LAMPIRAN A

1. Listing program algoritma pembelajaran ART1

```
'Masukkan pola baru'
    a = P(:,i);
    I = a'
'*************************************************************************'
'Langkah 1. Aktivasi neuron ke-i pada lapisan pembanding (F1)'
    X=I./(1+(A1*(I+B1))+C1)
'*************************************************************************'
    for n=1:s1
     if X(n)>0
      S(n)=1;
     else
      S(n)=0;
     end
    end
 'Langkah 2. Keluaran neuron ke-i pada lapisan pembanding (F1)'
   S=S
 '*************************************************************************'
    Sp=S ;
    Sq=Sp' ;
    w12=w12;
    Ta=w12*Sq;
    Tb=Ta';
 'Langkah 3. Masukan neuron ke-j pada lapisan pengenal (F2)'
    Tc=Tb'

 '*************************************************************************'
    Tc(ind_x) = -inf*ones(size(ind_x));
    [mxTc,k] = max(Tc);
    aU=zeros(s2,1);
    U=aU';
 'Langkah 4. Keluaran neuron kej pada lapisan pengenal (F2)'
    U(k)=1

 '*************************************************************************'
 'Langkah 5. Masukan neuron ke-i pada lapisan pembanding (F1)'
    V = w21(:,k)*U(k);
    V=V'

 '*************************************************************************'
 'Langkah 6. Aktivasi baru neuron ke-i pada lapisan pembanding (F1)'
    Xy=(I+(D1*V)-B1)./(1+(A1*(I+(D1.*V)))+C1)

 '*************************************************************************'
    for n=1:s1
     if Xy(n)>0
     S(n)=1;
     else
     S(n)=0;
     end
    end
    Sx=Sq';
```

```
'Langkah 7. Keluaran baru neuron ke-i pada lapisan pembanding (F1)'
   Sy=Sx

'*************************************************************************************'
   keluaranaktif=w21(:,k);
   Sy=a&keluaranaktif;
   jum_Sy=sum(Sy)
   jum_I=sum(I)
'Langkah 8. Tingkat kemiripan'
   sum(Sy)/sum(I)

'*************************************************************************************'
 %Langkah 9
  if ((sum(Sy)/sum(I))<rho)
     a0 = 1;
    else
     a0 = 0;
    end
    a0=a0;
    if (a0)
     ind_x = [ind_x; k];
     time = clock;
     set(edges2,'color',nnltgray);
     set(edges2(k),'color',nndkblue);
     nnsound(blip);
     while (etime(clock,time) < 0.5);
     'end'
     if(length(ind_x)==s2)
      if (s2==4)
         peringatan
         error('diperlukan lebih dari 4 pola keluaran atau pola masukan dikelompokkan terpisah')
       else
        w21 = [w21 ones(s1,1)];
         w12 = [w12; L*ones(1,s1)/(L+s1-1)];
        s2 = s2+1;
       end
      end
    else
     res_flag = 1;
    'langkah 10. Perbaiki bobot bottom-up'
     w12(k,:) = L*Sy'/(L+sum(Sy)-1)
'*************************************************************************************'
'langkah 11. Perbaiki bobot top-down'
     w21(:,k) = Sy
    end
   end
```

2. Listing program pembuatan kotak pada masukan dan keluaran pola

```
 pattern = zeros(1,8);
 ltyell = nnltyell;
 for k=1:8
  if k <= 4
    xpos = 20+88*(k-1);
    ypos = 260;
```

```
    pos = [xpos ypos 75 75];
    pp = reshape(P(:,k),I_y,I_x);
    present(k) = uicontrol(...
     'units','points',...
     'pos',[xpos+75/2-30 ypos-30 60 20],...
     'string','Kenalkan',...
     'callback',[me '("present",' num2str(k) ')']);
    edges1(k) = plot(xpos-3+81*[0 1 1 0 0],ypos-3+81*[0 0 1 1 0],...
     'color',nnltgray,...
     'erasemode','none');
   else
    xpos = 20+88*(k-5);
    ypos = 90;
    pos = [xpos ypos 75 75];
    pp = reshape(w21(:,k-4),I_y,I_x);
    edges2(k-4) = plot(xpos-3+81*[0 1 1 0 0],ypos-3+81*[0 0 1 1 0],...
     'color',nnltgray,...
     'erasemode','none');
   end
  end
  pattern = zeros(1,8);
  ltyell = nnltyell;
  for k=1:8
   if k <= 4
    title = sprintf('masukan %g',k);
    xpos = 20+88*(k-1);
    ypos = 260;
    pos = [xpos ypos 75 75];
    pp = reshape(P(:,k),I_y,I_x);
    color = nngreen;
   else
    title = sprintf('Keluaran %g',k-4);
    xpos = 20+88*(k-5);
    ypos = 90;
    pos = [xpos ypos 75 75];
    pp = reshape(w21(:,k-4),I_y,I_x);
    color = nnred;
   end
   pattern(k) = nnsfo('a2',title,",");
   set(pattern(k), ...
    'units','points',...
    'position',pos,...
    'color',nnltyell,...
    'xlim',[0 I_x], ...
    'ylim',[0 I_y],...
    'ydir','reverse')
   axis('off')
   pattern_h = zeros(I_x,I_y);
   box_x = [0 1 1 0 0];
   box_y = [0 0 1 1 0];
   for i=1:I_x, for j=1:I_y
    if pp(j,i) > 0
     pattern_h(i,j) = fill(box_x+i-1,box_y+j-1,color,...
      'edgecolor',nndkblue,...
      'erasemode','none');
```

```
    else
      pattern_h(i,j) = fill(box_x+i-1,box_y+j-1,ltyell,...
