LAMPIRAN A

KODE PROGRAM

```
function[gbr_satu]=interpolasi_1a()
clear;
close all;
clc;

global matrik_interpolasi;
global indeks;

 % Multidirectional Interpolation Processing
 gbr_satu=matrik_interpolasi;
 arah_atas_satu=matrik_interpolasi;
 arah_bawah_satu=matrik_interpolasi;
 [brs,klm]=size(matrik_interpolasi);

% Multidirectional Interpolation Processing
switch(indeks(1))
    case 0          % 0 Degree

        for m=brs:-1:1
        for n=klm:-1:1
            if arah_atas_satu(m,n)==0
             r=m;
             s=n+1;
             jrk=1
             jar=0;
             while (s<=klm)
               jar=jar+(1/((jrk*(s-n))^2.5));
               arah_atas_satu(m,n)=arah_atas_satu(m,n)+(arah_atas_satu(r,s))/(((s-
n)*jrk)^2.5);
               s=s+1;
             end;
             arah_atas_satu(m,n)=arah_atas_satu(m,n)./jar;
             end;
        end;
        end;

        clear m n

        for m=brs:-1:1
        for n=1:klm

          if(arah_bawah_satu(m,n)==0)
            t=m;
            u=n-1;
            jrk=1;
            jar1=0;
          while (u>=1)
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            jar1=jar1+(1/((jrk*(n-u))^2.5));

arah_bawah_satu(m,n)=arah_bawah_satu(m,n)+(arah_bawah_satu(t,u))/(((n-
u)*jrk)^2.5);
            u=u-1;
         end;
         arah_bawah_satu(m,n)=arah_bawah_satu(m,n)./jar1;
         end;
       end;
       end;

gbr_satu(9:16,9:16)=(arah_atas_satu(9:16,9:16)+arah_bawah_satu(9:16,9:16))./2;
       clear m n


   case 1          % 22.5 Degree

       for m=1:brs
       for n=klm:-1:1

         if arah_atas_satu(m,n)==0
           r=m-1;
           s=n+2;
           jar=0;
           jrk=sqrt(((s-n)^2)+((m-r)^2));
         while (r>=1 & s<=klm)
           jar=jar+(1/((jrk*((m-r)/1))^2.5));
           arah_atas_satu(m,n)=arah_atas_satu(m,n)+(arah_atas_satu(r,s))/((((s-
n)/2)*jrk)^2.5);
           r=r-1;
           s=s+2;
          end;
           arah_atas_satu(m,n)=arah_atas_satu(m,n)./jar;
         end;
       end;
       end;

       clear m n

       for m=brs:-1:1
       for n=1:klm

         if(arah_bawah_satu(m,n)==0)
           t=m+1;
           u=n-2;
           jrk=sqrt(((t-m)^2)+((n-u)^2));
            jar1=0;
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```
          while (t<=brs & u>=1)
            jar1=jar1+(1/((jrk*((t-m)/1))^2.5));

arah_bawah_satu(m,n)=arah_bawah_satu(m,n)+(arah_bawah_satu(t,u))/((((n-
u)/2)*jrk)^2.5);

            t=t+1;
            u=u-2;
          end;

          arah_bawah_satu(m,n)=arah_bawah_satu(m,n)./jar1;
        end;
      end;
      end;


gbr_satu(9:16,9:16)=(arah_atas_satu(9:16,9:16)+arah_bawah_satu(9:16,9:16))./2;


   case 2         % 45 degree ( 135 degree counter )

      for m=1:brs
      for n=klm:-1:1

        if arah_atas_satu(m,n)==0
          r=m-1;
          s=n+1;
          jrk=1;
          jar=0;
          arah_atas_satu(m,n)=0;
          while (r>=1 & s<=klm)

            jar=jar+(1/((jrk*((m-r))^2.5)));
