# LAMPIRAN A

PROGRAM PELATIHAN DAN PENGUJIAN

# Program Preprocessing Image

```
clc;
clear all;

% Preprocessing Image -------------------------------------------

daniel{1}=imread('daniel1.bmp');
daniel{2}=imread('daniel2.bmp');
daniel{3}=imread('daniel3.bmp');
daniel{4}=imread('daniel4.bmp');

for i1=1:4

GR{1,i1}=rgb2gray(daniel{i1})  ;
BW{1,i1}=im2bw(GR{1,i1});
im{1,i1}=imresize(BW{1,i1},[100 100])
brs{1,i1}=im{1,i1}(:);
klm{1,i1}=brs{1,i1}';

end

jan{1}=imread('jan1.bmp');
jan{2}=imread('jan2.bmp');
jan{3}=imread('jan3.bmp');
jan{4}=imread('jan4.bmp');

for i2=1:4

GR{2,i2}=rgb2gray(jan{i2})
BW{2,i2}=im2bw(GR{2,i2});
im{2,i2}=imresize(BW{2,i2},[100 100])
brs{2,i2}=im{2,i2}(:);
klm{2,i2}=brs{2,i2}';

end

danielh{1}=imread('danielh1.bmp');
danielh{2}=imread('danielh2.bmp');
danielh{3}=imread('danielh3.bmp');
danielh{4}=imread('danielh4.bmp');

for i3=1:4

GR{3,i3}=rgb2gray(danielh{i3})  ;
BW{3,i3}=im2bw(GR{3,i3});
im{3,i3}=imresize(BW{3,i3},[100 100])
brs{3,i3}=im{3,i3}(:);
klm{3,i3}=brs{3,i3}';

end

yance{1}=imread('yance1.bmp');
yance{2}=imread('yance2.bmp');
yance{3}=imread('yance3.bmp');
yance{4}=imread('yance4.bmp');

for i4=1:4

GR{4,i4}=rgb2gray(yance{i4})  ;
BW{4,i4}=im2bw(GR{4,i4});
im{4,i4}=imresize(BW{4,i4},[100 100])
brs{4,i4}=im{4,i4}(:);
klm{4,i4}=brs{4,i4}';

end

agus{1}=imread('agus1.bmp');
agus{2}=imread('agus2.bmp');
agus{3}=imread('agus3.bmp');
agus{4}=imread('agus4.bmp');
```

```
for i5=1:4

GR{5,i5}=rgb2gray(agus{i5})  ;
BW{5,i5}=im2bw(GR{5,i5});
im{5,i5}=imresize(BW{5,i5},[100 100])
brs{5,i5}=im{5,i5}(:);
klm{5,i5}=brs{5,i5}';

end

alfianto{1}=imread('alfianto1.bmp');
alfianto{2}=imread('alfianto2.bmp');
alfianto{3}=imread('alfianto3.bmp');
alfianto{4}=imread('alfianto4.bmp');

for i6=1:4

GR{6,i6}=rgb2gray(alfianto{i6})  ;
BW{6,i6}=im2bw(GR{6,i6});
im{6,i6}=imresize(BW{6,i6},[100 100])
brs{6,i6}=im{6,i6}(:);
klm{6,i6}=brs{6,i6}';

end

tony{1}=imread('tony1.bmp');
tony{2}=imread('tony2.bmp');
tony{3}=imread('tony3.bmp');
tony{4}=imread('tony4.bmp');

for i7=1:4

GR{7,i7}=rgb2gray(tony{i7})  ;
BW{7,i7}=im2bw(GR{7,i7});
im{7,i7}=imresize(BW{7,i7},[100 100])
brs{7,i7}=im{7,i7}(:);
klm{7,i7}=brs{7,i7}';

end

gerald{1}=imread('gerald1.bmp');
gerald{2}=imread('gerald2.bmp');
gerald{3}=imread('gerald3.bmp');
gerald{4}=imread('gerald4.bmp');

for i8=1:4

GR{8,i8}=rgb2gray(gerald{i8})  ;
BW{8,i8}=im2bw(GR{8,i8});
im{8,i8}=imresize(BW{8,i8},[100 100])
brs{8,i8}=im{8,i8}(:);
klm{8,i8}=brs{8,i8}';

end

gelar{1}=imread('gelar1.bmp');
gelar{2}=imread('gelar2.bmp');
gelar{3}=imread('gelar3.bmp');
gelar{4}=imread('gelar4.bmp');

for i9=1:4

GR{9,i9}=rgb2gray(gelar{i9})  ;
BW{9,i9}=im2bw(GR{9,i9});
im{9,i9}=imresize(BW{9,i9},[100 100])
brs{9,i9}=im{9,i9}(:);
klm{9,i9}=brs{9,i9}';

end

nofan{1}=imread('nofan1.bmp');
```

```
nofan{2}=imread('nofan2.bmp');
nofan{3}=imread('nofan3.bmp');
nofan{4}=imread('nofan4.bmp');

for i10=1:4

GR{10,i10}=rgb2gray(nofan{i10})
BW{10,i10}=im2bw(GR{10,i10});
im{10,i10}=imresize(BW{10,i10},[100 100])
brs{10,i10}=im{10,i10}(:);
klm{10,i10}=brs{10,i10}';

end

im1=klm'
klm=im1(:)
im=klm'

save preproses im
```

## Program Preprocessing Image

```
clc;
clear all;

% Preprocessing, mencari nilai moment central & 7 nilai moment invariant

load preproses im

t=length(im)

for i=1:t

    [r,c] = find(im{i}==1);             % nilai X & Y
    rbar = mean(r);                   % mean X
    cbar = mean(c);                   % mean Y
    n = length(r);


    % proses mencari nilai moment central-------------------------------------

    momlist = zeros(n,1);

    for m = 1 : n;

    momlist00(m) = (r(m) - rbar)^0 * (c(m) - cbar)^0;
    momlist10(m) = (r(m) - rbar)^1 * (c(m) - cbar)^0;
    momlist01(m) = (r(m) - rbar)^0 * (c(m) - cbar)^1;
    momlist11(m) = (r(m) - rbar)^1 * (c(m) - cbar)^1;
    momlist12(m) = (r(m) - rbar)^1 * (c(m) - cbar)^2;
    momlist21(m) = (r(m) - rbar)^2 * (c(m) - cbar)^1;
    momlist20(m) = (r(m) - rbar)^2 * (c(m) - cbar)^0;
    momlist02(m) = (r(m) - rbar)^0 * (c(m) - cbar)^2;
    momlist30(m) = (r(m) - rbar)^3 * (c(m) - cbar)^0;
    momlist03(m) = (r(m) - rbar)^0 * (c(m) - cbar)^3;

    end

    % moment central tingkat ke 0 - 1 ------------------------

    m00 = sum(momlist00);      % moment central pusat m00
    m10 = sum(momlist10);      % moment central pusat m10
    m01 = sum(momlist01);      % moment central pusat m01

        % syarat moment central tingkat 2 & 3 (p+q>=2)yang di normalisasi

    m11 = sum(momlist11);      % moment central tingkat ke 2
    m12 = sum(momlist12);      % moment central tingkat ke 3
```

```
    m21 = sum(momlist21);      % moment central tingkat ke 3
    m20 = sum(momlist20);      % moment central tingkat ke 2
    m02 = sum(momlist02);     % moment central tingkat ke 2
    m30 = sum(momlist30);      % moment central tingkat ke 3
    m03 = sum(momlist03);      % moment central tingkat ke 3

    % proses normalisasi moment central tingkat ke 2 & 3
     % area = bwarea(BW). salah satu cara mencari moment central       pusat ke 0
        (m00)

    area = bwarea(im{i});

    u11 = m11 / (area^2);
    u12 = m12 / (area^2.5);
    u21 = m21 / (area^2.5);
    u20 = m20 / (area^2);
    u02 = m02 / (area^2);
    u30 = m30 / (area^2.5);
    u03 = m03 / (area^2.5);

    % proses perhitungan 7  moment invariant----------------------

    h1 = u20 + u02;
    h2 = (u20-u02)^2 + 4*u11^2;
    h3 = (u30 - 3*u12)^2 + (u03 - 3*u21)^2;
    h4 = (u30 + u12)^2 + (u03 + u21)^2;
    h5 = (u30 - 3*u12) * (u30 + u12) * ( (u30 + u12)^2 - 3*(u03 +
            u21)^2 ) + (3*u21 - u03) * (u03 + u21) *
           ( 3*(u30 + u12)^2 - (u03 + u21)^2 );
     h6 = (u20 - u02) * ( (u30 + u12)^2 - (u03 + u21)^2 ) + 4*u11 *
           (u30 + u12) * (u03 + u21);
    h7 = (3*u21 - u03) * (u30 + u12) * ( (u30 + u12)^2 - 3*(u03 +
           u21)^2 ) - (3*u12 - u30) * (u03 + u21) * ( 3*(u30 + u12)^2- (u03 +
           u21)^2 );

    moment{i}=[ h1 h2 h3 h4 h5 h6 h7]

end

global moment
format long

save moment
```

# <u>Program Pelatihan Back Propagation</u>

```
%% ==Step_0==Inisialisasi=================================
clc
clear all


load moment


input=[];
input3=[];
for j=1:20
    input1=[];
    input1=im{j};
    input4=[];
    input3=[input3;input1];
end


 n = 7; %INPUT
 p = 4;
 m = 4; % OUTPUT
```

```
 alpha = 0.0002;
 e = 0.05; % error limit
% -------------------------------------------------------------
%%% Inisialisasi Input & Target

   x = [input3];
     t = [0 0 0 0;0 0 0 0;
          0 0 0 1;0 0 0 1;
          0 0 1 0;0 0 1 0;
          0 0 1 1;0 0 1 1;
          0 1 0 0;0 1 0 0;
          0 1 0 1;0 1 0 1;
          0 1 1 0;0 1 1 0;
          0 1 1 1;0 1 1 1;
          1 0 0 0;1 0 0 0;
          1 0 0 1;1 0 0 1;];
    tr = size(x,1);

% ------------------------------------------------------------
%%% Inisialisasi

        vv=(0.5-( rand(n,p)*((0.5)-(-0.5))) );
        v0 = (0.5-( rand(1,p)*((0.5)-(-0.5))) );
        w = rand(p,m) ;
        w0 = rand(1,m);

%update bobot

vi=length(vv);

for jj=1:p
    c(jj)=0
    for ii=1:n
        c(jj)=c(jj)+(vv(ii,jj).^2);
        xx(jj)=sqrt(c(jj));
        b=0.7*((sqrt(j)).^2);
        bb=2.212;
        v(ii,jj)=(bb*vv(ii,jj))/xx(jj);
    end
end

%%% hidden Layer pertama
    zin = zeros(tr,p);
    z = zeros(tr,p);
    din = zeros(tr,p);
    dj = zeros(tr,p);
    chv = zeros(n,p);
    chv0 = zeros(1,p);
%%%Output Layer
    yin = zeros(tr,m);
    y = zeros(tr,m);
    d = zeros(tr,m);
    chw = zeros(p,m);
    chw0 = zeros(1,m);
    error=zeros(tr,m);
iteration =1;
er = 0; error = 0;

%% ==Step_1===================================================
while er==0
    iteration
    errorMax(iteration) = max(max(error));
    disp(sprintf('max err : %d', errorMax(iteration)));
%%% ==Step_2===================================================
    for Tp=1:tr;
%% Feed forward:
%%% ==Step_3===================================================
%%% ==Step_4=================================================
%%% First Layer
        for j=1:p
            zin(Tp,j) = 0;
            for i=1:n
```

```
                zin(Tp,j) = zin(Tp,j) + x(Tp,i) * v(i,j);
            end
            zin(Tp,j) = v0(j) + zin(Tp,j);
             z(Tp,j) = (2/(1+exp(-zin(Tp,j))))-1; %aktivasi function Z
        end
%%% ==Step_5==============================================
    %%% Output Layer
        for k=1:m
            yin(Tp,k) = 0;
            for j=1:p
                yin(Tp,k) = yin(Tp,k) + z(Tp,j) * w(j,k);
            end
            yin(Tp,k) = w0(k) + yin(Tp,k);
             y(Tp,k) = 1/(1+exp(-yin(Tp,k))); %aktivasi function Y

        end
%% Backpropagation  error
%%% ==Step_6==============================================
        for k=1:m
        d(Tp,k) = 0;
        d(Tp,k) = (t(Tp,k) - y(Tp,k)) * (y(Tp,k) *(1 - y(Tp,k)));
            for j=1:p
                chw(j,k) = alpha * d(Tp,k) * z(Tp,j);
            end
            chw0(k) = alpha * d(Tp,k);
        end
%%% ==Step_7==============================================
        for j=1:p
            din(Tp,j) = 0;
            for k=1:m
                din(Tp,j) = din(Tp,j) + d(Tp,k) * w(j,k);
            end
            dj(Tp,j) = 0;
           dj(Tp,j) = (din(Tp,j) * ((1/2) * (1 + z(Tp,j))* (1 - z(Tp,j))));
            for i=1:n
                chv(i,j) = alpha * dj(Tp,j) * x(Tp,i);
            end
            chv0(j) = alpha * dj(Tp,j);
        end
%% ==Step_8==Update_bobot dan bias========================
        for k=1:m
            for j=1:p
                w(j,k)=w(j,k)+chw(j,k);
            end
           w0(k)=w0(k)+chw0(k);
        end
        for j=1:p
            for i=1:n
                v(i,j)=v(i,j)+chv(i,j);
            end
           v0(j)=v0(j)+chv0(j);
        end
    end


%% ==Step_9==Test_stop_kondisi==========================
for k=1:m

    error(Tp,k) =sqrt((t(Tp,k)-y(Tp,k)).^2);

end


    if max(max(error)) < e
        er =1;
    else
        er = 0;
    end
if (~mod(iteration,20000))
figure
plot(1:20000,errorMax(iteration-19999:iteration))
 getframe;% F(iteration) = potongframe;
```

```
 end
    iteration = iteration +1;
    if (iteration > 1000)
        break
    end


end
 for k=1:m
     if y(Tp,k) < 0.5
        y(Tp,k)=0;
        else
        y(Tp,k)=1;
     end
  end
y
save langsung11 v
save langsung22 w
save langsung12 v0
save langsung21 w0

save('weight6040.dat','v','v0','w','w0')
erLine = ones(1,size(errorMax,2))*0.05;
clf('reset'), cla reset
plot(1:size(errorMax,2),errorMax,1:size(errorMax,2),erLine,'r')
xlabel('iteration '), ylabel('error '), title('Plot of the error')
```