        'edgecolor',nndkblue,...
        'erasemode','none');
    end
  end, end
  set(pattern(k),'userdata',pattern_h);
end
```

3. Listing program pembuatan kotak rho

```
x = 30;
y = 60;
len = 325;
text(x,y,'Vigilance (rho):',...
  'color',nndkblue,...
  'fontw','bold',...
  'fontsize',12,...
  'horizontalalignment','left')
rho_text = text(x+len,y,sprintf('%3.1f',rho),...
  'color',nndkblue,...
  'fontw','bold',...
  'fontsize',12,...
  'horizontalalignment','right');
text(x,y-36,'0.0',...
  'color',nndkblue,...
  'fontw','bold',...
  'fontsize',10,...
  'horizontalalignment','left')
text(x+len,y-36,'1.0',...
  'color',nndkblue,...
  'fontw','bold',...
  'fontsize',10,...
  'horizontalalignment','right');
rho_bar = uicontrol(...
  'units','points',...
  'position',[x y-25 len 16],...
  'style','slider',...
  'backg',nnltgray,...
  'callback',[me '("rho")'],...
  'min',0,...
  'max',1,...
  'value',rho);
```

4. Listing program cek masukan pola yang tidak cocok

```
function varargout = perhatian(varargin)
if nargin == 0
fig = openfig(mfilename,'reuse');
set(fig,'Color',get(0,'defaultUicontrolBackgroundColor'));
handles = guihandles(fig);
guidata(fig, handles);
if nargout > 0
varargout{1} = fig;
```

```
end
elseif ischar(varargin{1})
try
if (nargout)
[varargout{1:nargout}] = feval(varargin{:});
else
feval(varargin{:});
end
catch
disp(lasterr);
end
end
```

5. Listing program masukan pola dengan mengklik mouse

```
for i=1:4
  [in,x,y] = nnaxclik(pattern(i));
  if in
    set(edges1,'color',nnltgray);
    set(edges2,'color',nnltgray);
    x = floor(x)+1;
    y = floor(y)+1;
    green = nngreen;
    ltyell = nnltyell;
    P = get(P_ptr,'userdata');
    squares = get(pattern(i),'userdata');
    ind = (x-1)*I_y+y;
    P(ind,i) = 1-P(ind,i);
    if P(ind,i) > 0
      set(squares(x,y),'facecolor',green);
    else
      set(squares(x,y),'facecolor',ltyell);
    end
    set(P_ptr,'userdata',P);
    break;
  end
end
```

6. Listing program utama SimulasiJSTART1.m

```
function SimulasiJSTART1(cmd,arg1)
%=======================================%
% programmer :                          %
% Nama : Akhmat Suud Baekhaqi           %
% NIM  : J2A 098 004                    %
% Bidang minat : Komputer               %
%=======================================%
% Program ini merupakan program utama untuk pengenalan
% pola karakter dengan jaringan saraf ART1
me = 'SimulasiJSTART1';
I_x = 5;
I_y = 5;
L = 2;
```

```
rho = 1.0;
A1 = 1;
B1 = 1.5;
C1 = 5;
D1 = 1;
if nargin == 0, cmd = ''; else cmd = lower(cmd); end
fig = nndfgflg(me);
if length(get(fig,'children')) == 0, fig = 0; end
if fig
  H = get(fig,'userdata');
  fig_axis = H(1);
  desc_text = H(2);
  pattern = H(3:10);
  P_ptr = H(11);
  w12_ptr = H(12);
  w21_ptr = H(13);
  edges1 = H(14:17);
  edges2 = H(18:21);
  rho_text = H(22);
  rho_bar = H(23);
  blip_ptr = H(24);
  bloop_ptr = H(25);
  blip = get(blip_ptr,'userdata');
  bloop = get(bloop_ptr,'userdata');
end
if strcmp(cmd,'')
  if fig
    figure(fig)
    set(fig,'visible','on')
  else
    feval(me,'init')
  end
elseif strcmp(cmd,'close') & (fig)
  delete(fig)
elseif strcmp(cmd,'init') & (~fig)
  fig = background(me,'','A. SUUD B.','J2A 098 004');
  set(fig, ...
    'windowbuttondownfcn',nncallbk(me,'down'), ...
    'BackingStore','off',...
    'nextplot','add');
  H = get(fig,'userdata');
  fig_axis = H(1);
  desc_text = H(2);
  x = 30;
  y = 60;
  len = 325;
  text(x,y,'Kewaspadaan (rho):',...
    'color',nndkblue,...
    'fontw','bold',...
    'fontsize',12,...
    'horizontalalignment','left')
  rho_text = text(x+len,y,sprintf('%3.1f',rho),...
    'color',nndkblue,...
    'fontw','bold',...
    'fontsize',12,...
```

```
  'horizontalalignment','right');
text(x,y-36,'0.0',...
  'color',nndkblue,...
  'fontw','bold',...
  'fontsize',10,...
  'horizontalalignment','left')
text(x+len,y-36,'1.0',...
  'color',nndkblue,...
  'fontw','bold',...
  'fontsize',10,...
  'horizontalalignment','right');
rho_bar = uicontrol(...
  'units','points',...
  'position',[x y-25 len 16],...
  'style','slider',...
  'backg',nnltgray,...
  'callback',[me '("rho")'],...
  'min',0,...
  'max',1,...