            arah_atas_satu(m,n)=arah_atas_satu(m,n)+(arah_atas_satu(r,s))/(((m-
r)*jrk)^2.5);
            r=r-1;
            s=s+1;
          end;
          arah_atas_satu(m,n)=arah_atas_satu(m,n)./jar;

        end;
      end;
      end;

       clear m n

      for m=brs:-1:1
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```
        for n=1:klm
          if(arah_bawah_satu(m,n)==0)
            t=m+1;
            u=n-1;
            jrk=1;
            jar1=0;
            while (t<=brs & u>=1)

              jar1=jar1+(1/((jrk*((t-m))^2.5)));

arah_bawah_satu(m,n)=arah_bawah_satu(m,n)+(arah_bawah_satu(t,u))/(((t-
m)*jrk)^2.5);

              t=t+1;
              u=u-1;
            end;

            arah_bawah_satu(m,n)=arah_bawah_satu(m,n)./jar1;
          end;
        end;
        end;


gbr_satu(9:16,9:16)=(arah_atas_satu(9:16,9:16)+arah_bawah_satu(9:16,9:16))./2;


    case 3          %67.5 degree

        for m=1:brs
        for n=klm:-1:1
          if arah_atas_satu(m,n)==0
            r=m-2;
            s=n+1;
            jrk=sqrt(((s-n)^2)+((m-r)^2));
            jar=0;
            while (r>=1 & s<=klm)

              jar=jar+(1/((jrk*((s-n)/1))^2.5));
              arah_atas_satu(m,n)=arah_atas_satu(m,n)+(arah_atas_satu(r,s))/((((s-
n)/1)*jrk)^2.5);

              r=r-2;
              s=s+1;
            end;

            arah_atas_satu(m,n)=arah_atas_satu(m,n)./jar;
          end;
```

```
        end;
        end;

        clear m n

        for m=brs:-1:1
        for n=1:klm

          if(arah_bawah_satu(m,n)==0)
            t=m+2;
            u=n-1;
            jrk=sqrt(((t-m)^2)+((n-u)^2));
            jar1=0;
            while (t<=brs & u>=1)
              jar1=jar1+(1/((jrk*((n-u)/1))^2.5));

arah_bawah_satu(m,n)=arah_bawah_satu(m,n)+(arah_bawah_satu(t,u))/((((n-
u)/1)*jrk)^2.5);
              t=t+2;
              u=u-1;
             end;

             arah_bawah_satu(m,n)=arah_bawah_satu(m,n)./jar1;
          end;
        end;
        end;


gbr_satu(9:16,9:16)=(arah_atas_satu(9:16,9:16)+arah_bawah_satu(9:16,9:16))./2;



    case 4          % 90 degree

        for m=brs:-1:1
        for n=klm:-1:1

          if arah_atas_satu(m,n)==0
             r=m+1;
             jar=0;
             jrk=1;
             while (r<=brs)
               jar=jar+(1/((jrk*(r-m))^2.5));
               arah_atas_satu(m,n)=arah_atas_satu(m,n)+(arah_atas_satu(r,n))/(((r-
m)*jrk)^2.5);
               r=r+1;
             end;
```

```
            arah_atas_satu(m,n)=arah_atas_satu(m,n)./jar;
          end;
        end;
        end;

        clear m n jar

        for m=1:brs
        for n=1:klm

          if(arah_bawah_satu(m,n)==0)
            t=m-1;
            jar1=0;
            jrk=1;
            while (t>=1)

              jar1=jar1+(1/((jrk*(m-t))^2.5));

arah_bawah_satu(m,n)=arah_bawah_satu(m,n)+(arah_bawah_satu(t,n))/(((m-
t)*jrk)^2.5);

              t=t-1;

             end;

             arah_bawah_satu(m,n)=arah_bawah_satu(m,n)./jar1;
