0.958
19	59.2	-0.8	20	-0.547	-0.281	0.365	0.079
20	59.4	-0.6	21	-0.552	-0.053	0.368	0.003
21	59.3	-0.7	22	-0.567	-0.148	0.378	0.022
22	59.1	-0.9	23	-0.601	-0.333	0.400	0.111
							6.630

lamda = 0,2

t	X_t	N_t	Z	Z_{t+1}	e_t	y_t	e_t^2
1	59.7	-0.3	2	-0.060	-0.300	0.040	0.090
2	58.9	-1.1	3	-0.268	-1.040	0.179	1.082
3	60.1	0.1	4	-0.194	0.368	0.130	0.135
4	59.8	-0.2	5	-0.196	-0.006	0.130	0.000
5	59.7	-0.3	6	-0.216	-0.104	0.144	0.011
6	59.4	-0.6	7	-0.293	-0.384	0.195	0.147
7	59.8	-0.2	8	-0.275	0.093	0.183	0.009
8	60.3	0.3	9	-0.160	0.575	0.106	0.330
9	60.1	0.1	10	-0.108	0.260	0.072	0.067
10	59.3	-0.7	11	-0.226	-0.592	0.151	0.351
11	58.8	-1.2	12	-0.421	-0.974	0.281	0.948
12	59.8	-0.2	13	-0.377	0.221	0.251	0.049
13	58.9	-1.1	14	-0.521	-0.723	0.348	0.523
14	59.7	-0.3	15	-0.477	0.221	0.318	0.049
15	60.2	0.2	16	-0.342	0.677	0.228	0.458
16	59.5	-0.5	17	-0.373	-0.158	0.249	0.025
17	58.6	-1.4	18	-0.579	-1.027	0.386	1.054
18	58.6	-1.4	19	-0.743	-0.821	0.495	0.675
19	59.2	-0.8	20	-0.754	-0.057	0.503	0.003
20	59.4	-0.6	21	-0.723	0.154	0.482	0.024
21	59.3	-0.7	22	-0.719	0.023	0.479	0.001
22	59.1	-0.9	23	-0.755	-0.181	0.503	0.033
							6.064

lamda = 0,3

t	X_t	N_t	Z	Z_{t+1}	e_t	y_t	e_t^2
1	59.7	-0.3	2	-0.090	-0.300	0.060	0.090
2	58.9	-1.1	3	-0.393	-1.010	0.262	1.020
3	60.1	0.1	4	-0.245	0.493	0.163	0.243
4	59.8	-0.2	5	-0.232	0.045	0.154	0.002
5	59.7	-0.3	6	-0.252	-0.068	0.168	0.005
6	59.4	-0.6	7	-0.356	-0.348	0.238	0.121
7	59.8	-0.2	8	-0.310	0.156	0.206	0.024
8	60.3	0.3	9	-0.127	0.610	0.084	0.372
9	60.1	0.1	10	-0.059	0.227	0.039	0.051
10	59.3	-0.7	11	-0.251	-0.641	0.167	0.411
11	58.8	-1.2	12	-0.536	-0.949	0.357	0.900
12	59.8	-0.2	13	-0.435	0.336	0.290	0.113
13	58.9	-1.1	14	-0.635	-0.665	0.423	0.442
14	59.7	-0.3	15	-0.534	0.335	0.356	0.112
15	60.2	0.2	16	-0.314	0.734	0.209	0.539
16	59.5	-0.5	17	-0.370	-0.186	0.246	0.035
17	58.6	-1.4	18	-0.679	-1.030	0.453	1.061
18	58.6	-1.4	19	-0.895	-0.721	0.597	0.520
19	59.2	-0.8	20	-0.867	0.095	0.578	0.009
20	59.4	-0.6	21	-0.787	0.267	0.524	0.071
21	59.3	-0.7	22	-0.761	0.087	0.507	0.008
22	59.1	-0.9	23	-0.802	-0.139	0.535	0.019
							6.169