  'value',rho);
I1 = [0 1 1 1 0 ;
      1 0 0 0 1 ;
      1 0 0 0 1 ;
      1 1 1 1 1 ;
      1 0 0 0 1];
I2 = [1 1 1 1 0 ;
      1 0 0 0 1 ;
      1 1 1 1 0 ;
      1 0 0 0 1 ;
      1 1 1 1 0];
I3 = [1 1 1 1 0 ;
      1 0 0 0 1 ;
      1 0 1 0 0 ;
      1 0 0 0 1 ;
      1 1 1 1 0];
I4 = [1 1 1 1 0 ;
      1 0 0 0 1 ;
      1 0 0 0 1 ;
      1 0 0 0 1 ;
      1 1 1 1 0];
s1 = I_x*I_y;
s2 = 4;
P = [I1(:) I2(:) I3(:) I4(:)];
'bobot top-down awal(Z=w21)dinisialisasikan ke-1'
w21 = ones(s1,s2)
'*************************************************************************'
'bobot bottom-up awal(W=w12)diinisialisasikan ke-0'
w12 = zeros(s2,s1)

'=========================================================================='
for k=1:s2
  w12(k,:) = L*w21(:,k)'/(L+sum(w21(:,k))-1);
end
pattern = zeros(1,8);
ltyell = nnltyell;
```

```
for k=1:8
 if k <= 4
  xpos = 20+88*(k-1);
  ypos = 260;
  pos = [xpos ypos 75 75];
  pp = reshape(P(:,k),I_y,I_x);
  present(k) = uicontrol(...
   'units','points',...
   'pos',[xpos+75/2-30 ypos-30 60 20],...
   'string','Kenalkan',...
   'callback',[me '("present",' num2str(k) ')']);
  edges1(k) = plot(xpos-3+81*[0 1 1 0 0],ypos-3+81*[0 0 1 1 0],...
   'color',nnltgray,...
   'erasemode','none');
 else
  xpos = 20+88*(k-5);
  ypos = 90;
  pos = [xpos ypos 75 75];
  pp = reshape(w21(:,k-4),I_y,I_x);
  edges2(k-4) = plot(xpos-3+81*[0 1 1 0 0],ypos-3+81*[0 0 1 1 0],...
   'color',nnltgray,...
   'erasemode','none');
 end
end
pattern = zeros(1,8);
ltyell = nnltyell;
for k=1:8
 if k <= 4
  title = sprintf('masukan %g',k);
  xpos = 20+88*(k-1);
  ypos = 260;
  pos = [xpos ypos 75 75];
  pp = reshape(P(:,k),I_y,I_x);
  color = nngreen;
 else
  title = sprintf('Keluaran %g',k-4);
  xpos = 20+88*(k-5);
  ypos = 90;
  pos = [xpos ypos 75 75];
  pp = reshape(w21(:,k-4),I_y,I_x);
  color = nnred;
 end
 pattern(k) = nnsfo('a2',title,'','');
 set(pattern(k), ...
  'units','points',...
  'position',pos,...
  'color',nnltyell,...
  'xlim',[0 I_x], ...
  'ylim',[0 I_y],...
  'ydir','reverse')
 axis('off')
 pattern_h = zeros(I_x,I_y);
 box_x = [0 1 1 0 0];
 box_y = [0 0 1 1 0];
 for i=1:I_x, for j=1:I_y
```

```
    if pp(j,i) > 0
      pattern_h(i,j) = fill(box_x+i-1,box_y+j-1,color,...
        'edgecolor',nndkblue,...
        'erasemode','none');
    else
      pattern_h(i,j) = fill(box_x+i-1,box_y+j-1,ltyell,...
        'edgecolor',nndkblue,...
        'erasemode','none');
    end
   end, end
   set(pattern(k),'userdata',pattern_h);
  end
  uicontrol(...
   'units','points',...
   'position',[410 140 60 20],...
   'string','Coba lagi',...
   'callback',[me '("clear")'])
  uicontrol(...
   'units','points',...
   'position',[410 80 60 20],...
   'string','Keluar',...
   'callback','delete(gcf)')
  P_ptr = uicontrol('visible','off','userdata',P);
  w12_ptr = uicontrol('visible','off','userdata',w12);
  w21_ptr = uicontrol('visible','off','userdata',w21);
  blip_ptr = uicontrol('visible','off','userdata',nndsnd(6));
  bloop_ptr = uicontrol('visible','off','userdata',nndsnd(7));
  H = [fig_axis desc_text pattern P_ptr w12_ptr w21_ptr,...
      edges1 edges2 rho_text rho_bar blip_ptr bloop_ptr];
  set(fig,'userdata',H,'nextplot','new','color',nnltgray)
  feval(me,'instr');
  nnchkfs;
 elseif strcmp(cmd,'instr') & (fig)
  nnsettxt(desc_text,...
  '-Klik kotak kuning untuk',...
  ' mendefinisikan karakter.',...
  '-Klik tombol kenalkan',...
  ' untuk menyajikan',...
  ' masukan.',...
  '-Keserupaan karakter',...
  ' ditunjukkan pada',...
  ' keluaran.',...
  '-Geser ke kanan atau',...
  ' kiri kotak rho untuk',...
  ' mengatur nilai',...