## Program Pengujian Back Propagation

```
%% ==Step_0==Inisialisasi=================================
clc
clear all

% test tanda tangan tanpa moment invariant

% load preproses im

load ramdan11 moment22
load jan11 moment11
load langsung11 v
load langsung22 w
load langsung12 v0
load langsung21 w0

%
% input=[];
% input3=[];
% for j=1:4
%     input1=[];
%     input1=moment{j};
%     input4=[];
%     input3=[input3;input1];
% end

 n = 14; %INPUT
 p = 2;
 m = 4; % OUTPUT
 alpha = 0.0002;
 e = 0.05; % error limit
% ------------------------------------------------------------
%%% Inisialisasi Input & Target
x1=moment22
x2=moment11
x = [x1 ; x2];
t=[ 0 0 0 1;0 0 1 0];
 tr = size(x,1);
```

```
% ------------------------------------------------------------

%%% hidden Layer pertama
    zin = zeros(tr,p);
    z = zeros(tr,p);
    din = zeros(tr,p);
    dj = zeros(tr,p);
    chv = zeros(n,p);
    chv0 = zeros(1,p);
%%%Output Layer
    yin = zeros(tr,m);
    y = zeros(tr,m);
    d = zeros(tr,m);
    chw = zeros(p,m);
    chw0 = zeros(1,m);
    error=zeros(tr,m);
iteration =1;
er = 0; error = 0;

%% ==Step_1===================================================

%%% ==Step_2===================================================
    for Tp=1:tr;
%% Feed forward:
%%% ==Step_3===================================================
%%% ==Step_4===================================================
%%% First Layer
        for j=1:p
            zin(Tp,j) = 0;
            for i=1:n
                zin(Tp,j) = zin(Tp,j) + x(Tp,i) * v(i,j);
            end
            zin(Tp,j) = v0(j) + zin(Tp,j);
             z(Tp,j) = (2/(1+exp(-zin(Tp,j))))-1; %aktivasi function Z
        end
%%% ==Step_5=================================================
    %%% Output Layer
        for k=1:m
            yin(Tp,k) = 0;
            for j=1:p
                yin(Tp,k) = yin(Tp,k) + z(Tp,j) * w(j,k);
            end
            yin(Tp,k) = w0(k) + yin(Tp,k);
             y(Tp,k) = 1/(1+exp(-yin(Tp,k))); %aktivasi function Y

        end

%% ==Step_9==Test_stop_kondisi==========================
for k=1:m

    error(Tp,k) =sqrt((t(Tp,k)-y(Tp,k)).^2);

end

    end
  for k=1:m
     if y(k) < 0.5
        y(k)=0;
        else
        y(k)=1
     end
  end
  y
errors=sum(error)/4

global y
format short
```