          end;
        end;
        end;


gbr_satu(9:16,9:16)=(arah_atas_satu(9:16,9:16)+arah_bawah_satu(9:16,9:16))./2;



    case 5          %112.5

        for m=brs:-1:1
        for n=brs:-1:1

          if arah_atas_satu(m,n)==0
             r=m+2;
             s=n+1;
             jrk=sqrt(((s-n)^2)+((r-m)^2));
             jar=0;
             while (r<=brs & s<=klm)
```

```
            jar=jar+(1/((jrk*((s-n)/1))^2.5));
            arah_atas_satu(m,n)=arah_atas_satu(m,n)+(arah_atas_satu(r,s))/((((s-
n)/1)*jrk)^2.5);

            r=r+2;
            s=s+1;
           end;

           arah_atas_satu(m,n)=arah_atas_satu(m,n)./jar;
         end;
       end;
       end;

       clear m n

       for m=1:brs
       for n=1:klm

         if(arah_bawah_satu(m,n)==0)
           t=m-2;
           u=n-1;
           jrk=sqrt(((n-u)^2)+((m-t)^2));
           jar1=0;
           while (t>=1 & u>=1)

             jar1=jar1+(1/((jrk*((n-u)/1))^2.5));

arah_bawah_satu(m,n)=arah_bawah_satu(m,n)+(arah_bawah_satu(t,u))/((((n-
u)/1)*jrk)^2.5);
             t=t-2;
             u=u-1;
           end;

           arah_bawah_satu(m,n)=arah_bawah_satu(m,n)./jar1;
         end;
       end;
       end;


gbr_satu(9:16,9:16)=(arah_atas_satu(9:16,9:16)+arah_bawah_satu(9:16,9:16))./2;



    case 6          % 135 degree ( Counter 45 Degree)

       for m=brs:-1:1
       for n=klm:-1:1
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```
  if arah_atas_satu(m,n)==0
    r=m+1;
    s=n+1;
    jar=0;
    jrk=1;
    while (r<=brs & s<=klm)

      jar=jar+(1/((jrk*((s-n))^2.5)));
      arah_atas_satu(m,n)=arah_atas_satu(m,n)+(arah_atas_satu(r,s))/(((s-
n)*jrk)^2.5);

      r=r+1;
      s=s+1;
    end;

    arah_atas_satu(m,n)=arah_atas_satu(m,n)./jar;
  end;
end;
end;

 clear m n

for m=1:brs
for n=1:klm

  if(arah_bawah_satu(m,n)==0)
    t=m-1;
    u=n-1;
    jar1=0
    jrk=1;
    while (t>=1 & u>=1)

      jar1=jar1+(1/((jrk*((m-t))^2.5)));

arah_bawah_satu(m,n)=arah_bawah_satu(m,n)+(arah_bawah_satu(t,u))/(((m-
t)*jrk)^2.5);
      t=t-1;
      u=u-1;
    end;

    arah_bawah_satu(m,n)=arah_bawah_satu(m,n)./jar1;
  end;
end;
end;
```

```
gbr_satu(9:16,9:16)=(arah_atas_satu(9:16,9:16)+arah_bawah_satu(9:16,9:16))./2;


   case 7        % 157,5 degree

      for m=brs:-1:1
      for n=klm:-1:1

        if arah_atas_satu(m,n)==0
          r=m+1;
          s=n+2;
          jrk=sqrt(((s-n)^2)+((m-r)^2));
          jar=0;
          while (r<=brs & s<=klm)

            jar=jar+(1/((jrk*((r-m)/1))^2.5));
            arah_atas_satu(m,n)=arah_atas_satu(m,n)+(arah_atas_satu(r,s))/((((s-
n)/2)*jrk)^2.5);

            r=r+1;
            s=s+2;
          end

          arah_atas_satu(m,n)=arah_atas_satu(m,n)./jar;
        end
      end
      end

      clear m n

      for m=1:brs
      for n=1:klm

        if(arah_bawah_satu(m,n)==0)
          t=m-1;
          u=n-2;
          jrk=sqrt(((n-u)^2)+((m-t)^2));
          jar1=0;
          while (t>=1 & u>=1)