  ' kewaspadaan.')
 elseif strcmp(cmd,'weights') & (fig) & (nargin == 1)
  w = get(w_ptr,'userdata');
  f = figure;
  feval('hintonw',w);
  axis('equal');
  set(f,'name','Network Weights')
 elseif strcmp(cmd,'rho')
  rho = get(rho_bar,'value');
  rho = round(rho*10)/10;
```

```
set(rho_text,'string',sprintf('%3.1f',rho))
elseif strcmp(cmd,'down') & (fig) & (nargin == 1)
 set(fig,'nextplot','add')
 for i=1:4
  [in,x,y] = nnaxclik(pattern(i));
  if in
   set(edges1,'color',nnltgray);
   set(edges2,'color',nnltgray);
   x = floor(x)+1;
   y = floor(y)+1;
   green = nngreen;
   ltyell = nnltyell;
   P = get(P_ptr,'userdata');
   squares = get(pattern(i),'userdata');
   ind = (x-1)*I_y+y;
   P(ind,i) = 1-P(ind,i);
   if P(ind,i) > 0
    set(squares(x,y),'facecolor',green);
   else
    set(squares(x,y),'facecolor',ltyell);
   end
   set(P_ptr,'userdata',P);
   break;
  end
 end
 set(fig,'nextplot','new')
elseif strcmp(cmd,'present') & (fig) & (nargin == 2)
 P = get(P_ptr,'userdata');
 w12 = get(w12_ptr,'userdata');
 w21 = get(w21_ptr,'userdata');
 rho = get(rho_bar,'value');
 rho = round(rho*10)/10;
 i = arg1;
 set(edges1,'color',nnltgray);
 set(edges1(i),'color',nndkblue);
  [s2,s1] = size(w12);
  ind_x = [];
  res_flag = 0;
  while(res_flag==0)
'%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
'Masukkan pola baru'
   a = P(:,i);
   I = a'
'*******************************************************************************'
'Langkah 1. Aktivasi neuron ke-i pada lapisan pembanding (F1)'
   X=I./(1+(A1*(I+B1))+C1)
'*******************************************************************************'
   for n=1:s1
    if X(n)>0
     S(n)=1;
    else
     S(n)=0;
    end
   end
'Langkah 2. Keluaran neuron ke-i pada lapisan pembanding (F1)'
```

```
  S=S
'*************************************************************************'
   Sp=S ;
   Sq=Sp' ;
   w12=w12;
   Ta=w12*Sq;
   Tb=Ta';
'Langkah 3. Masukan neuron ke-j pada lapisan pengenal (F2)'
   Tc=Tb'
'*************************************************************************'
   Tc(ind_x) = -inf*ones(size(ind_x));
   [mxTc,k] = max(Tc);
   aU=zeros(s2,1);
   U=aU';
'Langkah 4. Keluaran neuron kej pada lapisan pengenal (F2)'
   U(k)=1
'*************************************************************************'
'Langkah 5. Masukan neuron ke-i pada lapisan pembanding (F1)'
   V = w21(:,k)*U(k);
   V=V'
'*************************************************************************'
'Langkah 6. Aktivasi baru neuron ke-i pada lapisan pembanding (F1)'
   Xy=(I+(D1*V)-B1)./(1+(A1*(I+(D1.*V)))+C1)
'*************************************************************************'
   for n=1:s1
    if Xy(n)>0
    S(n)=1;
    else
    S(n)=0;
    end
   end
   Sx=Sq';
'Langkah 7. Keluaran baru neuron ke-i pada lapisan pembanding (F1)'
   Sy=Sx
'*************************************************************************'
   expect=w21(:,k);
   Sy=a&expect;
   jum_Sy=sum(Sy)
   jum_I=sum(I)
'Langkah 8. Tingkat kemiripan'
   sum(Sy)/sum(I)
'*************************************************************************'
 %Langkah 9
  if ((sum(Sy)/sum(I))<rho)
    a0 = 1;
   else
    a0 = 0;
   end
   a0=a0;
   if (a0)
    ind_x = [ind_x; k];
    time = clock;
    set(edges2,'color',nnltgray);
    set(edges2(k),'color',nndkblue);
    nnsound(blip);
```

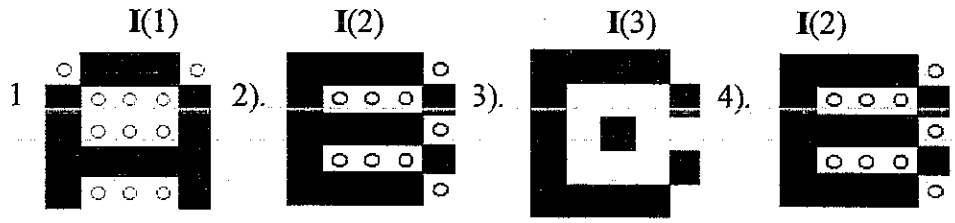
```
    while (etime(clock,time) < 0.5);
    end
    if(length(ind_x)==s2)
     if (s2==4)
        perhatian
        error('diperlukan lebih dari 4 pola keluaran atau pola masukan dikelompokkan terpisah')
      else
       w21 = [w21 ones(s1,1)];
        w12 = [w12; L*ones(1,s1)/(L+s1-1)];
       s2 = s2+1;
      end
     end
    else
     res_flag = 1;
    'langkah 10. Perbaiki bobot bottom-up'
     w12(k,:) = L*Sy'/(L+sum(Sy)-1)
'*************************************************************************'
'langkah 11. Perbaiki bobot top-down'
      w21(:,k) = Sy
    end
   end
'#########################################################################'
 set(edges2,'color',nnltgray);
 set(edges2(k),'color',nndkblue);
 nnsound(bloop);
 nnpause(0.3)
 for k=1:4
  squares = get(pattern(k+4),'userdata');
  for x=1:I_x
   for y=1:I_y
    ind = (x-1)*I_y+y;
    if w21(ind,k) > 0
     set(squares(x,y),'facecolor',nnred);
    else
     set(squares(x,y),'facecolor',nnltyell);
    end
   end
  end
 end
 set(w12_ptr,'userdata',w12);
 set(w21_ptr,'userdata',w21);
elseif strcmp(cmd,'clear') & (fig)
 set(edges1,'color',nnltgray);
 set(edges2,'color',nnltgray);
 s1 = I_x*I_y;
 s2 = 4;
 w21 = ones(s1,s2);
 w12 = zeros(s2,s1);
 for k=1:s2
  w12(k,:) = L*w21(:,k)'/(L+sum(w21(:,k))-1);
 end
 for k=1:4
  squares = get(pattern(k+4),'userdata');
  for x=1:I_x
   for y=1:I_y
```

```
      ind = (x-1)*I_y+y;
      if w21(ind,k) > 0
        set(squares(x,y),'facecolor',nnred);
      else
        set(squares(x,y),'facecolor',nnltyell);
      end
    end
  end
 end
 set(w12_ptr,'userdata',w12);
 set(w21_ptr,'userdata',w21);
end
```

LAMPIRAN B

1.Contoh data masukan program

A_1=1, B_1=1.5, C_1=5, D_1=1, L=2, $z_{ji}(0)$=0, $z_{ij}(0)$=1, dan ρ=0.9



2.Contoh data keluaran program

```
>>
L =
    2
rho =
   0.9000
A1 =
    1
B1 =
   1.5000
C1 =
    5

D1 =
    1
ans =
bobot top-down awal(Z=w21)dinisialisasikan ke-1
w21 =
    1    1    1    1
    1    1    1    1
    1    1    1    1
    1    1    1    1
    1    1    1    1
    1    1    1    1
    1    1    1    1
    1    1    1    1
    1    1    1    1
    1    1    1    1
    1    1    1    1
    1    1    1    1
    1    1    1    1
    1    1    1    1