# <u>Program Pelatihan GUI</u>

```
%      *See GUI Options on GUIDE's Tools menu.  Choose "GUI allows only one
%      instance to run (singleton)".
%
% See also: GUIDE, GUIDATA, GUIHANDLES

% Edit the above text to modify the response to help guinyobanyoba

% Last Modified by GUIDE v2.5 03-Feb-2011 23:28:17

% Begin initialization code - DO NOT EDIT
gui_Singleton = 1;
gui_State = struct('gui_Name',       mfilename, ...
                   'gui_Singleton',  gui_Singleton, ...
                   'gui_OpeningFcn', @guinyobanyoba_OpeningFcn, ...
                   'gui_OutputFcn',  @guinyobanyoba_OutputFcn, ...
                   'gui_LayoutFcn',  [] , ...
                   'gui_Callback',   []);
if nargin && ischar(varargin{1})
    gui_State.gui_Callback = str2func(varargin{1});
end

if nargout
    [varargout{1:nargout}] = gui_mainfcn(gui_State, varargin{:});
else
    gui_mainfcn(gui_State, varargin{:});
end
% End initialization code - DO NOT EDIT


% handles    structure with handles and user data (see GUIDATA)

% Preprocessing, mencari nilai moment central & 7 nilai moment invariant

% Image prosessing --------------------------------------------------------

load preproses2 klm


t=length(klm)

for i=1:t

    [r,c] = find(klm{i}==1);            % nilai X & Y
    rbar = mean(r);                    % mean X
    cbar = mean(c);                    % mean Y
    n = length(r);


    % proses mencari nilai moment central-------------------------------------

    momlist = zeros(n,1);

    for m = 1 : n;

    momlist00(m) = (r(m) - rbar)^0 * (c(m) - cbar)^0;
    momlist10(m) = (r(m) - rbar)^1 * (c(m) - cbar)^0;
    momlist01(m) = (r(m) - rbar)^0 * (c(m) - cbar)^1;
    momlist11(m) = (r(m) - rbar)^1 * (c(m) - cbar)^1;
    momlist12(m) = (r(m) - rbar)^1 * (c(m) - cbar)^2;
    momlist21(m) = (r(m) - rbar)^2 * (c(m) - cbar)^1;
    momlist20(m) = (r(m) - rbar)^2 * (c(m) - cbar)^0;
    momlist02(m) = (r(m) - rbar)^0 * (c(m) - cbar)^2;
    momlist30(m) = (r(m) - rbar)^3 * (c(m) - cbar)^0;
    momlist03(m) = (r(m) - rbar)^0 * (c(m) - cbar)^3;

    end

    % moment central tingkat ke 0 - 1 ---------------------------------------
```

```
    m00 = sum(momlist00);      % moment central pusat m00
    m10 = sum(momlist10);      % moment central pusat m10
    m01 = sum(momlist01);      % moment central pusat m01

    % syarat moment central tingkat kedua & ketiga (p+q>=2)yang di normalisasi

    m11 = sum(momlist11);      % moment central tingkat ke 2
    m12 = sum(momlist12);      % moment central tingkat ke 3
    m21 = sum(momlist21);      % moment central tingkat ke 3
    m20 = sum(momlist20);      % moment central tingkat ke 2
    m02 = sum(momlist02);     % moment central tingkat ke 2
    m30 = sum(momlist30);      % moment central tingkat ke 3
    m03 = sum(momlist03);      % moment central tingkat ke 3

    % proses perhitungan normalisasi moment central tingkat ke 2 & 3
    % area = bwarea(BW)--------salah satu cara mencari moment central pusat ke 0
(m00)

    area = bwarea(klm{i});

    u11 = m11 / (area^2);       % normalize moment central tingkat ke 2
    u12 = m12 / (area^2.5);     % normalize moment central tingkat ke 3
    u21 = m21 / (area^2.5);     % normalize moment central tingkat ke 3
    u20 = m20 / (area^2);      % normalize moment central tingkat ke 2
    u02 = m02 / (area^2);       % normalize moment central tingkat ke 2
    u30 = m30 / (area^2.5);     % normalize moment central tingkat ke 3
    u03 = m03 / (area^2.5);     % normalize moment central tingkat ke 3

    % proses perhitungan 7  moment invariant---------------------------------

    h1 = u20 + u02;
    h2 = (u20-u02)^2 + 4*u11^2;
    h3 = (u30 - 3*u12)^2 + (u03 - 3*u21)^2;
    h4 = (u30 + u12)^2 + (u03 + u21)^2;
    h5 = (u30 - 3*u12) * (u30 + u12) * ( (u30 + u12)^2 - 3*(u03 + u21)^2 ) +
(3*u21 - u03) * (u03 + u21) * ( 3*(u30 + u12)^2 - (u03 + u21)^2 );
    h6 = (u20 - u02) * ( (u30 + u12)^2 - (u03 + u21)^2 ) + 4*u11 * (u30 + u12) *
(u03 + u21);
    h7 = (3*u21 - u03) * (u30 + u12) * ( (u30 + u12)^2 - 3*(u03 + u21)^2 ) -
(3*u12 - u30) * (u03 + u21) * ( 3*(u30 + u12)^2 - (u03 + u21)^2 );

    moment1{i}=[ h1 h2 h3 h4 h5 h6 h7 ]
    cc=moment1{i}(:)
end

global moment
format long

save long moment1
set(handles.listbox3,'string',cc);



function edit1_Callback(hObject, eventdata, handles)
% hObject    handle to edit1 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit1 as text
%        str2double(get(hObject,'String')) returns contents of edit1 as a double


% --- Executes during object creation, after setting all properties.
function edit1_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit1 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
```

```
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end


% --- Executes on button press in pushbutton2.
function pushbutton2_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton2 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)


%  load otomatic1 moment1
 load long moment1

input=[];
input3=[];
for j=1:20
    input1=[];
    input1=moment1{j};
    input4=[];
    input3=[input3;input1];
end


 n = 7; %INPUT
 p = 2;
 m = 4; % OUTPUT
 alpha = 0.0002;
 e = 0.001; % error limit
% -------------------------------------------------------------
%%% Inisialisasi Input & Target


   x = [input3 ];
% t=[ 0 0 0 0;0 0 0 0];
 t = [0 0 0 0;0 0 0 0;
          0 0 0 1;0 0 0 1;
          0 0 1 0;0 0 1 0;
          0 0 1 1;0 0 1 1;
          0 1 0 0;0 1 0 0;
          0 1 0 1;0 1 0 1;
          0 1 1 0;0 1 1 0;
          0 1 1 1;0 1 1 1;
          1 0 0 0;1 0 0 0;
          1 0 0 1;1 0 0 1; ];
tr = size(x,1);

% ------------------------------------------------------------
%%% Inisialisasi

        vv=(0.5-( rand(n,p)*((0.5)-(-0.5))) );
        v0 = (0.5-( rand(1,p)*((0.5)-(-0.5))) );
        w = rand(p,m) ;
        w0 = rand(1,m);

%update bobot

vi=length(vv);

for jj=1:p
    c(jj)=0
    for ii=1:n
        c(jj)=c(jj)+(vv(ii,jj).^2);
        xx(jj)=sqrt(c(jj));
        b=0.7*((sqrt(j)).^2);
        bb=2.212;
        v(ii,jj)=(bb*vv(ii,jj))/xx(jj);
    end
end
```

```
%%% hidden Layer pertama
    zin = zeros(tr,p);
    z = zeros(tr,p);
    din = zeros(tr,p);
    dj = zeros(tr,p);
    chv = zeros(n,p);
    chv0 = zeros(1,p);
%%%Output Layer
    yin = zeros(tr,m);
    y = zeros(tr,m);
    d = zeros(tr,m);
    chw = zeros(p,m);
    chw0 = zeros(1,m);
    error=zeros(tr,m);
iteration =1;
er = 0; error = 0;

%% ==Step_1=====================================================
while er==0
    iteration
    errorMax(iteration) = max(max(error));
    disp(sprintf('max err : %d', errorMax(iteration)));
%%% ==Step_2=====================================================
    for Tp=1:tr;
%% Feed forward:
%%% ==Step_3=====================================================
%%% ==Step_4===================================================
%%% First Layer
        for j1=1:p
            zin(Tp,j1) = 0;
            for i=1:n
                zin(Tp,j1) = zin(Tp,j1) + x(Tp,i) * v(i,j1);
            end
            zin(Tp,j1) = v0(j1) + zin(Tp,j1);
             z(Tp,j1) = (2/(1+exp(-zin(Tp,j1))))-1; %aktivasi function Z
        end
%%% ==Step_5===================================================
    %%% Output Layer
        for k=1:m
            yin(Tp,k) = 0;
            for j5=1:p
                yin(Tp,k) = yin(Tp,k) + z(Tp,j5) * w(j5,k);
            end
            yin(Tp,k) = w0(k) + yin(Tp,k);
             y(Tp,k) = 1/(1+exp(-yin(Tp,k))); %aktivasi function Y

        end
%% Backpropagation  error
%%% ==Step_6===================================================
        for k=1:m
        d(Tp,k) = 0;
        d(Tp,k) = (t(Tp,k) - y(Tp,k)) * (y(Tp,k) *(1 - y(Tp,k)));
            for j6=1:p
                chw(j6,k) = alpha * d(Tp,k) * z(Tp,j6);
            end
            chw0(k) = alpha * d(Tp,k);
        end
%%% ==Step_7===================================================
        for j2=1:p
            din(Tp,j2) = 0;
            for k=1:m
                din(Tp,j2) = din(Tp,j2) + d(Tp,k) * w(j2,k);
            end
            dj(Tp,j2) = 0;
           dj(Tp,j2) = (din(Tp,j2) * ((1/2) * (1 + z(Tp,j2))* (1 - z(Tp,j2))));
            for i=1:n
                chv(i,j2) = alpha * dj(Tp,j2) * x(Tp,i);
            end
            chv0(j2) = alpha * dj(Tp,j2);
        end
%% ==Step_8==Update_bobot dan bias=========================
        for k=1:m
```

```
            for j3=1:p
                w(j3,k)=w(j3,k)+chw(j3,k);
            end
           w0(k)=w0(k)+chw0(k);
        end
        for j3=1:p
            for i=1:n
                v(i,j3)=v(i,j3)+chv(i,j3);
            end
           v0(j3)=v0(j3)+chv0(j3);
        end
    end



%% ==Step_9==Test_stop_kondisi=========================
for k=1:m

    error(Tp,k) =sqrt((t(Tp,k)-y(Tp,k)).^2);

end


    if max(max(error)) < e
        er =1;
    else
        er = 0;
    end
% if (~mod(iteration,20000))
% figure
% plot(1:20000,errorMax(iteration-19999:iteration))
%  getframe;% F(iteration) = potongframe;
%  end
    iteration = iteration +1;
    if (iteration > 100000)
        break
    end


end
 for k=1:m
     if y(Tp,k) < 0.5
        y(Tp,k)=0;
        else
        y(Tp,k)=1;
     end
  end
y
save bobota v
save bobotb v0
save bobotc w
save bobotd w0
z=y(:);
z1=error(:);

axes(handles.axes1);
erLine = ones(1,size(errorMax,2))*0.05;
plot(1:size(errorMax,2),errorMax,1:size(errorMax,2),erLine,'r')
xlabel('iteration '), ylabel('error '), title('Plot of the error')
set(handles.edit1,'string',z1);
set(handles.listbox2,'string',z);


% --- Executes on slider movement.
function listbox1_Callback(hObject, eventdata, handles)
% hObject    handle to listbox1 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'Value') returns position of slider
%        get(hObject,'Min') and get(hObject,'Max') to determine range of slider
```

```
% --- Executes during object creation, after setting all properties.
function listbox1_CreateFcn(hObject, eventdata, handles)
% hObject    handle to listbox1 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: slider controls usually have a light gray background.
if isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor',[.9 .9 .9]);
end


% --- Executes on selection change in listbox2.
function listbox2_Callback(hObject, eventdata, handles)
% hObject    handle to listbox2 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: contents = get(hObject,'String') returns listbox2 contents as cell array
%        contents{get(hObject,'Value')} returns selected item from listbox2


% --- Executes during object creation, after setting all properties.
function listbox2_CreateFcn(hObject, eventdata, handles)
% hObject    handle to listbox2 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: listbox controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end


% --- Executes on button press in pushbutton3.
function pushbutton3_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton3 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)
selection=questdlg(['Keluar...File...',get(handles.figure1,'Name')
'?'],['Keluar.....',get(handles.figure1,'Name') '...'],'Ya','Tidak','Ya');
                           if strcmp(selection,'Tidak')
                               return;
                           end
                           delete(handles.figure1)




% --- Executes on slider movement.
function slider1_Callback(hObject, eventdata, handles)
% hObject    handle to slider1 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'Value') returns position of slider
%        get(hObject,'Min') and get(hObject,'Max') to determine range of slider


% --- Executes during object creation, after setting all properties.
function slider1_CreateFcn(hObject, eventdata, handles)
% hObject    handle to slider1 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: slider controls usually have a light gray background.
if isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
```

```
    set(hObject,'BackgroundColor',[.9 .9 .9]);
end


% --------------------------------------------------------------------
function Untitled_1_Callback(hObject, eventdata, handles)
% hObject    handle to Untitled_1 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)


% --------------------------------------------------------------------
function Untitled_2_Callback(hObject, eventdata, handles)
% hObject    handle to Untitled_2 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)


% --------------------------------------------------------------------
function Untitled_3_Callback(hObject, eventdata, handles)
% hObject    handle to Untitled_3 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)


% --- Executes on button press in pushbutton5.
function pushbutton5_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton5 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)


% --- Executes on selection change in listbox3.
function listbox3_Callback(hObject, eventdata, handles)
% hObject    handle to listbox3 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: contents = get(hObject,'String') returns listbox3 contents as cell array
%        contents{get(hObject,'Value')} returns selected item from listbox3


% --- Executes during object creation, after setting all properties.
function listbox3_CreateFcn(hObject, eventdata, handles)
% hObject    handle to listbox3 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: listbox controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end


% --- Executes on button press in pushbutton6.
function pushbutton6_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton6 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)
load preproses2 klm


klm1=rot90(klm);
t=length(klm)

for i=1:t

    [r,c] = find(klm{i}==1);            % nilai X & Y
    rbar = mean(r);                  % mean X
    cbar = mean(c);                  % mean Y
```

```
    n = length(r);


    % proses mencari nilai moment central------------------------------------

    momlist = zeros(n,1);

    for m = 1 : n;

    momlist00(m) = (r(m) - rbar)^0 * (c(m) - cbar)^0;
    momlist10(m) = (r(m) - rbar)^1 * (c(m) - cbar)^0;
    momlist01(m) = (r(m) - rbar)^0 * (c(m) - cbar)^1;
    momlist11(m) = (r(m) - rbar)^1 * (c(m) - cbar)^1;
    momlist12(m) = (r(m) - rbar)^1 * (c(m) - cbar)^2;
    momlist21(m) = (r(m) - rbar)^2 * (c(m) - cbar)^1;
    momlist20(m) = (r(m) - rbar)^2 * (c(m) - cbar)^0;
    momlist02(m) = (r(m) - rbar)^0 * (c(m) - cbar)^2;
    momlist30(m) = (r(m) - rbar)^3 * (c(m) - cbar)^0;
    momlist03(m) = (r(m) - rbar)^0 * (c(m) - cbar)^3;

    end

    % moment central tingkat ke 0 - 1 ----------------------------------------

    m00 = sum(momlist00);      % moment central pusat m00
    m10 = sum(momlist10);      % moment central pusat m10
    m01 = sum(momlist01);      % moment central pusat m01

    % syarat moment central tingkat kedua & ketiga (p+q>=2)yang di normalisasi

    m11 = sum(momlist11);      % moment central tingkat ke 2
    m12 = sum(momlist12);      % moment central tingkat ke 3
    m21 = sum(momlist21);      % moment central tingkat ke 3
    m20 = sum(momlist20);      % moment central tingkat ke 2
    m02 = sum(momlist02);     % moment central tingkat ke 2
    m30 = sum(momlist30);      % moment central tingkat ke 3
    m03 = sum(momlist03);      % moment central tingkat ke 3

    % proses perhitungan normalisasi moment central tingkat ke 2 & 3
    % area = bwarea(BW)--------salah satu cara mencari moment central pusat ke 0
(m00)

    area = bwarea(klm{i});

    u11 = m11 / (area^2);       % normalize moment central tingkat ke 2
    u12 = m12 / (area^2.5);     % normalize moment central tingkat ke 3
    u21 = m21 / (area^2.5);     % normalize moment central tingkat ke 3
    u20 = m20 / (area^2);      % normalize moment central tingkat ke 2
    u02 = m02 / (area^2);       % normalize moment central tingkat ke 2
    u30 = m30 / (area^2.5);     % normalize moment central tingkat ke 3
    u03 = m03 / (area^2.5);     % normalize moment central tingkat ke 3

    % proses perhitungan 7  moment invariant----------------------------------

    h1 = u20 + u02;
    h2 = (u20-u02)^2 + 4*u11^2;
    h3 = (u30 - 3*u12)^2 + (u03 - 3*u21)^2;
    h4 = (u30 + u12)^2 + (u03 + u21)^2;
    h5 = (u30 - 3*u12) * (u30 + u12) * ( (u30 + u12)^2 - 3*(u03 + u21)^2 ) +
(3*u21 - u03) * (u03 + u21) * ( 3*(u30 + u12)^2 - (u03 + u21)^2 );
    h6 = (u20 - u02) * ( (u30 + u12)^2 - (u03 + u21)^2 ) + 4*u11 * (u30 + u12) *
(u03 + u21);
    h7 = (3*u21 - u03) * (u30 + u12) * ( (u30 + u12)^2 - 3*(u03 + u21)^2 ) -
(3*u12 - u30) * (u03 + u21) * ( 3*(u30 + u12)^2 - (u03 + u21)^2 );

    moment1{i}=[ h1 h2 h3 h4 h5 h6 h7 ]
    cc=moment1{i}(:)
end

global moment
format long
```

```
save long moment1
set(handles.listbox3,'string',cc);


% --- Executes on button press in radiobutton1.
function radiobutton1_Callback(hObject, eventdata, handles)
% hObject    handle to radiobutton1 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hint: get(hObject,'Value') returns toggle state of radiobutton1


% --- Executes on button press in radiobutton2.
function radiobutton2_Callback(hObject, eventdata, handles)
% hObject    handle to radiobutton2 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hint: get(hObject,'Value') returns toggle state of radiobutton2


% --- Executes on button press in radiobutton3.
function radiobutton3_Callback(hObject, eventdata, handles)
% hObject    handle to radiobutton3 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hint: get(hObject,'Value') returns toggle state of radiobutton3


% --- Executes on button press in pushbutton7.
function pushbutton7_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton7 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)


% --- Executes on button press in pushbutton8.
function pushbutton8_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton8 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)
load preproses2 klm


klm1=flipud(klm);
t=length(klm)

for i=1:t

    [r,c] = find(klm{i}==1);            % nilai X & Y
    rbar = mean(r);                  % mean X
    cbar = mean(c);                  % mean Y
    n = length(r);


    % proses mencari nilai moment central-------------------------------------

    momlist = zeros(n,1);

    for m = 1 : n;

    momlist00(m) = (r(m) - rbar)^0 * (c(m) - cbar)^0;
    momlist10(m) = (r(m) - rbar)^1 * (c(m) - cbar)^0;
    momlist01(m) = (r(m) - rbar)^0 * (c(m) - cbar)^1;
    momlist11(m) = (r(m) - rbar)^1 * (c(m) - cbar)^1;
    momlist12(m) = (r(m) - rbar)^1 * (c(m) - cbar)^2;
    momlist21(m) = (r(m) - rbar)^2 * (c(m) - cbar)^1;
    momlist20(m) = (r(m) - rbar)^2 * (c(m) - cbar)^0;
    momlist02(m) = (r(m) - rbar)^0 * (c(m) - cbar)^2;
    momlist30(m) = (r(m) - rbar)^3 * (c(m) - cbar)^0;
```

```
    momlist03(m) = (r(m) - rbar)^0 * (c(m) - cbar)^3;

    end

    % moment central tingkat ke 0 - 1 ----------------------------------------

    m00 = sum(momlist00);      % moment central pusat m00
    m10 = sum(momlist10);      % moment central pusat m10
    m01 = sum(momlist01);      % moment central pusat m01

    % syarat moment central tingkat kedua & ketiga (p+q>=2)yang di normalisasi

    m11 = sum(momlist11);      % moment central tingkat ke 2
    m12 = sum(momlist12);      % moment central tingkat ke 3
    m21 = sum(momlist21);      % moment central tingkat ke 3
    m20 = sum(momlist20);      % moment central tingkat ke 2
    m02 = sum(momlist02);     % moment central tingkat ke 2
    m30 = sum(momlist30);      % moment central tingkat ke 3
    m03 = sum(momlist03);      % moment central tingkat ke 3

    % proses perhitungan normalisasi moment central tingkat ke 2 & 3
    % area = bwarea(BW)--------salah satu cara mencari moment central pusat ke 0
(m00)

    area = bwarea(klm{i});

    u11 = m11 / (area^2);       % normalize moment central tingkat ke 2
    u12 = m12 / (area^2.5);     % normalize moment central tingkat ke 3
    u21 = m21 / (area^2.5);     % normalize moment central tingkat ke 3
    u20 = m20 / (area^2);      % normalize moment central tingkat ke 2
    u02 = m02 / (area^2);       % normalize moment central tingkat ke 2
    u30 = m30 / (area^2.5);     % normalize moment central tingkat ke 3
    u03 = m03 / (area^2.5);     % normalize moment central tingkat ke 3

    % proses perhitungan 7  moment invariant----------------------------------

    h1 = u20 + u02;
    h2 = (u20-u02)^2 + 4*u11^2;
    h3 = (u30 - 3*u12)^2 + (u03 - 3*u21)^2;
    h4 = (u30 + u12)^2 + (u03 + u21)^2;
    h5 = (u30 - 3*u12) * (u30 + u12) * ( (u30 + u12)^2 - 3*(u03 + u21)^2 ) +
(3*u21 - u03) * (u03 + u21) * ( 3*(u30 + u12)^2 - (u03 + u21)^2 );
    h6 = (u20 - u02) * ( (u30 + u12)^2 - (u03 + u21)^2 ) + 4*u11 * (u30 + u12) *
(u03 + u21);
    h7 = (3*u21 - u03) * (u30 + u12) * ( (u30 + u12)^2 - 3*(u03 + u21)^2 ) -
(3*u12 - u30) * (u03 + u21) * ( 3*(u30 + u12)^2 - (u03 + u21)^2 );

    moment1{i}=[ h1 h2 h3 h4 h5 h6 h7 ]
    cc=moment1{i}(:)
end

global moment
format long

save long moment1
set(handles.listbox3,'string',cc);



% --- Executes on button press in pushbutton9.
function pushbutton9_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton9 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)
load preproses2 klm


klm1=fliplr(klm);
t=length(klm)

for i=1:t
```

```
    [r,c] = find(klm{i}==1);            % nilai X & Y
    rbar = mean(r);                   % mean X
    cbar = mean(c);                   % mean Y
    n = length(r);


    % proses mencari nilai moment central-----------------------------------

    momlist = zeros(n,1);

    for m = 1 : n;

    momlist00(m) = (r(m) - rbar)^0 * (c(m) - cbar)^0;
    momlist10(m) = (r(m) - rbar)^1 * (c(m) - cbar)^0;
    momlist01(m) = (r(m) - rbar)^0 * (c(m) - cbar)^1;
    momlist11(m) = (r(m) - rbar)^1 * (c(m) - cbar)^1;
    momlist12(m) = (r(m) - rbar)^1 * (c(m) - cbar)^2;
    momlist21(m) = (r(m) - rbar)^2 * (c(m) - cbar)^1;
    momlist20(m) = (r(m) - rbar)^2 * (c(m) - cbar)^0;
    momlist02(m) = (r(m) - rbar)^0 * (c(m) - cbar)^2;
    momlist30(m) = (r(m) - rbar)^3 * (c(m) - cbar)^0;
    momlist03(m) = (r(m) - rbar)^0 * (c(m) - cbar)^3;

    end

    % moment central tingkat ke 0 - 1 ----------------------------------------

    m00 = sum(momlist00);      % moment central pusat m00
    m10 = sum(momlist10);      % moment central pusat m10
    m01 = sum(momlist01);      % moment central pusat m01

    % syarat moment central tingkat kedua & ketiga (p+q>=2)yang di normalisasi

    m11 = sum(momlist11);      % moment central tingkat ke 2
    m12 = sum(momlist12);      % moment central tingkat ke 3
    m21 = sum(momlist21);      % moment central tingkat ke 3
    m20 = sum(momlist20);      % moment central tingkat ke 2
    m02 = sum(momlist02);     % moment central tingkat ke 2
    m30 = sum(momlist30);      % moment central tingkat ke 3
    m03 = sum(momlist03);      % moment central tingkat ke 3

    % proses perhitungan normalisasi moment central tingkat ke 2 & 3
    % area = bwarea(BW)--------salah satu cara mencari moment central pusat ke 0
(m00)

    area = bwarea(klm{i});

    u11 = m11 / (area^2);       % normalize moment central tingkat ke 2
    u12 = m12 / (area^2.5);     % normalize moment central tingkat ke 3
    u21 = m21 / (area^2.5);     % normalize moment central tingkat ke 3
    u20 = m20 / (area^2);      % normalize moment central tingkat ke 2
    u02 = m02 / (area^2);       % normalize moment central tingkat ke 2
    u30 = m30 / (area^2.5);     % normalize moment central tingkat ke 3
    u03 = m03 / (area^2.5);     % normalize moment central tingkat ke 3

    % proses perhitungan 7  moment invariant----------------------------------

    h1 = u20 + u02;
    h2 = (u20-u02)^2 + 4*u11^2;
    h3 = (u30 - 3*u12)^2 + (u03 - 3*u21)^2;
    h4 = (u30 + u12)^2 + (u03 + u21)^2;
    h5 = (u30 - 3*u12) * (u30 + u12) * ( (u30 + u12)^2 - 3*(u03 + u21)^2 ) +
(3*u21 - u03) * (u03 + u21) * ( 3*(u30 + u12)^2 - (u03 + u21)^2 );
    h6 = (u20 - u02) * ( (u30 + u12)^2 - (u03 + u21)^2 ) + 4*u11 * (u30 + u12) *
(u03 + u21);
    h7 = (3*u21 - u03) * (u30 + u12) * ( (u30 + u12)^2 - 3*(u03 + u21)^2 ) -
(3*u12 - u30) * (u03 + u21) * ( 3*(u30 + u12)^2 - (u03 + u21)^2 );

    moment1{i}=[ h1 h2 h3 h4 h5 h6 h7 ]
    cc=moment1{i}(:)
end
```

```
global moment
format long

save long moment1
set(handles.listbox3,'string',cc);
```

