LAMPIRAN-LAMPIRAN

1. **Lampiran Source Code Pembuatan Data Prediksi Covid-19 dengan Metode Grey** GM (1,1)

```
clc clear syms a u;
c = [a,u]';% Constitutes a matrix
A = [ 85983 70017 42320 26565 21439 113409 271185 35930 7182
3775 2407 1350 48058 261484 62897 9998 2982]; %Enter data
Ago = cumsum(A);% The original data is accumulated once, and
the 1-AGOsequence xi(1) is obtained.
n = length(A);%Number of original data

for k=1:(n-1)
    Z(k)=(Ago(k)+Ago(k+1))/2; %Z(i) generates a sequence for
theimmediate mean of xi(1)
end

Yn = A;%Yn is a constant term vector
Yn(1) = []; % Starts from the second number, that is x(2),
x(3)...Yn = Yn';
E = [-Z;ones(1,n-1)]';% Accumulate the generated data to make
the meanc = (E'*E)\(E'*Yn);% Use the formula to find a, u
c = c';
a = c(1);% Gets the value of au = c(2);% Gets the value of u
F = [];
F(1)  = A(1);
for k = 2:(n)
F(k)  =  (A(1)-u/a)/exp(a*(k-1))+u/a;%  Find  the  GM(1,1)  model
formula
End
G=[];
G(1)  = A(1);
for k = 2:(n)
    G(k)  = F(k)-F(k-1);% Difference between the two to
restore theoriginal sequence, get the predicted data
end

t1=1:n;t2=1:n;
plot(t1,A,'bo--');hold on; plot(t2,G,'r*-');
title('Prediksi Pertumbuhan Penjangkitan Covid-19');
```

```
legend('Actual value','Predictive value');

% Posterior test
e=A-G;
q=e/A;
%Relative error
s1=var(A);
s2=var(e);
c=s2/s1;
% Variance ratio
len=length(e);
p=0; % Small error probability
for i=1:len
if(abs(e(i))<0.6745*s1) p=p+1;
end
end
p=p/len;
```

2. **Lampiran Source Code Pembuatan Nilai Analisis Variabel Protokol Kesehatan dan Asumsi Pengaruh Penularan Covid-19 dengan Metode Grey Relational Analisis (GRA) terhadap Data AwalCovid-19**

```
clc
clear
PELP  = [408; 454; 941; 17162; 35687; 19932; 61510; 81608;
122599; 199153; 156101; 120015; 473173; 528996; 296969;
191202; 185226];
KTK    = [124171; 190032; 219189; 152435; 130347; 191144;
133795; 53560; 31457; 26162; 15893; 20052; 19478; 48404;
9502; 3737; 2332];
VKS    = [70409; 207282; 1494766; 1433620; 1110495; 2224241;
2359721; 2913705; 2800503; 912552; 600338; 297624; 232018;
94727; 1963767; 957424; 189150];
MSK    = [204975; 190683; 122735; 60850; 46974; 33007;
65187; 79223; 53214; 48594; 26030; 29108; 38010; 54320;
32069; 24323; 27081];
NOMSK = [67018; 38201; 19335; 11657; 12855; 6542; 6611; 4101;
2953; 2723; 1313; 1393; 1866; 2354; 2157; 1740; 1231];
```

```
JRK     = [190988; 182134; 120311; 60621; 44094; 31392;
53312; 71792; 50007; 44888; 24092; 27284; 36540; 52766;
30289; 23357; 26715];
NOJRK = [72365; 46900; 21759; 11886; 15735; 8157; 18336;