    1    1    1    1
    1    1    1    1
    1    1    1    1
    1    1    1    1
    1    1    1    1
```

```
     1     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1
ans =
**************************************************************************
******
ans =
bobot bottom-up awal(W=w12)diinisialisasikan ke-0
w12 =
  Columns 1 through 13
     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     0     0     0     0
  Columns 14 through 25
     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
ans =
==========================================================================
==========
ans =
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
ans =
Masukkan pola baru
I =
  Columns 1 through 13

     0     1     1     1     1     1     0     0     1     0     1     0     0
  Columns 14 through 25
     1     0     1     0     0     1     0     0     1     1     1     1
ans =
**************************************************************************
********
ans =
Langkah 1. Aktivasi neuron ke-i pada lapisan pembanding (F1)
X =
  Columns 1 through 8
         0    0.1176    0.1176    0.1176    0.1176    0.1176         0         0
  Columns 9 through 16
    0.1176         0    0.1176         0         0    0.1176         0    0.1176
  Columns 17 through 24
         0         0    0.1176         0         0    0.1176    0.1176    0.1176
  Column 25
    0.1176
ans =
**************************************************************************
********
ans =
Langkah 2. Keluaran neuron ke-i pada lapisan pembanding (F1)
```

```
S =
 Columns 1 through 13
   0   1   1   1   1   1   0   0   1   0   1   0   0
 Columns 14 through 25
   1   0   1   0   0   1   0   0   1   1   1   1

ans =
**************************************************************************
*******
ans =
Langkah 3. Masukan neuron ke-j pada lapisan pengenal (F2)
Tc =
   1.0769
   1.0769
   1.0769
   1.0769
ans =
**************************************************************************
*******
ans =
Langkah 4. Keluaran neuron kej pada lapisan pengenal (F2)
U =
   1   0   0   0
ans =
**************************************************************************
*******
ans =
Langkah 5. Masukan neuron ke-i pada lapisan pembanding (F1)
V =
 Columns 1 through 13
   1   1   1   1   1   1   1   1   1   1   1   1   1
 Columns 14 through 25
   1   1   1   1   1   1   1   1   1   1   1   1

ans =
**************************************************************************
*******
ans =
Langkah 6. Aktivasi baru neuron ke-i pada lapisan pembanding (F1)
Xy =
 Columns 1 through 8
  -0.0714   0.0625   0.0625   0.0625   0.0625   0.0625  -0.0714  -0.0714
 Columns 9 through 16
   0.0625  -0.0714   0.0625  -0.0714  -0.0714   0.0625  -0.0714   0.0625
 Columns 17 through 24
  -0.0714  -0.0714   0.0625  -0.0714  -0.0714   0.0625   0.0625   0.0625
 Column 25
   0.0625
ans =
**************************************************************************
*******
ans =
Langkah 7. Keluaran baru neuron ke-i pada lapisan pembanding (F1)
Sy =
 Columns 1 through 13
```

```
    0    1    1    1    1    1    0    0    1    0    1    0    0
  Columns 14 through 25
    1    0    1    0    0    1    0    0    1    1    1    1
ans =
********************************************************************************
*******
jum_Sy =
    14
jum_I =
    14
ans =
Langkah 8. Tingkat kemiripan
ans =
     1
ans =
********************************************************************************
*******
ans =
langkah 10. Perbaiki bobot bottom-up
w12 =
  Columns 1 through 8
         0    0.1333    0.1333    0.1333    0.1333    0.1333         0         0
    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769
    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769
    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769
  Columns 9 through 16
    0.1333         0    0.1333         0         0    0.1333         0    0.1333
    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769
    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769
    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769
  Columns 17 through 24
         0         0    0.1333         0         0    0.1333    0.1333    0.1333
    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769
    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769
    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769
  Column 25
    0.1333
    0.0769
    0.0769
    0.0769
ans =
********************************************************************************
********
ans =
langkah 11. Perbaiki bobot top-down
w21 =
     0    1    1    1
     1    1    1    1
     1    1    1    1
     1    1    1    1
     1    1    1    1
     1    1    1    1
     0    1    1    1
     0    1    1    1
     1    1    1    1
```

```
     0     1     1     1
     1     1     1     1
     0     1     1     1
     0     1     1     1
     1     1     1     1
     0     1     1     1
     1     1     1     1
     0     1     1     1
     0     1     1     1
     1     1     1     1
     0     1     1     1
     0     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1
ans =
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
ans =
Masukkan pola baru
I =
  Columns 1 through 13
     1     1     1     1     1     1     0     1     0     1     1     0     1
  Columns 14 through 25
     0     1     1     0     1     0     1     0     1     0     1     0
ans =
**********************************************************************************
********
ans =
Langkah 1. Aktivasi neuron ke-i pada lapisan pembanding (F1