## Program Pengujian GUI

```
function varargout = GUITEST(varargin)
% GUITEST M-file for GUITEST.fig
%      GUITEST, by itself, creates a new GUITEST or raises the existing
%      singleton*.
%
%      H = GUITEST returns the handle to a new GUITEST or the handle to
%      the existing singleton*.
%
%      GUITEST('CALLBACK',hObject,eventData,handles,...) calls the local
%      function named CALLBACK in GUITEST.M with the given input arguments.
%
%      GUITEST('Property','Value',...) creates a new GUITEST or raises the
%      existing singleton*.  Starting from the left, property value pairs are
%      applied to the GUI before GUITEST_OpeningFcn gets called.  An
%      unrecognized property name or invalid value makes property application
%      stop.  All inputs are passed to GUITEST_OpeningFcn via varargin.
%
%      *See GUI Options on GUIDE's Tools menu.  Choose "GUI allows only one
%      instance to run (singleton)".
%
% See also: GUIDE, GUIDATA, GUIHANDLES

% Edit the above text to modify the response to help GUITEST

% Last Modified by GUIDE v2.5 03-Feb-2011 17:48:42

% Begin initialization code - DO NOT EDIT
gui_Singleton = 1;
gui_State = struct('gui_Name',       mfilename, ...
                   'gui_Singleton',  gui_Singleton, ...
                   'gui_OpeningFcn', @GUITEST_OpeningFcn, ...
                   'gui_OutputFcn',  @GUITEST_OutputFcn, ...
                   'gui_LayoutFcn',  [] , ...
                   'gui_Callback',   []);
if nargin && ischar(varargin{1})
    gui_State.gui_Callback = str2func(varargin{1});
end

if nargout
    [varargout{1:nargout}] = gui_mainfcn(gui_State, varargin{:});
else
    gui_mainfcn(gui_State, varargin{:});
end
% End initialization code - DO NOT EDIT


% --- Executes just before GUITEST is made visible.
function GUITEST_OpeningFcn(hObject, eventdata, handles, varargin)
% This function has no output args, see OutputFcn.
% hObject    handle to figure
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)
% varargin   command line arguments to GUITEST (see VARARGIN)

% Choose default command line output for GUITEST
handles.output = hObject;

% Update handles structure
```

```
guidata(hObject, handles);

% UIWAIT makes GUITEST wait for user response (see UIRESUME)
% uiwait(handles.figure1);


% --- Outputs from this function are returned to the command line.
function varargout = GUITEST_OutputFcn(hObject, eventdata, handles)
% varargout  cell array for returning output args (see VARARGOUT);
% hObject    handle to figure
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Get default command line output from handles structure
varargout{1} = handles.output;


% --- Executes on button press in panggil.
function panggil_Callback(hObject, eventdata, handles)
% hObject    handle to panggil (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)
file=uigetfile('*bmp');
if~isequal(file,0)
    myform=guidata(gcbo);

    gambar=imread(file);
    imshow(gambar);
    axes=(myform.axes1);
    open(file);
end



% --- Executes on button press in pushbutton2.
function pushbutton2_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton2 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)


myform=guidata(gcbo);
gambar=(myform.panggil);
gambar=im2bw(gambar);
im=imresize(gambar,[100 100]);

    [r,c] = find(im==1);            % nilai X & Y
    rbar = mean(r);                  % mean X
    cbar = mean(c);                  % mean Y
    n = length(r);


    % proses mencari nilai moment central-------------------------------------

    momlist = zeros(n,1);

    for m = 1 : n;

    momlist00(m) = (r(m) - rbar)^0 * (c(m) - cbar)^0;
    momlist10(m) = (r(m) - rbar)^1 * (c(m) - cbar)^0;
    momlist01(m) = (r(m) - rbar)^0 * (c(m) - cbar)^1;
    momlist11(m) = (r(m) - rbar)^1 * (c(m) - cbar)^1;
    momlist12(m) = (r(m) - rbar)^1 * (c(m) - cbar)^2;
    momlist21(m) = (r(m) - rbar)^2 * (c(m) - cbar)^1;
    momlist20(m) = (r(m) - rbar)^2 * (c(m) - cbar)^0;
    momlist02(m) = (r(m) - rbar)^0 * (c(m) - cbar)^2;
    momlist30(m) = (r(m) - rbar)^3 * (c(m) - cbar)^0;
    momlist03(m) = (r(m) - rbar)^0 * (c(m) - cbar)^3;

    end

    % moment central tingkat ke 0 - 1 ----------------------------------------
```

```
    m00 = sum(momlist00);      % moment central pusat m00
    m10 = sum(momlist10);      % moment central pusat m10
    m01 = sum(momlist01);      % moment central pusat m01

    % syarat moment central tingkat kedua & ketiga (p+q>=2)yang di normalisasi

    m11 = sum(momlist11);      % moment central tingkat ke 2
    m12 = sum(momlist12);      % moment central tingkat ke 3
    m21 = sum(momlist21);      % moment central tingkat ke 3
    m20 = sum(momlist20);      % moment central tingkat ke 2
    m02 = sum(momlist02);     % moment central tingkat ke 2
    m30 = sum(momlist30);      % moment central tingkat ke 3
    m03 = sum(momlist03);      % moment central tingkat ke 3

    % proses perhitungan normalisasi moment central tingkat ke 2 & 3
    % area = bwarea(BW)--------salah satu cara mencari moment central pusat ke 0
(m00)

    area = bwarea(im);

    u11 = m11 / (area^2);       % normalize moment central tingkat ke 2
    u12 = m12 / (area^2.5);     % normalize moment central tingkat ke 3
    u21 = m21 / (area^2.5);     % normalize moment central tingkat ke 3
    u20 = m20 / (area^2);      % normalize moment central tingkat ke 2
    u02 = m02 / (area^2);       % normalize moment central tingkat ke 2
    u30 = m30 / (area^2.5);     % normalize moment central tingkat ke 3
    u03 = m03 / (area^2.5);     % normalize moment central tingkat ke 3

    % proses perhitungan 7  moment invariant---------------------------------

    h1 = u20 + u02;
    h2 = (u20-u02)^2 + 4*u11^2;
    h3 = (u30 - 3*u12)^2 + (u03 - 3*u21)^2;
    h4 = (u30 + u12)^2 + (u03 + u21)^2;
    h5 = (u30 - 3*u12) * (u30 + u12) * ( (u30 + u12)^2 - 3*(u03 + u21)^2 ) +
(3*u21 - u03) * (u03 + u21) * ( 3*(u30 + u12)^2 - (u03 + u21)^2 );
    h6 = (u20 - u02) * ( (u30 + u12)^2 - (u03 + u21)^2 ) + 4*u11 * (u30 + u12) *
(u03 + u21);
    h7 = (3*u21 - u03) * (u30 + u12) * ( (u30 + u12)^2 - 3*(u03 + u21)^2 ) -
(3*u12 - u30) * (u03 + u21) * ( 3*(u30 + u12)^2 - (u03 + u21)^2 );

    momentgui=[ h1 h2 h3 h4 h5 h6 h7 rbar cbar area]
% end
global moment
format long

save gui1 momentgui




function edit1_Callback(hObject, eventdata, handles)
% hObject    handle to edit1 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit1 as text
%        str2double(get(hObject,'String')) returns contents of edit1 as a double


% --- Executes during object creation, after setting all properties.
function edit1_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit1 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
```

```
    set(hObject,'BackgroundColor','white');
end



function edit2_Callback(hObject, eventdata, handles)
% hObject    handle to edit2 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit2 as text
%        str2double(get(hObject,'String')) returns contents of edit2 as a double


% --- Executes during object creation, after setting all properties.
function edit2_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit2 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end


% --- Executes on button press in pushbutton4.
function pushbutton4_Callback(hObject, eventdata, handles)
selection=questdlg(['Keluar...File...',get(handles.figure1,'Name')
'?'],['Keluar.....',get(handles.figure1,'Name') '...'],'Ya','Tidak','Ya');
                           if strcmp(selection,'Tidak')
                               return;
                           end
                           delete(handles.figure1)
% hObject    handle to pushbutton4 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)


% --- Executes on button press in pushbutton6.
function pushbutton6_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton6 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)
clc
clear all
myform=guidata(gcbo);
load gui1 momentgui
load asli1 v
load asli2 w
load asli3 v0
load asli4 w0



 n = 10; %INPUT
 p = 2;
 m = 4; % OUTPUT
 alpha = 0.0002;
 e = 0.05; % error limit
% ------------------------------------------------------------
%%% Inisialisasi Input & Target


x = [momentgui];
t=[0 0 0 1];
tr = size(x,1);

% ------------------------------------------------------------
```

```
%%% hidden Layer pertama
    zin = zeros(tr,p);
    z = zeros(tr,p);
    din = zeros(tr,p);
    dj = zeros(tr,p);
    chv = zeros(n,p);
    chv0 = zeros(1,p);
%%%Output Layer
    yin = zeros(tr,m);
    y = zeros(tr,m);
    d = zeros(tr,m);
    chw = zeros(p,m);
    chw0 = zeros(1,m);
    error=zeros(tr,m);
iteration =1;
er = 0; error = 0;

%% ==Step_1====================================================

%%% ==Step_2===================================================
    for Tp=1:tr;
%% Feed forward:
%%% ==Step_3===================================================
%%% ==Step_4===================================================
%%% First Layer
        for j=1:p
            zin(Tp,j) = 0;
            for i=1:n
                zin(Tp,j) = zin(Tp,j) + x(Tp,i) * v(i,j);
            end
            zin(Tp,j) = v0(j) + zin(Tp,j);
             z(Tp,j) = (2/(1+exp(-zin(Tp,j))))-1; %aktivasi function Z
        end
%%% ==Step_5=================================================
    %%% Output Layer
        for k=1:m
            yin(Tp,k) = 0;
            for j=1:p
                yin(Tp,k) = yin(Tp,k) + z(Tp,j) * w(j,k);
            end
            yin(Tp,k) = w0(k) + yin(Tp,k);
             y(Tp,k) = 1/(1+exp(-yin(Tp,k))); %aktivasi function Y

        end

%% ==Step_9==Test_stop_kondisi==========================
for k=1:m

    error(Tp,k) =sqrt((t(Tp,k)-y(Tp,k)).^2);

end



    end
%
%   for k=1:m
%      if y(k) < 0.5
%         y(k)=0;
%         else
%         y(k)=1
%      end
%   end

errors=sum(error)/4

global y
format short
set(myform.listbox1,'string',error);
set(myform.listbox2,'string',y);
  for k=1:m
     if y(k) < 0.5
```