lamda = 0,4

t	X_t	N_t	Z	Z_{t+1}	e_t	y_t	e_t^2
1	59.7	-0.3	2	-0.120	-0.300	0.080	0.090
2	58.9	-1.1	3	-0.512	-0.980	0.341	0.960
3	60.1	0.1	4	-0.267	0.612	0.178	0.375
4	59.8	-0.2	5	-0.240	0.067	0.160	0.005
5	59.7	-0.3	6	-0.264	-0.060	0.176	0.004
6	59.4	-0.6	7	-0.399	-0.336	0.266	0.113
7	59.8	-0.2	8	-0.319	0.199	0.213	0.039
8	60.3	0.3	9	-0.071	0.619	0.048	0.383
9	60.1	0.1	10	-0.003	0.171	0.002	0.029
10	59.3	-0.7	11	-0.282	-0.697	0.188	0.486
11	58.8	-1.2	12	-0.649	-0.918	0.433	0.843
12	59.8	-0.2	13	-0.469	0.449	0.313	0.202
13	58.9	-1.1	14	-0.722	-0.631	0.481	0.398
14	59.7	-0.3	15	-0.553	0.422	0.369	0.178
15	60.2	0.2	16	-0.252	0.753	0.168	0.567
16	59.5	-0.5	17	-0.351	-0.248	0.234	0.062
17	58.6	-1.4	18	-0.771	-1.049	0.514	1.100
18	58.6	-1.4	19	-1.022	-0.629	0.682	0.396
19	59.2	-0.8	20	-0.933	0.222	0.622	0.049
20	59.4	-0.6	21	-0.800	0.333	0.533	0.111
21	59.3	-0.7	22	-0.760	0.100	0.507	0.010
22	59.1	-0.9	23	-0.816	-0.140	0.544	0.020
							6.419

lamda = 0,5

t	X_t	N_t	Z	Z_{t+1}	e_t	y_t	e_t^2
1	59.7	-0.3	2	-0.150	-0.300	0.100	0.090
2	58.9	-1.1	3	-0.625	-0.950	0.417	0.903
3	60.1	0.1	4	-0.262	0.725	0.175	0.526
4	59.8	-0.2	5	-0.231	0.062	0.154	0.004
5	59.7	-0.3	6	-0.266	-0.069	0.177	0.005
6	59.4	-0.6	7	-0.433	-0.334	0.289	0.112
7	59.8	-0.2	8	-0.316	0.233	0.211	0.054
8	60.3	0.3	9	-0.008	0.616	0.005	0.380
9	60.1	0.1	10	0.046	0.108	-0.031	0.012
10	59.3	-0.7	11	-0.327	-0.746	0.218	0.556
11	58.8	-1.2	12	-0.764	-0.873	0.509	0.762
12	59.8	-0.2	13	-0.482	0.564	0.321	0.318
13	58.9	-1.1	14	-0.791	-0.618	0.527	0.382
14	59.7	-0.3	15	-0.545	0.491	0.364	0.241
15	60.2	0.2	16	-0.173	0.745	0.115	0.556
16	59.5	-0.5	17	-0.336	-0.327	0.224	0.107
17	58.6	-1.4	18	-0.868	-1.064	0.579	1.131
18	58.6	-1.4	19	-1.134	-0.532	0.756	0.283
19	59.2	-0.8	20	-0.967	0.334	0.645	0.112
20	59.4	-0.6	21	-0.784	0.367	0.522	0.135
21	59.3	-0.7	22	-0.742	0.084	0.495	0.007
22	59.1	-0.9	23	-0.821	-0.158	0.547	0.025
							6.699