X =
  Columns 1 through 8
    0.1176    0.1176    0.1176    0.1176    0.1176    0.1176         0    0.1176
  Columns 9 through 16
         0    0.1176    0.1176         0    0.1176         0    0.1176    0.1176
  Columns 17 through 24
         0    0.1176         0    0.1176         0    0.1176         0    0.1176
  Column 25
         0
ans =
**********************************************************************************
********
ans =
Langkah 2. Keluaran neuron ke-i pada lapisan pembanding (F1)
S =
  Columns 1 through 13
     1     1     1     1     1     1     0     1     0     1     1     0     1
  Columns 14 through 25
     0     1     1     0     1     0     1     0     1     0     1     0
ans =
**********************************************************************************
*******
ans =
Langkah 3. Masukan neuron ke-j pada lapisan pengenal (F2)
```

```
Tc =
   1.2000
   1.2308
   1.2308
   1.2308
ans =
**************************************************************************************
*******
ans =
Langkah 4. Keluaran neuron kej pada lapisan pengenal (F2)
U =
    0    1    0    0
ans =
**************************************************************************************
*******
ans =
Langkah 5. Masukan neuron ke-i pada lapisan pembanding (F1)
V =
 Columns 1 through 13
    1    1    1    1    1    1    1    1    1    1    1    1    1
 Columns 14 through 25
    1    1    1    1    1    1    1    1    1    1    1    1
ans =
**************************************************************************************
*******
ans =
Langkah 6. Aktivasi baru neuron ke-i pada lapisan pembanding (F1)
Xy =
 Columns 1 through 8
  0.0625   0.0625   0.0625   0.0625   0.0625   0.0625  -0.0714   0.0625
 Columns 9 through 16
 -0.0714   0.0625   0.0625  -0.0714   0.0625  -0.0714   0.0625   0.0625
 Columns 17 through 24
 -0.0714   0.0625  -0.0714   0.0625  -0.0714   0.0625  -0.0714   0.0625
 Column 25
 -0.0714
ans =
**************************************************************************************
*******
ans =
Langkah 7. Keluaran baru neuron ke-i pada lapisan pembanding (F1)
Sy =
 Columns 1 through 13
    1    1    1    1    1    1    0    1    0    1    1    0    1
 Columns 14 through 25
    0    1    1    0    1    0    1    0    1    0    1    0
ans =
**************************************************************************************
*******
jum_Sy =
    16
jum_I =
    16
ans =
Langkah 8. Tingkat kemiripan
```

```
ans =
     1
ans =
**********************************************************************************
*******
ans =
langkah 10. Perbaiki bobot bottom-up
w12 =
  Columns 1 through 8
         0    0.1333    0.1333    0.1333    0.1333    0.1333         0         0
    0.1176    0.1176    0.1176    0.1176    0.1176    0.1176         0    0.1176
    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769
    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769
  Columns 9 through 16
    0.1333         0    0.1333         0         0    0.1333         0    0.1333
         0    0.1176    0.1176         0    0.1176         0    0.1176    0.1176
    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769
    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769
  Columns 17 through 24
         0         0    0.1333         0         0    0.1333    0.1333    0.1333
         0    0.1176         0    0.1176         0    0.1176         0    0.1176
    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769
    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769    0.0769
  Column 25
    0.1333
         0
    0.0769
    0.0769
ans =
**********************************************************************************
********
ans =
langkah 11. Perbaiki bobot top-down
w21 =
     0     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1
     0     0     1     1
     0     1     1     1
     1     0     1     1
     0     1     1     1
     1     1     1     1
     0     0     1     1
     0     1     1     1
     1     0     1     1
     0     1     1     1
     1     1     1     1
     0     0     1     1
     0     1     1     1
     1     0     1     1
     0     1     1     1
     0     0     1     1
```

```
     1     1     1     1
     1     0     1     1
     1     1     1     1
     1     0     1     1
ans =
##########################################################################################
########
ans =
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

ans =
Masukkan pola baru
I =
 Columns 1 through 13
     1     1     1     1     1     1     0     0     0     1     1     0     1
 Columns 14 through 25
     0     1     1     0     0     0     1     0     1     0     1     0
ans =
**********************************************************************************
********
ans =
Langkah 1. Aktivasi neuron ke-i pada lapisan pembanding (F1)
X =
 Columns 1 through 8
   0.1176   0.1176   0.1176   0.1176   0.1176   0.1176        0        0
 Columns 9 through 16
        0   0.1176   0.1176        0   0.1176        0   0.1176   0.1176
 Columns 17 through 24
        0        0        0   0.1176        0   0.1176        0   0.1176
 Column 25
        0
ans =
**********************************************************************************
********
ans =
Langkah 2. Keluaran neuron ke-i pada lapisan pembanding (F1)
S =
 Columns 1 through 13
     1     1     1     1     1     1     0     0     0     1     1     0     1
 Columns 14 through 25
     0     1     1     0     0     0     1     0     1     0     1     0
ans =