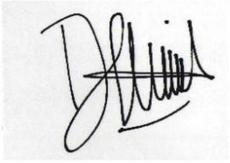
```
        y(k)=0;
        else
        y(k)=1
     end
  end
set(myform.listbox3,'string',y);




% --- Executes on key press with focus on uitable1 and none of its controls.
function uitable1_KeyPressFcn(hObject, eventdata, handles)
% hObject    handle to uitable1 (see GCBO)
% eventdata  structure with the following fields (see UITABLE)
%   Key: name of the key that was pressed, in lower case
%   Character: character interpretation of the key(s) that was pressed
%   Modifier: name(s) of the modifier key(s) (i.e., control, shift) pressed
% handles    structure with handles and user data (see GUIDATA)


% --- Executes on selection change in listbox1.
function listbox1_Callback(hObject, eventdata, handles)
% hObject    handle to listbox1 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: contents = get(hObject,'String') returns listbox1 contents as cell array
%        contents{get(hObject,'Value')} returns selected item from listbox1


% --- Executes during object creation, after setting all properties.
function listbox1_CreateFcn(hObject, eventdata, handles)
% hObject    handle to listbox1 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: listbox controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end


% --- Executes on selection change in listbox2.
function listbox2_Callback(hObject, eventdata, handles)
% hObject    handle to listbox2 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: contents = get(hObject,'String') returns listbox2 contents as cell array
%        contents{get(hObject,'Value')} returns selected item from listbox2


% --- Executes during object creation, after setting all properties.
function listbox2_CreateFcn(hObject, eventdata, handles)
% hObject    handle to listbox2 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: listbox controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end


% --- Executes on button press in radiobutton1.
function radiobutton1_Callback(hObject, eventdata, handles)
```

```
% hObject    handle to radiobutton1 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hint: get(hObject,'Value') returns toggle state of radiobutton1


% --- Executes on button press in radiobutton2.
function radiobutton2_Callback(hObject, eventdata, handles)
% hObject    handle to radiobutton2 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hint: get(hObject,'Value') returns toggle state of radiobutton2


% --- Executes on button press in radiobutton3.
function radiobutton3_Callback(hObject, eventdata, handles)
% hObject    handle to radiobutton3 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hint: get(hObject,'Value') returns toggle state of radiobutton3


% --- Executes on button press in radiobutton4.
function radiobutton4_Callback(hObject, eventdata, handles)
% hObject    handle to radiobutton4 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hint: get(hObject,'Value') returns toggle state of radiobutton4


% --- Executes on selection change in listbox3.
function listbox3_Callback(hObject, eventdata, handles)
% hObject    handle to listbox3 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: contents = get(hObject,'String') returns listbox3 contents as cell array
%        contents{get(hObject,'Value')} returns selected item from listbox3


% --- Executes during object creation, after setting all properties.
function listbox3_CreateFcn(hObject, eventdata, handles)
% hObject    handle to listbox3 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: listbox controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end
```

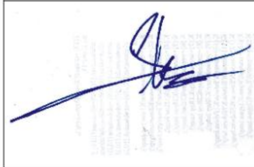
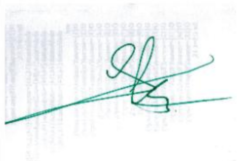
# LAMPIRAN B

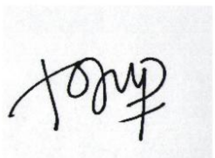
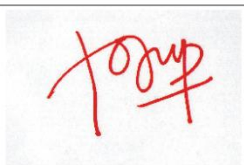
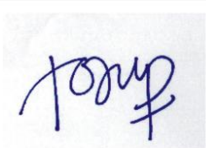
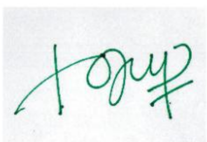
DATA CITRA TANDA TANGAN

| AGUS 1 | AGUS 2 |
| --- | --- |
|  |  |
| AGUS 3 | AGUS 4 |
|  |  |

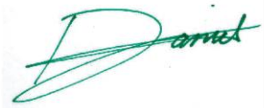
| DANIELH 1 | DANIELH 2 |
| --- | --- |
|  |  |
| DANIELH 3 | DANIELH 4 |
|  |  |

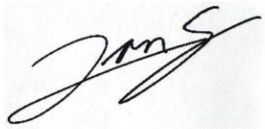
| ALFIANTO 1 | ALFIANTO 2 |
| --- | --- |
|  |  |
| ALFIANTO 3 | ALFIANTO 4 |
|  |  |

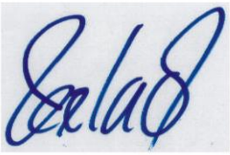
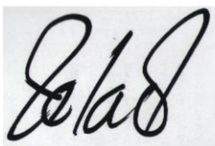
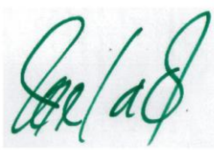
| YANCE 1 | YANCE 2 |
| --- | --- |
|  |  |
| YANCE 3 | YANCE 4 |
|  |  |

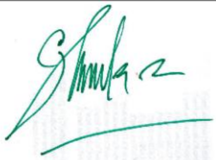
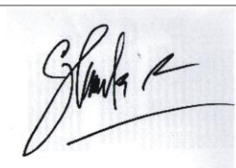
| TONY 1 | TONY 2 |
| --- | --- |
|  |  |
| TONY 3 | TONY 4 |
|  |  |

| NOFAN 1 | NOFAN 2 |
| --- | --- |
|  |  |
| NOFAN 3 | NOFAN 4 |
|  |  |

| DANIEL 1 | DANIEL 2 |
| --- | --- |
|  |  |
| DANIEL 3 | DANIEL 4 |
|  |  |

| JAN 1 | JAN 2 |
| --- | --- |
|  |  |
| JAN 3 | JAN 4 |
|  |  |

| GELAR 1 | GELAR 2 |
| --- | --- |
|  |  |
| GELAR 3 | GELAR 4 |
|  |  |

| GERALD 1 | GERALD 2 |
| --- | --- |
|  |  |
| GERALD 3 | GERALD 4 |
|  |  |

# LAMPIRAN C

## DATA UJI HIPOTESIS

1. Uji Hipotesis (Tabel 4.2)

| | Target | Output | | Selisih |
|---|---|---|---|---|
| t1 | 0 | 0.20003 | | -0.2 |
| | 0 | 0.20002 | | -0.2 |
| | 0 | 0.20002 | | -0.2 |
| | 0 | 0.20001 | | -0.2 |
| | 0 | 0.20001 | | -0.2 |
| | 0 | 0.2 | | -0.2 |
| | 0 | 0.2 | | -0.2 |
| | 0 | 0.19999 | | -0.2 |
| | 0 | 0.19999 | | -0.2 |
| | 0 | 0.19998 | | -0.2 |
| | 0 | 0.19998 | | -0.2 |
| | 0 | 0.19997 | | -0.2 |
| | 0 | 0.19997 | | -0.2 |
| | 0 | 0.19996 | | -0.2 |
| | 0 | 0.19996 | | -0.2 |
| | 0 | 0.19995 | | -0.2 |
| | 1 | 0.19995 | | 0.8001 |
| | 1 | 0.19997 | | 0.8 |
| | 1 | 0.19999 | | 0.8 |
| | 1 | 0.20001 | | 0.8 |
| t2 | 0 | 0.40004 | o2 | -0.4 |
| | 0 | 0.40001 | | -0.4 |
| | 0 | 0.39999 | | -0.4 |
| | 0 | 0.39997 | | -0.4 |
| | 0 | 0.39994 | | -0.3999 |
| | 0 | 0.39992 | | -0.3999 |
| | 0 | 0.3999 | | -0.3999 |
| | 0 | 0.39987 | | -0.3999 |
| | 1 | 0.39985 | | 0.6002 |
| | 1 | 0.39989 | | 0.6001 |
| | 1 | 0.39992 | | 0.6001 |
| | 1 | 0.39995 | | 0.6001 |
| | 1 | 0.39999 | | 0.6 |
| | 1 | 0.40002 | | 0.6 |
| | 1 | 0.40006 | | 0.5999 |
| | 1 | 0.40009 | | 0.5999 |
| | 0 | 0.40013 | | -0.4001 |
| | 0 | 0.4001 | | -0.4001 |
| | 0 | 0.40006 | | -0.4001 |
| | 0 | 0.40008 | | -0.4001 |
| t3 | 0 | 0.39999 | o3 | -0.4 |
| | 0 | 0.39997 | | -0.4 |
| | 0 | 0.39994 | | -0.3999 |
| | 0 | 0.39992 | | -0.3999 |
| | 1 | 0.3999 | | 0.6001 |
| | 1 | 0.39993 | | 0.6001 |
| | 1 | 0.39997 | | 0.6 |
| | 1 | 0.4 | | 0.6 |
| | 0 | 0.40004 | | -0.4 |
| | 0 | 0.40001 | | -0.4 |
| | 0 | 0.39999 | | -0.4 |
| | 0 | 0.39997 | | -0.4 |