11826; 6160; 5761; 3251; 3537; 4068; 3788; 3937; 2706; 1797];
CVD     = [85983; 70017; 42320; 26565; 21439; 113409; 271185;
35930; 7182;3775; 2407; 1350; 48058; 261484; 62897; 9998;
2982];%Enter data

disp('GRA Experiment for Smaller the better example\n');
disp('Step 1 preprocessing --> data normalization with
smaller the bettercriteria');

PELP_1      = (max(PELP)-PELP)/(max(PELP)-min(PELP));KTK_1
            = (max(KTK)-KTK)/(max(KTK)-min(KTK));
VKS_1       = (max(VKS)-VKS)/(max(VKS)-min(VKS));
MSK_1       = (max(MSK)-MSK)/(max(MSK)-min(MSK));
NOMSK_1     = (max(NOMSK)-NOMSK)/(max(NOMSK)-min(NOMSK));JRK_1
            = (max(JRK)-JRK)/(max(JRK)-min(JRK));
NOJRK_1     = (max(NOJRK)-NOJRK)/(max(NOJRK)-min(NOJRK));CVD_1
            = (max(CVD)-CVD)/(max(CVD)-min(CVD));
disp([{'PELP_1','KTK_1','VKS_1','MSK_1','NOMSK_1','JRK_1','NOJRK
_1', 'CVD_1'};
num2cell([PELP_1,KTK_1,VKS_1,MSK_1,NOMSK_1,JRK_1,NOJRK_1,CVD_
1])]);
disp('Step 2 --> Find delta value based on ideal value: 1');
delta_CVD_PELP      = abs(CVD_1 - PELP_1);
delta_CVD_KTK       = abs(CVD_1 - KTK_1);
delta_CVD_VKS       = abs(CVD_1 - VKS_1);
delta_CVD_MSK       = abs(CVD_1 - MSK_1);
delta_CVD_NOMSK     = abs(CVD_1 - NOMSK_1);
delta_CVD_JRK       = abs(CVD_1 - JRK_1);
delta_CVD_NOJRK     = abs(CVD_1 - NOJRK_1);

disp([{'delta_CVD_PELP','delta_CVD_KTK','delta_CVD_VKS','delta_C
VD_MSK','
delta_CVD_NOMSK','delta_CVD_JRK','delta_CVD_NOJRK'};num2cell([de
lta_CVD_P ELP, delta_CVD_KTK, delta_CVD_VKS, delta_CVD_MSK,
delta_CVD_NOMSK, delta_CVD_JRK, delta_CVD_NOJRK])]);
```

```
disp('Step 3 --> Find Grey Relational Coefficient');

dist_val = 0.5;
PELP_2     =(min(delta_CVD_PELP)+
dist_val*max(delta_CVD_PELP))./(delta_CVD_PELP +
dist_val*max(delta_CVD_PELP));
KTK_2      =(min(delta_CVD_KTK) +
dist_val*max(delta_CVD_KTK))./(delta_CVD_KTK +
dist_val*max(delta_CVD_KTK));
VKS_2      =(min(delta_CVD_VKS) +
dist_val*max(delta_CVD_VKS))./(delta_CVD_VKS +
dist_val*max(delta_CVD_VKS));
MSK_2      =(min(delta_CVD_MSK) +
dist_val*max(delta_CVD_MSK))./(delta_CVD_MSK +
dist_val*max(delta_CVD_MSK));
NOMSK_2  =(min(delta_CVD_NOMSK) +
dist_val*max(delta_CVD_NOMSK))./(delta_CVD_NOMSK +
dist_val*max(delta_CVD_NOMSK));
JRK_2      =(min(delta_CVD_JRK) +
dist_val*max(delta_CVD_JRK))./(delta_CVD_JRK +
dist_val*max(delta_CVD_JRK));
NOJRK_2  =(min(delta_CVD_NOJRK) +
dist_val*max(delta_CVD_NOJRK))./(delta_CVD_NOJRK +
dist_val*max(delta_CVD_NOJRK));

disp([{'GRA PBC-PELP','GRA PBC-KTK','GRA PBC-VKS','GRA PBC-
MSK','GRA PBC-NOMSK','GRA PBC-JRK','GRA PBC-