lamda = 0,6

t	X_t	N_t	Z	Z_{t+1}	e_t	y_t	e_t^2
1	59.7	-0.3	2	-0.180	-0.300	0.120	0.090
2	58.9	-1.1	3	-0.732	-0.920	0.488	0.846
3	60.1	0.1	4	-0.233	0.832	0.155	0.692
4	59.8	-0.2	5	-0.213	0.033	0.142	0.001
5	59.7	-0.3	6	-0.265	-0.087	0.177	0.008
6	59.4	-0.6	7	-0.466	-0.335	0.311	0.112
7	59.8	-0.2	8	-0.306	0.266	0.204	0.071
8	60.3	0.3	9	0.057	0.606	-0.038	0.368
9	60.1	0.1	10	0.083	0.043	-0.055	0.002
10	59.3	-0.7	11	-0.387	-0.783	0.258	0.613
11	58.8	-1.2	12	-0.875	-0.813	0.583	0.661
12	59.8	-0.2	13	-0.470	0.675	0.313	0.455
13	58.9	-1.1	14	-0.848	-0.630	0.565	0.397
14	59.7	-0.3	15	-0.519	0.548	0.346	0.300
15	60.2	0.2	16	-0.088	0.719	0.058	0.517
16	59.5	-0.5	17	-0.335	-0.412	0.223	0.170
17	58.6	-1.4	18	-0.974	-1.065	0.649	1.134
18	58.6	-1.4	19	-1.230	-0.426	0.820	0.181
19	59.2	-0.8	20	-0.972	0.430	0.648	0.185
20	59.4	-0.6	21	-0.749	0.372	0.499	0.138
21	59.3	-0.7	22	-0.719	0.049	0.480	0.002
22	59.1	-0.9	23	-0.828	-0.181	0.552	0.033
							6.977

LAMPIRAN 4

Pembuktian persamaan (3-3)

$$\hat{b}(T)\sum_{t=1}^{T}\beta^{T-t} = \sum_{t=1}^{T}\beta^{T=t}X_t$$

$$\sum_{t=1}^{T}\beta^{T-t} = \beta^{T-1} + \beta^{T-2} + \ldots + 1 \quad = 1 + \beta + \beta^2 + \ldots + \beta^{T-1}$$

misal : $\beta = q$ dan $\sum_{t=1}^{T}\beta^{T-t} = S_n$

$S_n = 1 + q + q^2 + \ldots + q^{n-1}$

$q\,S_n = q + q^2 + q^3 + \ldots + q^n$ -

$S_n - q\,S_n = 1 - q^n$

$S_n\,(1 - q) = 1 - q^n$

$$S_n = \frac{1-q^n}{1-q}$$

jadi $\sum_{t=1}^{T}\beta^{T-t} = \frac{1-\beta^T}{1-\beta}$

kemudian $\hat{b}(T)\frac{1-\beta^T}{1-\beta} = \sum_{t=1}^{T}\beta^{T=t}X_t$

$$\hat{b}(T) = \frac{1-\beta}{1-\beta^T}\sum_{t=1}^{T}\beta^{T=t}X_t$$

Bila $\hat{b}(T-1)\sum_{t=1}^{T-1}\beta^{T-t} = \sum_{t=1}^{T-1}\beta^{T=t}X_t$

Maka $\sum_{t=1}^{T-1}\beta^{T-t} = \beta^{T-1} + \beta^{T-2} + \ldots + \beta$

$$= \beta + \beta^2 + \beta^3 + \ldots + \beta^{T-1}$$

misal : $\beta = q$ dan $\sum_{t=1}^{T-1}\beta^{T-t} = S_{t-1}$

$S_{t-1} = q + q^2 + q^3 + \ldots + q^{t-1}$

$q\,S_{t-1} = q^2 + q^3 + q^4 + \ldots + q^t$ -

$S_{t-1} - q\,S_{t-1} = q - q^t$

$S_{t-1}\,(1 - q) = q\,(1 - q^{t-1})$

$$S_{t-1} = \frac{q(1-q^{t-1})}{1-q} \quad \text{jadi} \quad \sum_{t=1}^{T-1} \beta^{T-t} = \frac{\beta(1-\beta^{T-1})}{1-\beta}$$

$$\hat{b}(T-1)\frac{\beta(1-\beta^{T-1})}{1-\beta} = \sum_{t=1}^{T-1} \beta^{T=t} X_t$$

$$\hat{b}(T-1) = \frac{(1-\beta)}{\beta(1-\beta^{T-1})} \sum_{t=1}^{T} \beta^{T=t} X_t$$

kemudian $\sum_{t=1}^{T-1} \beta^{T-t} X_t = \beta^{T-1}X + \beta^{T-2}X + \ldots + \beta X \quad = X_T(\beta + \beta^2 + \beta^3 + \ldots + \beta^{T-1})$