| | Target | Output | | Selisih |
|---|---|---|---|---|
| | 1 | 0.39994 | | 0.6001 |
| | 1 | 0.39998 | | 0.6 |
| | 1 | 0.40001 | | 0.6 |
| | 1 | 0.40005 | | 0.6 |
| | 0 | 0.40008 | | -0.4001 |
| | 0 | 0.40006 | | -0.4001 |
| | 0 | 0.40004 | | -0.4 |
| | 0 | 0.40001 | | -0.4 |
| t4 | 0 | 0.50003 | o4 | -0.5 |
| | 0 | 0.49999 | | -0.5 |
| | 1 | 0.49996 | | 0.5 |
| | 1 | 0.5 | | 0.5 |
| | 0 | 0.50003 | | -0.5 |
| | 0 | 0.49999 | | -0.5 |
| | 1 | 0.49996 | | 0.5 |
| | 1 | 0.5 | | 0.5 |
| | 0 | 0.50003 | | -0.5 |
| | 0 | 0.49999 | | -0.5 |
| | 1 | 0.49996 | | 0.5 |
| | 1 | 0.5 | | 0.5 |
| | 0 | 0.50003 | | -0.5 |
| | 0 | 0.49999 | | -0.5 |
| | 1 | 0.49996 | | 0.5 |
| | 1 | 0.5 | | 0.5 |
| | 0 | 0.50003 | | -0.5 |
| | 0 | 0.49999 | | -0.5 |
| | 1 | 0.49996 | | 0.5 |
| | 1 | 0.5 | | 0.5 |
| D (rata –rata) | | | | 1E-05 |
| SD (Standar Deviasi) | | | | 0.4747 |
| t (Satistik Uji) | | | | 0.0002 |
| \|t\| | | | | 0.0002 |
| Ta (Alpha) | | | | 1.9937 |

2. Uji Hipotesis (Tabel 4.4)

| | Target | Output | | Selisih |
|---|---|---|---|---|
| t1 | 0 | 0.0759 | | -0.076 |
| | 0 | 0 | | 0 |
| | 0 | 0.0751 | | -0.075 |
| | 0 | 0 | | 0 |
| | 0 | 0.0775 | | -0.078 |
| | 0 | 0 | | 0 |
| | 0 | 0.0772 | | -0.077 |
| | 0 | 0 | | 0 |
| | 0 | 0.0765 | | -0.077 |
| | 0 | 0 | | 0 |
| | 0 | 0.0753 | | -0.075 |
| | 0 | 0 | | 0 |
| | 0 | 0.0711 | | -0.071 |
| | 0 | 0 | | 0 |
| | 0 | 0.076 | | -0.076 |
| | 0 | 0 | | 0 |
| | 1 | 0.9289 | | 0.0711 |
| | 1 | 1 | | 0 |
| | 1 | 0.9259 | | 0.0741 |
| | 1 | 1 | | 0 |
| t2 | 0 | 0.0743 | o2 | -0.074 |
| | 0 | 0 | | 0 |
| | 0 | 0.0762 | | -0.076 |
| | 0 | 0 | | 0 |
| | 0 | 0.0817 | | -0.082 |
| | 0 | 0 | | 0 |
| | 0 | 0.0808 | | -0.081 |
| | 0 | 0 | | 0 |
| | 1 | 0.9322 | | 0.0678 |
| | 1 | 1 | | 0 |
| | 1 | 0.9278 | | 0.0722 |
| | 1 | 1 | | 0 |
| | 1 | 0.9243 | | 0.0757 |
| | 1 | 1 | | 0 |
| | 1 | 0.9275 | | 0.0725 |
| | 1 | 1 | | 0 |
| | 0 | 0.0772 | | -0.077 |
| | 0 | 0 | | 0 |
| | 0 | 0.0748 | | -0.075 |
| | 0 | 0 | | 0 |
| t3 | 0 | 0.0761 | o3 | -0.076 |
| | 0 | 0 | | 0 |
| | 0 | 0.0774 | | -0.077 |
| | 0 | 0 | | 0 |
| | 1 | 0.9283 | | 0.0717 |
| | 1 | 1 | | 0 |
| | 1 | 0.9311 | | 0.0689 |
| | 1 | 1 | | 0 |
| | 0 | 0.0787 | | -0.079 |
| | 0 | 0 | | 0 |
| | 0 | 0.0766 | | -0.077 |
| | 0 | 0 | | 0 |

| | Target | Output | | Selisih |
|---|---|---|---|---|
| | 1 | 0.9244 | | 0.0756 |
| | 1 | 1 | | 0 |
| | 1 | 0.9286 | | 0.0714 |
| | 1 | 1 | | 0 |
| | 0 | 0.0765 | | -0.077 |
| | 0 | 0 | | 0 |
| | 0 | 0.0769 | | -0.077 |
| | 0 | 0 | | 0 |
| t4 | 0 | 0.0755 | o4 | -0.076 |
| | 0 | 0 | | 0 |
| | 1 | 0.9262 | | 0.0738 |
| | 1 | 1 | | 0 |
| | 0 | 0.9322 | | -0.932 |
| | 0 | 1 | | -1 |
| | 1 | 0.0763 | | 0.9237 |
| | 1 | 1 | | 0 |
| | 0 | 0.0819 | | -0.082 |
| | 0 | 0 | | 0 |
| | 1 | 0.9272 | | 0.0728 |
| | 1 | 1 | | 0 |
| | 0 | 0.0695 | | -0.07 |
| | 0 | 0 | | 0 |
| | 1 | 0.9253 | | 0.0747 |
| | 1 | 1 | | 0 |
| | 0 | 0.0758 | | -0.076 |
| | 0 | 0 | | 0 |
| | 1 | 0.9257 | | 0.0743 |
| | 1 | 1 | | 0 |
| D (rata –rata) | | | | **-0.023** |
| SD (Standar Deviasi) | | | | **0.1914** |
| t (Satistik Uji) | | | | -1.067 |
| \|t\| | | | | 1.0667 |
| Ta (Alpha) | | | | 1.9937 |

3. Uji Hipotesis (Tabel 4.5, 4.6)

| | Target | Output | | Selisih |
|---|---|---|---|---|
| t1 | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| t2 | 0 | 0 | o2 | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| t3 | 0 | 0.0743 | o3 | -0.0743 |
| | 0 | 0.0743 | | -0.0743 |
| | 0 | 0.0757 | | -0.0757 |
| | 0 | 0.0757 | | -0.0757 |
| | 1 | 0.9283 | | 0.0717 |
| | 1 | 0.9283 | | 0.0717 |
| | 1 | 0.9311 | | 0.0689 |
| | 1 | 0.9311 | | 0.0689 |
| | 0 | 0.0787 | | -0.0787 |
| | 0 | 0.0787 | | -0.0787 |
| | 0 | 0.0771 | | -0.0771 |
| | 0 | 0.0771 | | -0.0771 |

| | Target | Output | | Selisih |
|---|---|---|---|---|
| | 1 | 0.9244 | | 0.0756 |
| | 1 | 0.9286 | | 0.0714 |
| | 1 | 0.9286 | | 0.0714 |
| | 0 | 0.0766 | | -0.0766 |
| | 0 | 0.0766 | | -0.0766 |
| | 0 | 0.0727 | | -0.0727 |
| | 0 | 0.0727 | | -0.0727 |
| t4 | 0 | 0.0756 | o4 | -0.0756 |
| | 0 | 0.0756 | | -0.0756 |
| | 1 | 0.9251 | | 0.0749 |
| | 1 | 0.9251 | | 0.0749 |
| | 0 | 0.9322 | | -0.9322 |
| | 0 | 0.9322 | | -0.9322 |
| | 1 | 0.0763 | | 0.9237 |
| | 1 | 0.0763 | | 0.9237 |
| | 0 | 0.0819 | | -0.0819 |
| | 0 | 0.0819 | | -0.0819 |
| | 1 | 0.9321 | | 0.0679 |
| | 1 | 0.9321 | | 0.0679 |
| | 0 | 0.0696 | | -0.0696 |
| | 0 | 0.0696 | | -0.0696 |
| | 1 | 0.9253 | | 0.0747 |
| | 1 | 0.9253 | | 0.0747 |
| | 0 | 0.0758 | | -0.0758 |
| | 0 | 0.0758 | | -0.0758 |
| | 1 | 0.923 | | 0.077 |
| | 1 | 0.923 | | 0.077 |
| D (rata –rata) | | | | **-0.0046** |
| SD (Standar Deviasi) | | | | **0.21473** |
| t (Satistik Uji) | | | | -0.192 |
| \|t\| | | | | 0.19202 |
| Ta (Alpha) | | | | 1.9937 |

4. Uji Hipotesis (Tabel 4.8)

| | Target | Output | | Selisih |
|---|---|---|---|---|
| t1 | 0 | 0.069 | | -0.069 |
| | 0 | 0 | | 0 |
| | 0 | 0.0739 | | -0.0739 |
| | 0 | 0 | | 0 |
| | 0 | 0.0775 | | -0.0775 |
| | 0 | 0 | | 0 |
| | 0 | 0.0725 | | -0.0725 |
| | 0 | 0 | | 0 |
| | 0 | 0.0812 | | -0.0812 |
| | 0 | 0 | | 0 |
| | 0 | 0.0699 | | -0.0699 |
| | 0 | 0 | | 0 |
| | 0 | 0.0784 | | -0.0784 |
| | 0 | 0 | | 0 |
| | 0 | 0.0747 | | -0.0747 |
| | 0 | 0 | | 0 |
| | 1 | 0.9264 | | 0.0736 |
| | 1 | 1 | | 0 |
| | 1 | 0.9272 | | 0.0728 |
| | 1 | 1 | | 0 |
| t2 | 0 | 0.0727 | o2 | -0.0727 |
| | 0 | 0 | | 0 |
| | 0 | 0.0746 | | -0.0746 |
| | 0 | 0 | | 0 |
| | 0 | 0.0736 | | -0.0736 |
| | 0 | 0 | | 0 |
| | 0 | 0.0695 | | -0.0695 |
| | 0 | 0 | | 0 |
| | 1 | 0.9292 | | 0.0708 |
| | 1 | 1 | | 0 |
| | 1 | 0.9219 | | 0.0781 |
| | 1 | 1 | | 0 |
| | 1 | 0.9318 | | 0.0682 |
| | 1 | 1 | | 0 |
| | 1 | 0.9348 | | 0.0652 |
| | 1 | 1 | | 0 |
| | 0 | 0.0758 | | -0.0758 |
| | 0 | 0 | | 0 |
| | 0 | 0.0737 | | -0.0737 |
| | 0 | 0 | | 0 |
| t3 | 0 | 0.0727 | o3 | -0.0727 |
| | 0 | 0 | | 0 |
| | 0 | 0.0741 | | -0.0741 |
| | 0 | 0 | | 0 |
| | 1 | 0.0731 | | 0.9269 |
| | 1 | 1 | | 0 |
| | 1 | 0.9259 | | 0.0741 |
| | 1 | 1 | | 0 |
| | 0 | 0.0783 | | -0.0783 |
| | 0 | 0 | | 0 |
| | 0 | 0.0711 | | -0.0711 |
| | 0 | 0 | | 0 |

| | Target | Output | | Selisih |
|---|---|---|---|---|
| | 1 | 0.9299 | | 0.0701 |
| | 1 | 1 | | 0 |
| | 1 | 0.9311 | | 0.0689 |
| | 1 | 1 | | 0 |
| | 0 | 0.0761 | | -0.0761 |
| | 0 | 0 | | 0 |
| | 0 | 0.0741 | | -0.0741 |
| | 0 | 0 | | 0 |
| t4 | 0 | 0.0735 | o4 | -0.0735 |
| | 0 | 0 | | 0 |
| | 1 | 0.9264 | | 0.0736 |
| | 1 | 1 | | 0 |
| | 0 | 0.9263 | | -0.9263 |
| | 0 | 1 | | -1 |
| | 1 | 0.926 | | 0.074 |
| | 1 | 1 | | 0 |
| | 0 | 0.0798 | | -0.0798 |
| | 0 | 0 | | 0 |
| | 1 | 0.9237 | | 0.0763 |
| | 1 | 1 | | 0 |
| | 0 | 0.0741 | | -0.0741 |
| | 0 | 0 | | 0 |
| | 1 | 0.9371 | | 0.0629 |
| | 1 | 1 | | 0 |
| | 0 | 0.0759 | | -0.0759 |
| | 0 | 0 | | 0 |
| | 1 | 0.9252 | | 0.0748 |
| | 1 | 1 | | 0 |
| D (rata –rata) | | | | **-0.0223** |
| SD (Standar Deviasi) | | | | **0.191** |
| t (Satistik Uji) | | | | -1.0434 |
| \|t\| | | | | 1.0434 |
| Ta (Alpha) | | | | 1.9937 |