NOJRK'};num2cell([PELP_2,KTK_2, VKS_2, MSK_2, NOMSK_2, JRK_2,
NOJRK_2])]);
disp('Step 4 --> Find Grey Relational Grade and the ranks');
PELP_3       = mean(PELP_2);
KTK_3        = mean(KTK_2);
VKS_3        = mean(VKS_2);
MSK_3        = mean(MSK_2);
NOMSK_3      = mean(NOMSK_2);
JRK_3        = mean(JRK_2);
NOJRK_3      = mean(NOJRK_2);
```

```
disp([{'Avg_GRA CVD-PELP','Avg_GRA CVD-KTK','Avg_GRA CVD-
VKS','Avg_GRACVD-MSK','Avg_GRA CVD-NOMSK', 'Avg_GRA CVD-JRK',
'Avg_GRA CVD- NOJRK'};
num2cell([PELP_3, KTK_3, VKS_3, MSK_3, NOMSK_3, JRK_3,
NOJRK_3])]);
GRG            = vertcat(PELP_3, KTK_3, VKS_3, MSK_3, NOMSK_3,
JRK_3, NOJRK_3);
GRG_r          = sort(GRG,'descend');

disp([{'GRG-Rank PELP-KTK-VKS-MSK-NOMSK-JRK-NOJRK-
CVD'};num2cell([GRG_r])]);
```

3. Lampiran Source Code Pembuatan Nilai Analisis Variabel Protokol Kesehatan dan Asumsi Pengaruh Penularan Covid-19 dengan Metode Grey Relational Analisis (GRA) terhadap DataPrediksi Covid-19

```
clc
clear

PELP    = [408; 454; 941; 17162; 35687; 19932; 61510; 81608;
122599; 199153; 156101; 120015; 473173; 528996; 296969;
191202; 185226];
KTK     = [124171; 190032; 219189; 152435; 130347; 191144;
133795; 53560; 31457; 26162; 15893; 20052; 19478; 48404;
9502; 3737; 2332];
VKS     = [70409; 207282; 1494766; 1433620; 1110495; 2224241;
2359721; 2913705; 2800503; 912552; 600338; 297624; 232018;
94727; 1963767; 957424; 189150];
MSK     = [204975; 190683; 122735; 60850; 46974; 33007;
65187; 79223; 53214; 48594; 26030; 29108; 38010; 54320;
32069; 24323; 27081];
NOMSK   = [67018; 38201; 19335; 11657; 12855; 6542; 6611;
4101; 2953; 2723; 1313; 1393; 1866; 2354; 2157; 1740; 1231];
JRK     = [190988; 182134; 120311; 60621; 44094; 31392;
53312; 71792; 50007; 44888; 24092; 27284; 36540; 52766;
30289; 23357; 26715];
NOJRK = [72365; 46900; 21759; 11886; 15735; 8157; 18336;
11826; 6160; 5761; 3251; 3537; 4068; 3788; 3937; 2706; 1797];
```

```
CVD     = [85983; 68922; 67838; 66772; 65722; 64689; 63672;
62671; 61686; 60716; 59761; 58822; 57897; 56987; 56091;
55209; 54341]; %Enter data

disp('GRA Experiment for Smaller the better example\n');
disp('Step 1 preprocessing --> data normalization with
smaller the bettercriteria');

PELP_1     = (max(PELP)-PELP)/(max(PELP)-min(PELP));KTK_1
           = (max(KTK)-KTK)/(max(KTK)-min(KTK));
VKS_1      = (max(VKS)-VKS)/(max(VKS)-min(VKS));
MSK_1      = (max(MSK)-MSK)/(max(MSK)-min(MSK));
NOMSK_1    = (max(NOMSK)-NOMSK)/(max(NOMSK)-min(NOMSK));
JRK_1      = (max(JRK)-JRK)/(max(JRK)-min(JRK));
NOJRK_1     = (max(NOJRK)-NOJRK)/(max(NOJRK)-min(NOJRK));