misal : $\beta = q$ dan $\sum_{t=1}^{T-1} \beta^{T-t} X_t = S_{t-1}$

$S_{t-1} = X_T (q + q^2 + q^3 + \ldots + q^{t-1})$

$q\, S_{t-1} = X_T (q^2 + q^3 + q^4 + \ldots + q^t)$ -

$S_{t-1} - q\, S_{t-1} = X_T (q - q^t)$

$S_{t-1} (1 - q) = X_T\, q\, (1 - q^{t-1})$

$$S_{t-I} = \frac{X_T q(1-q^{t-1})}{1-q}$$

jadi $\sum_{t=1}^{T-1} \beta^{T-t} X_t = \frac{X_T \beta(1-\beta^{T-1})}{1-\beta}$

$$\hat{b}(T-1) = \frac{(1-\beta)}{\beta(1-\beta^{T-1})} x \frac{X_T \beta(1-\beta^{T-1})}{(1-\beta)}$$

$$= X_T$$

jadi $\hat{b}(T) = \frac{1-\beta}{1-\beta^T} \sum_{t=1}^{T} \beta^{T=t} X_t$

$$= \frac{1-\beta}{1-\beta^T}\left[X_T + \sum_{t=1}^{T-1} \beta^{T-t} X_t\right]$$

$$= \frac{1-\beta}{1-\beta^T}\left[X_T + \frac{X_T \beta(1-\beta^{T-1})}{(1-\beta)}\right]$$

$$= \frac{(1-\beta)X_T}{1-\beta^T}\left[\frac{(1-\beta)X_T \beta(1-\beta^{T-1})}{(1-\beta^T)(1-\beta)}\right]$$

$$\hat{b}(T) = \frac{(1-\beta)X_T + \beta(1-\beta^{T-1})\hat{b}(T-1)}{1-\beta^T}$$

LAMPIRAN 5

Pembuktian persamaan (3-8)

Bila var $(X_t) = \sigma^2$ maka akan dibuktikan var $(Z_t) = \sigma^2\left(\frac{\lambda}{2-\lambda}\right)\left[1-(1-\lambda)^{2t}\right]$

Diketahui $Z_t = \lambda\sum_{j=0}^{t-1}(1-\lambda)^j X_{t-j} + (1-\lambda)^t Z_0$

$$\text{var}(Z_t) = \text{var}\left(\lambda\sum_{j=0}^{t-1}(1-\lambda)^j X_{t-j} + (1-\lambda)^t Z_0\right)$$

$$= \text{var}\left(\lambda\sum_{j=0}^{t-1}(1-\lambda)^j X_{t-j}\right) + \text{var}\left((1-\lambda)^t Z_0\right)$$

$$= \text{var}\left(\lambda\sum_{j=0}^{t-1}(1-\lambda)^j X_{t-j}\right)$$

$$= \lambda^2\sum_{j=0}^{t-1}(1-\lambda)^{2j}\,\text{var}(X_{t-j})$$

$$\sum_{j=0}^{t-1}(1-\lambda)^{2j} = 1+(1-\lambda)^2+(1-\lambda)^4+\cdots+(1-\lambda)^{2t-2}$$

misal $q = (1-\lambda)$ dan $S_{t-1} = \sum_{j=0}^{t-1}(1-\lambda)^{2j}$

maka $S_{t-1} = 1 + q^2 + q^4 + \ldots + q^{2t-2}$

$q^2 S_{t-1} = q^2 + q^4 + q^6 + \ldots + q^{2t}$ -

$S_{t-1} - q^2 S_{t-1} = 1 - q^{2t}$

$S_{t-1}(1-q^2) = (1-q^{2t})$

$$S_{t-1} = \frac{(1-q^{2t})}{1-q^2}$$

$$\sum_{j=0}^{t-1}(1-\lambda)^{2j} = \frac{1-(1-\lambda)^{2t}}{1-(1-\lambda)^2} = \frac{1-(1-\lambda)^{2t}}{1-(1-2\lambda+\lambda^2)} = \frac{1-(1-\lambda)^{2t}}{2\lambda-\lambda^2} = \frac{1-(1-\lambda)^{2t}}{\lambda(2-\lambda)}$$

maka $\text{var}(Z_t) = \lambda^2\left(\frac{1-(1-\lambda)^{2t}}{\lambda(2-\lambda)}\right)\text{var}(X_{t-j})$

$$= \sigma^2\frac{\lambda}{2-\lambda}\left[1-(1-\lambda)^{2t}\right]$$