5. Uji Hipotesis (Tabel 4.9, 2.10)

| | Target | Output | | Selisih |
|---|---|---|---|---|
| t1 | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| t2 | 0 | 0 | o2 | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| t3 | 0 | 0.0728 | o3 | -0.0728 |
| | 0 | 0.0728 | | -0.0728 |
| | 0 | 0.0741 | | -0.0741 |
| | 0 | 0.0741 | | -0.0741 |
| | 1 | 0.9264 | | 0.0736 |
| | 1 | 0.9264 | | 0.0736 |
| | 1 | 0.9259 | | 0.0741 |
| | 1 | 0.9259 | | 0.0741 |
| | 0 | 0.0783 | | -0.0783 |
| | 0 | 0.0783 | | -0.0783 |
| | 0 | 0.0711 | | -0.0711 |
| | 0 | 0.0711 | | -0.0711 |

| | Target | Output | | Selisih |
|---|---|---|---|---|
| | 1 | 0.9299 | | 0.0701 |
| | 1 | 0.9299 | | 0.0701 |
| | 1 | 0.9311 | | 0.0689 |
| | 1 | 0.9311 | | 0.0689 |
| | 0 | 0.0761 | | -0.0761 |
| | 0 | 0.0761 | | -0.0761 |
| | 0 | 0.0741 | | -0.0741 |
| | 0 | 0.0741 | | -0.0741 |
| t4 | 0 | 0.0736 | o4 | -0.0736 |
| | 0 | 0.0736 | | -0.0736 |
| | 1 | 0.9265 | | 0.0735 |
| | 1 | 0.9265 | | 0.0735 |
| | 0 | 0.0719 | | -0.0719 |
| | 0 | 0.0719 | | -0.0719 |
| | 1 | 0.926 | | 0.074 |
| | 1 | 0.926 | | 0.074 |
| | 0 | 0.0798 | | -0.0798 |
| | 0 | 0.0798 | | -0.0798 |
| | 1 | 0.9237 | | 0.0763 |
| | 1 | 0.9237 | | 0.0763 |
| | 0 | 0.0741 | | -0.0741 |
| | 0 | 0.0741 | | -0.0741 |
| | 1 | 0.9371 | | 0.0629 |
| | 1 | 0.9371 | | 0.0629 |
| | 0 | 0.0759 | | -0.0759 |
| | 0 | 0.0759 | | -0.0759 |
| | 1 | 0.9252 | | 0.0748 |
| | 1 | 0.9252 | | 0.0748 |
| D (rata –rata) | | | | **-0.0043** |
| SD (Standar Deviasi) | | | | **0.0522** |
| t (Satistik Uji) | | | | -0.744 |
| \|t\| | | | | 0.744 |
| Ta (Alpha) | | | | 1.9937 |

6. Uji Hipotesis (Tabel 4.12)

| | Target | Output | | Selisih |
|---|---|---|---|---|
| t1 | 0 | 0.0801 | | -0.0801 |
| | 0 | 0 | | 0 |
| | 0 | 0.0742 | | -0.0742 |
| | 0 | 0 | | 0 |
| | 0 | 0.0725 | | -0.0725 |
| | 0 | 0 | | 0 |
| | 0 | 0.0757 | | -0.0757 |
| | 0 | 0 | | 0 |
| | 0 | 0.0765 | | -0.0765 |
| | 0 | 0 | | 0 |
| | 0 | 0.0788 | | -0.0788 |
| | 0 | 0 | | 0 |
| | 0 | 0.0752 | | -0.0752 |
| | 0 | 0 | | 0 |
| | 0 | 0.0759 | | -0.0759 |
| | 0 | 0 | | 0 |
| | 1 | 0.9258 | | 0.0742 |
| | 1 | 1 | | 0 |
| | 1 | 0.9329 | | 0.0671 |
| | 1 | 1 | | 0 |
| t2 | 0 | 0.0801 | o2 | -0.0801 |
| | 0 | 0 | | 0 |
| | 0 | 0.0756 | | -0.0756 |
| | 0 | 0 | | 0 |
| | 0 | 0.0721 | | -0.0721 |
| | 0 | 0 | | 0 |
| | 0 | 0.0757 | | -0.0757 |
| | 0 | 0 | | 0 |
| | 1 | 0.9264 | | 0.0736 |
| | 1 | 1 | | 0 |
| | 1 | 0.9427 | | 0.0573 |
| | 1 | 1 | | 0 |
| | 1 | 0.932 | | 0.068 |
| | 1 | 1 | | 0 |
| | 1 | 0.9295 | | 0.0705 |
| | 1 | 1 | | 0 |
| | 0 | 0.0716 | | -0.0716 |
| | 0 | 0 | | 0 |
| | 0 | 0.075 | | -0.075 |
| | 0 | 0 | | 0 |
| t3 | 0 | 0.0758 | o3 | -0.0758 |
| | 0 | 0 | | 0 |
| | 0 | 0.0774 | | -0.0774 |
| | 0 | 0 | | 0 |
| | 1 | 0.9262 | | 0.0738 |
| | 1 | 1 | | 0 |
| | 1 | 0.9274 | | 0.0726 |
| | 1 | 1 | | 0 |
| | 0 | 0.0749 | | -0.0749 |
| | 0 | 0 | | 0 |
| | 0 | 0.0756 | | -0.0756 |
| | 0 | 0 | | 0 |

| | Target | Output | | Selisih |
|---|---|---|---|---|
| | 1 | 0.9298 | | 0.0702 |
| | 1 | 1 | | 0 |
| | 1 | 0.9257 | | 0.0743 |
| | 1 | 1 | | 0 |
| | 0 | 0.0717 | | -0.0717 |
| | 0 | 0 | | 0 |
| | 0 | 0.0766 | | -0.0766 |
| | 0 | 0 | | 0 |
| t4 | 0 | 0.0767 | o4 | -0.0767 |
| | 0 | 0 | | 0 |
| | 1 | 0.9322 | | 0.0678 |
| | 1 | 1 | | 0 |
| | 0 | 0.0734 | | -0.0734 |
| | 0 | 0 | | 0 |
| | 1 | 0.9264 | | 0.0736 |
| | 1 | 1 | | 0 |
| | 0 | 0.0768 | | -0.0768 |
| | 0 | 0 | | 0 |
| | 1 | 0.932 | | 0.068 |
| | 1 | 1 | | 0 |
| | 0 | 0.0756 | | -0.0756 |
| | 0 | 0 | | 0 |
| | 1 | 0.9276 | | 0.0724 |
| | 1 | 1 | | 0 |
| | 0 | 0.0682 | | -0.0682 |
| | 0 | 0 | | 0 |
| | 1 | 0.9311 | | 0.0689 |
| | 1 | 1 | | 0 |
| D (rata –rata) | | | | **-0.01037** |
| SD (Standar Deviasi) | | | | **0.05123** |
| t (Satistik Uji) | | | | **-1.81023** |
| \|t\| | | | | **1.81023** |
| Ta (Alpha) | | | | **1.9937** |

7. Uji Hipotesis (Tabel 4.13, 4.14)

| | Target | Output | | Selisih |
|---|---|---|---|---|
| t1 | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| t2 | 0 | 0 | o2 | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| t3 | 0 | 0.0765 | o3 | -0.0765 |
| | 0 | 0.0765 | | -0.0765 |
| | 0 | 0.0762 | | -0.0762 |
| | 0 | 0.0762 | | -0.0762 |
| | 1 | 0.9256 | | 0.0744 |
| | 1 | 0.9256 | | 0.0744 |
| | 1 | 0.9283 | | 0.0717 |
| | 1 | 0.9283 | | 0.0717 |
| | 0 | 0.0764 | | -0.0764 |
| | 0 | 0.0764 | | -0.0764 |
| | 0 | 0.0777 | | -0.0777 |
| | 0 | 0.0777 | | -0.0777 |

| | Target | Output | | Selisih |
|---|---|---|---|---|
| | 1 | 0.9267 | | 0.0733 |
| | 1 | 0.9267 | | 0.0733 |
| | 1 | 0.9257 | | 0.0743 |
| | 1 | 0.9257 | | 0.0743 |
| | 0 | 0.0717 | | -0.0717 |
| | 0 | 0.0717 | | -0.0717 |
| | 0 | 0.0766 | | -0.0766 |
| | 0 | 0.0766 | | -0.0766 |
| t4 | 0 | 0.075 | o4 | -0.075 |
| | 0 | 0.075 | | -0.075 |
| | 1 | 0.9272 | | 0.0728 |
| | 1 | 0.9272 | | 0.0728 |
| | 0 | 0.0739 | | -0.0739 |
| | 0 | 0.0739 | | -0.0739 |
| | 1 | 0.9287 | | 0.0713 |
| | 1 | 0.9287 | | 0.0713 |
| | 0 | 0.0762 | | -0.0762 |
| | 0 | 0.0762 | | -0.0762 |
| | 1 | 0.9301 | | 0.0699 |
| | 1 | 0.9301 | | 0.0699 |
| | 0 | 0.0784 | | -0.0784 |
| | 0 | 0.0784 | | -0.0784 |
| | 1 | 0.9276 | | 0.0724 |
| | 1 | 0.9276 | | 0.0724 |
| | 0 | 0.0682 | | -0.0682 |
| | 0 | 0.0682 | | -0.0682 |
| | 1 | 0.9311 | | 0.0689 |
| | 1 | 0.9311 | | 0.0689 |
| D (rata –rata) | | | | -0.00445 |
| SD (Standar Deviasi) | | | | 0.052355 |
| t (Satistik Uji) | | | | -0.75938 |
| \|t\| | | | | 0.759385 |
| Ta (Alpha) | | | | 1.9937 |

8. Uji Hipotesis (Tabel 4.16)

| | Target | Output | | Selisih |
|---|---|---|---|---|
| t1 | 0 | 0.076 | | -0.076 |
| | 0 | 0 | | 0 |
| | 0 | 0.0779 | | -0.0779 |
| | 0 | 0 | | 0 |
| | 0 | 0.0779 | | -0.0779 |
| | 0 | 0 | | 0 |
| | 0 | 0.0711 | | -0.0711 |
| | 0 | 0 | | 0 |
| | 0 | 0.071 | | -0.071 |
| | 0 | 0 | | 0 |
| | 0 | 0.074 | | -0.074 |
| | 0 | 0 | | 0 |
| | 0 | 0.0755 | | -0.0755 |
| | 0 | 0 | | 0 |
| | 0 | 0.0779 | | -0.0779 |
| | 0 | 0 | | 0 |
| | 1 | 0.9257 | | 0.0743 |
| | 1 | 1 | | 0 |
| | 1 | 0.9322 | | 0.0678 |
| | 1 | 1 | | 0 |
| t2 | 0 | 0.0762 | o2 | -0.0762 |
| | 0 | 0 | | 0 |
| | 0 | 0.0778 | | -0.0778 |
| | 0 | 0 | | 0 |
| | 0 | 0.0769 | | -0.0769 |
| | 0 | 0 | | 0 |
| | 0 | 0.0754 | | -0.0754 |
| | 0 | 0 | | 0 |
| | 1 | 0.9252 | | 0.0748 |
| | 1 | 1 | | 0 |
| | 1 | 0.9274 | | 0.0726 |
| | 1 | 1 | | 0 |
| | 1 | 0.9279 | | 0.0721 |
| | 1 | 1 | | 0 |
| | 1 | 0.9355 | | 0.0645 |
| | 1 | 1 | | 0 |
| | 0 | 0.07297 | | -0.07297 |
| | 0 | 0 | | 0 |
| | 0 | 0.0764 | | -0.0764 |
| | 0 | 0 | | 0 |
| t3 | 0 | 0.0807 | o3 | -0.0807 |
| | 0 | 0 | | 0 |
| | 0 | 0.0728 | | -0.0728 |
| | 0 | 0 | | 0 |
| | 1 | 0.9278 | | 0.0722 |
| | 1 | 1 | | 0 |
| | 1 | 0.9265 | | 0.0735 |
| | 1 | 1 | | 0 |
| | 0 | 0.0707 | | -0.0707 |
| | 0 | 0 | | 0 |
| | 0 | 0.0747 | | -0.0747 |
| | 0 | 0 | | 0 |

| | Target | Output | | Selisih |
|---|---|---|---|---|
| | 1 | 0.927 | | 0.073 |
| | 1 | 1 | | 0 |
| | 1 | 0.9348 | | 0.0652 |
| | 1 | 1 | | 0 |
| | 0 | 0.07407 | | -0.07407 |
| | 0 | 0 | | 0 |
| | 0 | 0.0786 | | -0.0786 |
| | 0 | 0 | | 0 |
| t4 | 0 | 0.0785 | o4 | -0.0785 |
| | 0 | 0 | | 0 |
| | 1 | 0.9301 | | 0.0699 |
| | 1 | 1 | | 0 |
| | 0 | 0.0784 | | -0.0784 |
| | 0 | 0 | | 0 |
| | 1 | 0.9244 | | 0.0756 |
| | 1 | 1 | | 0 |
| | 0 | 0.0732 | | -0.0732 |
| | 0 | 0 | | 0 |
| | 1 | 0.9248 | | 0.0752 |
| | 1 | 1 | | 0 |
| | 0 | 0.0749 | | -0.0749 |
| | 0 | 0 | | 0 |
| | 1 | 0.9293 | | 0.0707 |
| | 1 | 1 | | 0 |
| | 0 | 0.0727 | | -0.0727 |
| | 0 | 0 | | 0 |
| | 1 | 0.927 | | 0.073 |
| | 1 | 1 | | 0 |
| D (rata –rata) | | | | -0.01015 |
| SD (Standar Deviasi) | | | | 0.051726 |
| t (Satistik Uji) | | | | -1.75475 |
| \|t\| | | | | 1.754745 |
| Ta (Alpha) | | | | 1.9937 |