CVD_1      = (max(CVD)-CVD)/(max(CVD)-min(CVD));

disp([{'PELP_1','KTK_1','VKS_1','MSK_1','NOMSK_1','JRK_1','NOJRK
_1', 'CVD_1'};
num2cell([PELP_1,KTK_1,VKS_1,MSK_1,NOMSK_1,JRK_1,NOJRK_1,CVD_
1])]);
disp('Step 2 --> Find delta value based on ideal value: 1');
delta_CVD_PELP     = abs(CVD_1 - PELP_1);
delta_CVD_KTK      = abs(CVD_1 - KTK_1);
delta_CVD_VKS      = abs(CVD_1 - VKS_1);
delta_CVD_MSK      = abs(CVD_1 - MSK_1);
delta_CVD_NOMSK    = abs(CVD_1 - NOMSK_1);
delta_CVD_JRK      = abs(CVD_1 - JRK_1);
delta_CVD_NOJRK    = abs(CVD_1 - NOJRK_1);

disp([{'delta_CVD_PELP','delta_CVD_KTK','delta_CVD_VKS','delta_C
VD_MSK','
delta_CVD_NOMSK','delta_CVD_JRK','delta_CVD_NOJRK'};num2cell([de
lta_CVD_P ELP, delta_CVD_KTK, delta_CVD_VKS, delta_CVD_MSK,
delta_CVD_NOMSK, delta_CVD_JRK, delta_CVD_NOJRK])]);
disp('Step 3 --> Find Grey Relational Coefficient');

dist_val = 0.5;
```

```
PELP_2      =(min(delta_CVD_PELP)+
dist_val*max(delta_CVD_PELP))./(delta_CVD_PELP +
dist_val*max(delta_CVD_PELP));
KTK_2       =(min(delta_CVD_KTK) +
dist_val*max(delta_CVD_KTK))./(delta_CVD_KTK +
dist_val*max(delta_CVD_KTK));
VKS_2       =(min(delta_CVD_VKS) +
dist_val*max(delta_CVD_VKS))./(delta_CVD_VKS +
dist_val*max(delta_CVD_VKS));
MSK_2       =(min(delta_CVD_MSK) +
dist_val*max(delta_CVD_MSK))./(delta_CVD_MSK +
dist_val*max(delta_CVD_MSK));
NOMSK_2    =(min(delta_CVD_NOMSK) +
dist_val*max(delta_CVD_NOMSK))./(delta_CVD_NOMSK +
dist_val*max(delta_CVD_NOMSK));
JRK_2       =(min(delta_CVD_JRK) +
dist_val*max(delta_CVD_JRK))./(delta_CVD_JRK +
dist_val*max(delta_CVD_JRK));
NOJRK_2 =(min(delta_CVD_NOJRK) +
dist_val*max(delta_CVD_NOJRK))./(delta_CVD_NOJRK +
dist_val*max(delta_CVD_NOJRK));

disp([{'GRA PBC-PELP','GRA PBC-KTK','GRA PBC-VKS','GRA PBC-
MSK','GRA PBC-NOMSK','GRA PBC-JRK','GRA PBC-NOJRK'};
num2cell([PELP_2,KTK_2, VKS_2, MSK_2, NOMSK_2, JRK_2,
NOJRK_2])]);

disp('Step 4 --> Find Grey Relational Grade and the ranks');
PELP_3      = mean(PELP_2);
KTK_3       = mean(KTK_2);
VKS_3       = mean(VKS_2);
MSK_3       = mean(MSK_2);
NOMSK_3      = mean(NOMSK_2);
JRK_3       = mean(JRK_2);
NOJRK_3     = mean(NOJRK_2);

disp([{'Avg_GRA CVD-PELP','Avg_GRA CVD-KTK','Avg_GRA CVD-
VKS','Avg_GRACVD-MSK','Avg_GRA CVD-NOMSK', 'Avg_GRA CVD-JRK',
```

```
'Avg_GRA CVD- NOJRK'};num2cell([PELP_3, KTK_3, VKS_3, MSK_3,
NOMSK_3, JRK_3, NOJRK_3])]);
GRG      = vertcat(PELP_3, KTK_3, VKS_3, MSK_3, NOMSK_3,
JRK_3, NOJRK_3);
GRG_r   = sort(GRG,'descend');

disp([{'GRG-Rank PELP-KTK-VKS-MSK-NOMSK-JRK-NOJRK-
CVD'};num2cell([GRG_r])]);
```