**********************************************************************************
*******
ans =
Langkah 3. Masukan neuron ke-j pada lapisan pengenal (F2)
Tc =
    1.2000
    1.6471
    1.0769
    1.0769
ans =
**********************************************************************************
*******
```

```
ans =
Langkah 4. Keluaran neuron kej pada lapisan pengenal (F2)
U =
     0     1     0     0
ans =
*********************************************************************************
*******
ans =
Langkah 5. Masukan neuron ke-i pada lapisan pembanding (F1)
V =
  Columns 1 through 13
     1     1     1     1     1     1     0     1     0     1     1     0     1
  Columns 14 through 25
     0     1     1     0     1     0     1     0     1     0     1     0
ans =
*********************************************************************************
*******
ans =
Langkah 6. Aktivasi baru neuron ke-i pada lapisan pembanding (F1)
Xy =
  Columns 1 through 8
    0.0625    0.0625    0.0625    0.0625    0.0625    0.0625   -0.2500   -0.0714
  Columns 9 through 16
   -0.2500    0.0625    0.0625   -0.2500    0.0625   -0.2500    0.0625    0.0625
  Columns 17 through 24
   -0.2500   -0.0714   -0.2500    0.0625   -0.2500    0.0625   -0.2500    0.0625
  Column 25
   -0.2500
ans =
*********************************************************************************
*******
ans =
Langkah 7. Keluaran baru neuron ke-i pada lapisan pembanding (F1)
Sy =
  Columns 1 through 13
     1     1     1     1     1     1     0     0     0     1     1     0     1
  Columns 14 through 25
     0     1     1     0     0     0     1     0     1     0     1     0
ans =
*********************************************************************************
*******
jum_Sy =
    14
jum_I =
    14
ans =
Langkah 8. Tingkat kemiripan
ans =
     1
ans =
*********************************************************************************
*******
ans =
langkah 10. Perbaiki bobot bottom-up
w12 =
```

```
Columns 1 through 8
     0   0.1333   0.1333   0.1333   0.1333   0.1333        0        0
  0.1333   0.1333   0.1333   0.1333   0.1333   0.1333        0        0
  0.0769   0.0769   0.0769   0.0769   0.0769   0.0769   0.0769   0.0769
  0.0769   0.0769   0.0769   0.0769   0.0769   0.0769   0.0769   0.0769
Columns 9 through 16
  0.1333        0   0.1333        0        0   0.1333        0   0.1333
     0   0.1333   0.1333        0   0.1333        0   0.1333   0.1333
  0.0769   0.0769   0.0769   0.0769   0.0769   0.0769   0.0769   0.0769
  0.0769   0.0769   0.0769   0.0769   0.0769   0.0769   0.0769   0.0769
Columns 17 through 24
     0        0   0.1333        0        0   0.1333   0.1333   0.1333
     0        0        0   0.1333        0   0.1333        0   0.1333
  0.0769   0.0769   0.0769   0.0769   0.0769   0.0769   0.0769   0.0769
  0.0769   0.0769   0.0769   0.0769   0.0769   0.0769   0.0769   0.0769
Column 25
  0.1333
     0
  0.0769
  0.0769
ans =
**************************************************************************
********
ans =
langkah 11. Perbaiki bobot top-down
w21 =
     0     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1
     0     0     1     1
     0     0     1     1
     1     0     1     1
     0     1     1     1
     1     1     1     1
     0     0     1     1
     0     1     1     1
     1     0     1     1
     0     1     1     1
     1     1     1     1
     0     0     1     1
     0     0     1     1
     1     0     1     1
     0     1     1     1
     0     0     1     1
     1     1     1     1
     1     0     1     1
     1     1     1     1
     1     0     1     1
ans =
##########################################################################
######################
ans =
```

```
ans =
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
ans =
Masukkan pola baru
I =
  Columns 1 through 13
    1   1   1   1   1   1   0   1   0   1   1   0   1
  Columns 14 through 25
    0   1   1   0   1   0   1   0   1   0   1   0
ans =
*************************************************************************************
ans =
Langkah 1. Aktivasi neuron ke-i pada lapisan pembanding (F1)
X =
  Columns 1 through 8
   0.1176   0.1176   0.1176   0.1176   0.1176   0.1176        0   0.1176
  Columns 9 through 16
        0   0.1176   0.1176        0   0.1176        0   0.1176   0.1176
  Columns 17 through 24
        0   0.1176        0   0.1176        0   0.1176        0   0.1176
  Column 25
        0
ans =
*************************************************************************************
ans =
Langkah 2. Keluaran neuron ke-i pada lapisan pembanding (F1)
S =
  Columns 1 through 13
    1   1   1   1   1   1   0   1   0   1   1   0   1
  Columns 14 through 25
    0   1   1   0   1   0   1   0   1   0   1   0
ans =
************************************************************************************
ans =
Langkah 3. Masukan neuron ke-j pada lapisan pengenal (F2)
Tc =
    1.2000
    1.8667
    1.2308
    1.2308
ans =
************************************************************************************
ans =
Langkah 4. Keluaran neuron kej pada lapisan pengenal (F2)
U =
    0   1   0   0
ans =
************************************************************************************
ans =
```

```
Langkah 5. Masukan neuron ke-i pada lapisan pembanding (F1)
V =
 Columns 1 through 13
   1   1   1   1   1   1   0   0   0   1   1   0   1
 Columns 14 through 25
   0   1   1   0   0   0   1   0   1   0   1   0
ans =
*************************************************************************
*******
ans =
Langkah 6. Aktivasi baru neuron ke-i pada lapisan pembanding (F1)