9. Uji Hipotesis (Tabel 4.17, 4.18)

| | Target | Output | | Selisih |
|---|---|---|---|---|
| t1 | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| t2 | 0 | 0 | o2 | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| | 1 | 1 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| | 0 | 0 | | 0 |
| t3 | 0 | 0.0773 | o3 | -0.0773 |
| | 0 | 0.0773 | | -0.0773 |
| | 0 | 0.077 | | -0.077 |
| | 0 | 0.077 | | -0.077 |
| | 1 | 0.927 | | 0.073 |
| | 1 | 0.927 | | 0.073 |
| | 1 | 0.9275 | | 0.0725 |
| | 1 | 0.9275 | | 0.0725 |
| | 0 | 0.0709 | | -0.0709 |
| | 0 | 0.0709 | | -0.0709 |
| | 0 | 0.0733 | | -0.0733 |
| | 0 | 0.0733 | | -0.0733 |

| | Target | Output | | Selisih |
|---|---|---|---|---|
| | 1 | 0.9242 | | 0.0758 |
| | 1 | 0.9242 | | 0.0758 |
| | 1 | 0.9262 | | 0.0738 |
| | 1 | 0.9262 | | 0.0738 |
| | 0 | 0.0783 | | -0.0783 |
| | 0 | 0.0783 | | -0.0783 |
| | 0 | 0.0756 | | -0.0756 |
| | 0 | 0.0756 | | -0.0756 |
| t4 | 0 | 0.0771 | o4 | -0.0771 |
| | 0 | 0.0771 | | -0.0771 |
| | 1 | 0.9283 | | 0.0717 |
| | 1 | 0.9283 | | 0.0717 |
| | 0 | 0.0749 | | -0.0749 |
| | 0 | 0.0749 | | -0.0749 |
| | 1 | 0.925 | | 0.075 |
| | 1 | 0.925 | | 0.075 |
| | 0 | 0.0714 | | -0.0714 |
| | 0 | 0.0714 | | -0.0714 |
| | 1 | 0.9242 | | 0.0758 |
| | 1 | 0.9242 | | 0.0758 |
| | 0 | 0.0711 | | -0.0711 |
| | 0 | 0.0711 | | -0.0711 |
| | 1 | 0.927 | | 0.073 |
| | 1 | 0.927 | | 0.073 |
| | 0 | 0.0769 | | -0.0769 |
| | 0 | 0.0769 | | -0.0769 |
| | 1 | 0.9305 | | 0.0695 |
| | 1 | 0.9305 | | 0.0695 |
| D (rata –rata) | | | | -0.0041 |
| SD (Standar Deviasi) | | | | 0.0527 |
| t (Satistik Uji) | | | | -0.6951 |
| \|t\| | | | | 0.6951 |
| Ta (Alpha) | | | | 1.9937 |

10. Uji Hipotesis (Tabel 4.20)

| | Target | Output | | Selisih |
|---|---|---|---|---|
| t1 | 0 | 0.23003 | 01 | -0.23003 |
| | 0 | 0.23002 | | -0.23002 |
| | 0 | 0.23001 | | -0.23001 |
| | 0 | 0.23 | | -0.23 |
| | 0 | 0.23 | | -0.23 |
| | 0 | 0.22999 | | -0.22999 |
| | 0 | 0.1508 | | -0.1508 |
| | 0 | 0.22998 | | -0.22998 |
| | 1 | 0.22998 | | 0.77002 |
| | 1 | 0.23 | | 0.77 |
| t2 | 0 | 0.33253 | O2 | -0.33253 |
| | 0 | 0.33252 | | -0.33252 |
| | 0 | 0.3325 | | -0.3325 |
| | 0 | 0.33248 | | -0.33248 |
| | 1 | 0.33247 | | 0.66753 |
| | 1 | 0.3325 | | 0.6675 |
| | 1 | 0.94707 | | 0.05293 |
| | 1 | 0.33253 | | 0.66747 |
| | 0 | 0.33257 | | -0.33257 |
| | 0 | 0.33255 | | -0.33255 |
| t3 | 0 | 0.33119 | O3 | -0.33119 |
| | 0 | 0.33117 | | -0.33117 |
| | 0 | 0.33116 | | -0.33116 |
| | 1 | 0.33119 | | 0.66881 |
| | 1 | 0.33122 | | 0.66878 |
| | 0 | 0.33121 | | -0.33121 |
| | 0 | 0.91285 | | -0.91285 |
| | 1 | 0.33119 | | 0.66881 |
| | 1 | 0.33122 | | 0.66878 |
| | 0 | 0.33121 | | -0.33121 |
| t4 | 0 | 0.55875 | O4 | -0.55875 |
| | 1 | 0.55872 | | 0.44128 |
| | 0 | 0.45875 | | -0.45875 |
| | 1 | 0.55871 | | 0.44129 |
| | 0 | 0.55874 | | -0.55874 |
| | 1 | 0.55871 | | 0.44129 |
| | 0 | 0.11388 | | -0.11388 |
| | 1 | 0.55873 | | 0.44127 |
| | 0 | 0.55876 | | -0.55876 |
| | 1 | 0.55873 | | 0.44127 |

| | |
|---|---|
| D (rata –rata) | **-0.00121** |
| SD (Standar Deviasi) | **0.47133** |
| t (Satistik Uji) | -0.01621 |
| \|t\| | 0.01621 |
| Ta (Alpha) | 2.0210 |

# APPENDIX STATISTICAL TABLE

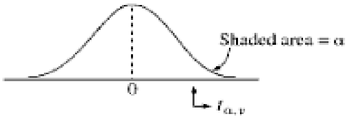



**TABLE 2**

Percentage points of Student's *t* distribution

| | Right-Tail Probability (α) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **df** | **.40** | **.25** | **.10** | **.05** | **.025** | **.01** | **.005** | **.001** | **.0005** |
| 1 | .325 | 1.000 | 3.078 | 6.314 | 12.706 | 31.821 | 63.657 | 318.309 | 636.619 |
| 2 | .289 | .816 | 1.886 | 2.920 | 4.303 | 6.965 | 9.925 | 22.327 | 31.599 |
| 3 | .277 | .765 | 1.638 | 2.353 | 3.182 | 4.541 | 5.841 | 10.215 | 12.924 |
| 4 | .271 | .741 | 1.533 | 2.132 | 2.776 | 3.747 | 4.604 | 7.173 | 8.610 |
| 5 | .267 | .727 | 1.476 | 2.015 | 2.571 | 3.365 | 4.032 | 5.893 | 6.869 |
| 6 | .265 | .718 | 1.440 | 1.943 | 2.447 | 3.143 | 3.707 | 5.208 | 5.959 |
| 7 | .263 | .711 | 1.415 | 1.895 | 2.365 | 2.998 | 3.499 | 4.785 | 5.408 |
| 8 | .262 | .706 | 1.397 | 1.860 | 2.306 | 2.896 | 3.355 | 4.501 | 5.041 |
| 9 | .261 | .703 | 1.383 | 1.833 | 2.262 | 2.821 | 3.250 | 4.297 | 4.781 |
| 10 | .260 | .700 | 1.372 | 1.812 | 2.228 | 2.764 | 3.169 | 4.144 | 4.587 |
| 11 | .260 | .697 | 1.363 | 1.796 | 2.201 | 2.718 | 3.106 | 4.025 | 4.437 |
| 12 | .259 | .695 | 1.356 | 1.782 | 2.179 | 2.681 | 3.055 | 3.930 | 4.318 |
| 13 | .259 | .694 | 1.350 | 1.771 | 2.160 | 2.650 | 3.012 | 3.852 | 4.221 |
| 14 | .258 | .692 | 1.345 | 1.761 | 2.145 | 2.624 | 2.977 | 3.787 | 4.140 |
| 15 | .258 | .691 | 1.341 | 1.753 | 2.131 | 2.602 | 2.947 | 3.733 | 4.073 |
| 16 | .258 | .690 | 1.337 | 1.746 | 2.120 | 2.583 | 2.921 | 3.686 | 4.015 |
| 17 | .257 | .689 | 1.333 | 1.740 | 2.110 | 2.567 | 2.898 | 3.646 | 3.965 |
| 18 | .257 | .688 | 1.330 | 1.734 | 2.101 | 2.552 | 2.878 | 3.610 | 3.922 |
| 19 | .257 | .688 | 1.328 | 1.729 | 2.093 | 2.539 | 2.861 | 3.579 | 3.883 |
| 20 | .257 | .687 | 1.325 | 1.725 | 2.086 | 2.528 | 2.845 | 3.552 | 3.850 |
| 21 | .257 | .686 | 1.323 | 1.721 | 2.080 | 2.518 | 2.831 | 3.527 | 3.819 |
| 22 | .256 | .686 | 1.321 | 1.717 | 2.074 | 2.508 | 2.819 | 3.505 | 3.792 |
| 23 | .256 | .685 | 1.319 | 1.714 | 2.069 | 2.500 | 2.807 | 3.485 | 3.768 |
| 24 | .256 | .685 | 1.318 | 1.711 | 2.064 | 2.492 | 2.797 | 3.467 | 3.745 |
| 25 | .256 | .684 | 1.316 | 1.708 | 2.060 | 2.485 | 2.787 | 3.450 | 3.725 |
| 26 | .256 | .684 | 1.315 | 1.706 | 2.056 | 2.479 | 2.779 | 3.435 | 3.707 |
| 27 | .256 | .684 | 1.314 | 1.703 | 2.052 | 2.473 | 2.771 | 3.421 | 3.690 |
| 28 | .256 | .683 | 1.313 | 1.701 | 2.048 | 2.467 | 2.763 | 3.408 | 3.674 |
| 29 | .256 | .683 | 1.311 | 1.699 | 2.045 | 2.462 | 2.756 | 3.396 | 3.659 |
| 30 | .256 | .683 | 1.310 | 1.697 | 2.042 | 2.457 | 2.750 | 3.385 | 3.646 |
| 35 | .255 | .682 | 1.306 | 1.690 | 2.030 | 2.438 | 2.724 | 3.340 | 3.591 |
| 40 | .255 | .681 | 1.303 | 1.684 | 2.021 | 2.423 | 2.704 | 3.307 | 3.551 |
| 50 | .255 | .679 | 1.299 | 1.676 | 2.009 | 2.403 | 2.678 | 3.261 | 3.496 |
| 60 | .254 | .679 | 1.296 | 1.671 | 2.000 | 2.390 | 2.660 | 3.232 | 3.460 |
| 120 | .254 | .677 | 1.289 | 1.658 | 1.980 | 2.358 | 2.617 | 3.160 | 3.373 |
| **inf.** | .253 | .674 | 1.282 | 1.645 | 1.960 | 2.326 | 2.576 | 3.090 | 3.291 |

Source: Computed by M. Longnecker using the R function *qt* (1 − α, df).

For 2-tailed tests and C.I.s use value in column headed by α/2.