            jar1=jar1+(1/((jrk*((m-t)/1))^2.5));

arah_bawah_satu(m,n)=arah_bawah_satu(m,n)+(arah_bawah_satu(t,u))/((((n-
u)/2)*jrk)^2.5);

            t=t-1;
```

```
            u=u-2;
           end
           arah_bawah_satu(m,n)=arah_bawah_satu(m,n)./jar1;
         end
       end
       end


gbr_satu(9:16,9:16)=(arah_atas_satu(9:16,9:16)+arah_bawah_satu(9:16,9:16))./2;

end  % end switch


function[gbr_dua]=interpolasi_2a()
clear;
close all;
clc;

global matrik_interpolasi;
global indeks;

 % Multidirectional Interpolation Processing
 gbr_dua=matrik_interpolasi;
 arah_atas_dua=matrik_interpolasi;
 arah_bawah_dua=matrik_interpolasi;
 [brs,klm]=size(matrik_interpolasi);

% Multidirectional Interpolation Processing
switch(indeks(2))
   case 0          % 0 Degree

       for m=brs:-1:1
       for n=klm:-1:1
          if arah_atas_dua(m,n)==0
           r=m;
           s=n+1;
           jrk=1
           jar=0;
           while (s<=klm)
             jar=jar+(1/((jrk*(s-n))^2.5));
             arah_atas_dua(m,n)=arah_atas_dua(m,n)+(arah_atas_dua(r,s))/(((s-
n)*jrk)^2.5);
             s=s+1;
           end;
           arah_atas_dua(m,n)=arah_atas_dua(m,n)./jar;
           end;
       end;
```

```
        end;

        clear m n

        for m=brs:-1:1
        for n=1:klm

          if(arah_bawah_dua(m,n)==0)
            t=m;
            u=n-1;
            jrk=1;
            jar1=0;
          while (u>=1)
              jar1=jar1+(1/((jrk*(n-u))^2.5));

arah_bawah_dua(m,n)=arah_bawah_dua(m,n)+(arah_bawah_dua(t,u))/(((n-
u)*jrk)^2.5);
              u=u-1;
          end;
          arah_bawah_dua(m,n)=arah_bawah_dua(m,n)./jar1;
          end;
        end;
        end;

gbr_dua(9:16,9:16)=(arah_atas_dua(9:16,9:16)+arah_bawah_dua(9:16,9:16))./2;
        clear m n


    case 1          % 22.5 Degree

        for m=1:brs
        for n=klm:-1:1

          if arah_atas_dua(m,n)==0
             r=m-1;
             s=n+2;
             jar=0;
             jrk=sqrt(((s-n)^2)+((m-r)^2));
          while (r>=1 & s<=klm)
             jar=jar+(1/((jrk*((m-r)/1))^2.5));
             arah_atas_dua(m,n)=arah_atas_dua(m,n)+(arah_atas_dua(r,s))/((((s-
n)/2)*jrk)^2.5);
             r=r-1;
             s=s+2;
           end;
             arah_atas_dua(m,n)=arah_atas_dua(m,n)./jar;
          end;
```

```
        end;
        end;

        clear m n

        for m=brs:-1:1
        for n=1:klm

          if(arah_bawah_dua(m,n)==0)
            t=m+1;
            u=n-2;
            jrk=sqrt(((t-m)^2)+((n-u)^2));
             jar1=0;
            while (t<=brs & u>=1)
              jar1=jar1+(1/((jrk*((t-m)/1))^2.5));

arah_bawah_dua(m,n)=arah_bawah_dua(m,n)+(arah_bawah_dua(t,u))/((((n-
u)/2)*jrk)^2.5);

              t=t+1;
              u=u-2;
             end;

             arah_bawah_dua(m,n)=arah_bawah_dua(m,n)./jar1;
          end;
        end;
        end;


gbr_dua(9:16,9:16)=(arah_atas_dua(9:16,9:16)+arah_bawah_dua(9:16,9:16))./2;