Xy =
 Columns 1 through 8
  0.0625   0.0625   0.0625   0.0625   0.0625   0.0625  -0.2500  -0.0714
 Columns 9 through 16
 -0.2500   0.0625   0.0625  -0.2500   0.0625  -0.2500   0.0625   0.0625
 Columns 17 through 24
 -0.2500  -0.0714  -0.2500   0.0625  -0.2500   0.0625  -0.2500   0.0625
 Column 25
 -0.2500
ans =
*************************************************************************
*******
ans =
Langkah 7. Keluaran baru neuron ke-i pada lapisan pembanding (F1)
Sy =
 Columns 1 through 13
   1   1   1   1   1   1   0   1   0   1   1   0   1
 Columns 14 through 25
   0   1   1   0   1   0   1   0   1   0   1   0
ans =
*************************************************************************
*******
jum_Sy =
   14
jum_I =
   16
ans =
Langkah 8. Tingkat kemiripan
ans =
   0.8750
ans =
*************************************************************************
*******
ans =
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
ans =
Masukkan pola baru
I =
 Columns 1 through 13
   1   1   1   1   1   1   0   1   0   1   1   0   1
 Columns 14 through 25
   0   1   1   0   1   0   1   0   1   0   1   0
ans =
```

```
**********************************************************************************
********
ans =
Langkah 1. Aktivasi neuron ke-i pada lapisan pembanding (F1)
X =
 Columns 1 through 8
  0.1176   0.1176   0.1176   0.1176   0.1176   0.1176        0   0.1176
 Columns 9 through 16
       0   0.1176   0.1176        0   0.1176        0   0.1176   0.1176
 Columns 17 through 24
       0   0.1176        0   0.1176        0   0.1176        0   0.1176
 Column 25
       0
ans =
**********************************************************************************
********
ans =
Langkah 2. Keluaran neuron ke-i pada lapisan pembanding (F1)
S =
 Columns 1 through 13
    1    1    1    1    1    1    0    1    0    1    1    0    1
 Columns 14 through 25
    0    1    1    0    1    0    1    0    1    0    1    0
ans =
**********************************************************************************
*******
ans =
Langkah 3. Masukan neuron ke-j pada lapisan pengenal (F2)
Tc =
    1.2000
    1.8667
    1.2308
    1.2308
ans =
**********************************************************************************
*******
ans =
Langkah 4. Keluaran neuron kej pada lapisan pengenal (F2)
U =
    0    0    1    0
ans =
**********************************************************************************
*******
ans =
Langkah 5. Masukan neuron ke-i pada lapisan pembanding (F1)
V =
 Columns 1 through 13
    1    1    1    1    1    1    1    1    1    1    1    1    1
 Columns 14 through 25
    1    1    1    1    1    1    1    1    1    1    1    1
ans =
**********************************************************************************
*******
ans =
Langkah 6. Aktivasi baru neuron ke-i pada lapisan pembanding (F1)
```

```
Xy =
 Columns 1 through 8
  0.0625   0.0625   0.0625   0.0625   0.0625   0.0625  -0.0714   0.0625
 Columns 9 through 16
 -0.0714   0.0625   0.0625  -0.0714   0.0625  -0.0714   0.0625   0.0625
 Columns 17 through 24
 -0.0714   0.0625  -0.0714   0.0625  -0.0714   0.0625  -0.0714   0.0625
 Column 25
 -0.0714
ans =
********************************************************************************
*******
ans =
Langkah 7. Keluaran baru neuron ke-i pada lapisan pembanding (F1)
Sy =
 Columns 1 through 13
   1   1   1   1   1   1   0   1   0   1   1   0   1
 Columns 14 through 25
   0   1   1   0   1   0   1   0   1   0   1   0
ans =
********************************************************************************
*******
jum_Sy =
   16
jum_I =
   16
ans =
Langkah 8. Tingkat kemiripan
ans =
    1
ans =
********************************************************************************
*******
ans =
langkah 10. Perbaiki bobot bottom-up
w12 =
 Columns 1 through 8
        0   0.1333   0.1333   0.1333   0.1333   0.1333        0        0
   0.1333   0.1333   0.1333   0.1333   0.1333   0.1333        0        0
   0.1176   0.1176   0.1176   0.1176   0.1176   0.1176        0   0.1176
   0.0769   0.0769   0.0769   0.0769   0.0769   0.0769   0.0769   0.0769
 Columns 9 through 16
   0.1333        0   0.1333        0        0   0.1333        0   0.1333
        0   0.1333   0.1333        0   0.1333        0   0.1333   0.1333
        0   0.1176   0.1176        0   0.1176        0   0.1176   0.1176
   0.0769   0.0769   0.0769   0.0769   0.0769   0.0769   0.0769   0.0769
 Columns 17 through 24
        0        0   0.1333        0        0   0.1333   0.1333   0.1333
        0        0        0   0.1333        0   0.1333        0   0.1333
        0   0.1176        0   0.1176        0   0.1176        0   0.1176
   0.0769   0.0769   0.0769   0.0769   0.0769   0.0769   0.0769   0.0769
 Column 25
   0.1333
        0
        0
```

```
    0.0769
ans =
**********************************************************************************
********
ans =
langkah 11. Perbaiki bobot top-down
w21 =
     0     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1
     0     0     0     1
     0     0     1     1
     1     0     0     1
     0     1     1     1
     1     1     1     1
     0     0     0     1
     0     1     1     1
     1     0     0     1
     0     1     1     1
     1     1     1     1
     0     0     0     1
     0     0     1     1
     1     0     0     1
     0     1     1     1
     0     0     0     1
     1     1     1     1
     1     0     0     1
     1     1     1     1
     1     0     0     1
ans =
##################################################################################
########
>>
```