    case 2          % 45 degree ( 135 degree counter )

        for m=1:brs
        for n=klm:-1:1

          if arah_atas_dua(m,n)==0
             r=m-1;
             s=n+1;
             jrk=1;
             jar=0;
             arah_atas_dua(m,n)=0;
             while (r>=1 & s<=klm)

               jar=jar+(1/((jrk*((m-r))^2.5)));
```

```
            arah_atas_dua(m,n)=arah_atas_dua(m,n)+(arah_atas_dua(r,s))/(((m-
r)*jrk)^2.5);
            r=r-1;
            s=s+1;
          end;
          arah_atas_dua(m,n)=arah_atas_dua(m,n)./jar;

        end;
      end;
      end;

       clear m n

      for m=brs:-1:1
      for n=1:klm
        if(arah_bawah_dua(m,n)==0)
          t=m+1;
          u=n-1;
          jrk=1;
          jar1=0;
          while (t<=brs & u>=1)

            jar1=jar1+(1/((jrk*((t-m))^2.5)));

arah_bawah_dua(m,n)=arah_bawah_dua(m,n)+(arah_bawah_dua(t,u))/(((t-
m)*jrk)^2.5);

            t=t+1;
            u=u-1;
          end;

          arah_bawah_dua(m,n)=arah_bawah_dua(m,n)./jar1;
        end;
      end;
      end;


gbr_dua(9:16,9:16)=(arah_atas_dua(9:16,9:16)+arah_bawah_dua(9:16,9:16))./2;


   case 3          %67.5 degree

      for m=1:brs
      for n=klm:-1:1
        if arah_atas_dua(m,n)==0
          r=m-2;
          s=n+1;
```

```
            jrk=sqrt(((s-n)^2)+((m-r)^2));
            jar=0;
            while (r>=1 & s<=klm)

              jar=jar+(1/((jrk*((s-n)/1))^2.5));
              arah_atas_dua(m,n)=arah_atas_dua(m,n)+(arah_atas_dua(r,s))/((((s-
n)/1)*jrk)^2.5);

              r=r-2;
              s=s+1;
            end;

            arah_atas_dua(m,n)=arah_atas_dua(m,n)./jar;
          end;
        end;
        end;

        clear m n

        for m=brs:-1:1
        for n=1:klm

          if(arah_bawah_dua(m,n)==0)
            t=m+2;
            u=n-1;
            jrk=sqrt(((t-m)^2)+((n-u)^2));
            jar1=0;
            while (t<=brs & u>=1)
              jar1=jar1+(1/((jrk*((n-u)/1))^2.5));

arah_bawah_dua(m,n)=arah_bawah_dua(m,n)+(arah_bawah_dua(t,u))/((((n-
u)/1)*jrk)^2.5);
              t=t+2;
              u=u-1;
            end;

            arah_bawah_dua(m,n)=arah_bawah_dua(m,n)./jar1;
          end;
        end;
        end;


gbr_dua(9:16,9:16)=(arah_atas_dua(9:16,9:16)+arah_bawah_dua(9:16,9:16))./2;



    case 4          % 90 degree
```

```
for m=brs:-1:1
for n=klm:-1:1

  if arah_atas_dua(m,n)==0
     r=m+1;
     jar=0;
     jrk=1;
     while (r<=brs)
       jar=jar+(1/((jrk*(r-m))^2.5));
       arah_atas_dua(m,n)=arah_atas_dua(m,n)+(arah_atas_dua(r,n))/(((r-
m)*jrk)^2.5);
       r=r+1;
     end;
       arah_atas_dua(m,n)=arah_atas_dua(m,n)./jar;
  end;
end;
end;

clear m n jar

for m=1:brs
for n=1:klm

  if(arah_bawah_dua(m,n)==0)
    t=m-1;
    jar1=0;
    jrk=1;
    while (t>=1)

      jar1=jar1+(1/((jrk*(m-t))^2.5));

arah_bawah_dua(m,n)=arah_bawah_dua(m,n)+(arah_bawah_dua(t,n))/(((m-
t)*jrk)^2.5);

      t=t-1;

    end;

    arah_bawah_dua(m,n)=arah_bawah_dua(m,n)./jar1;
  end;
end;
end;


gbr_dua(9:16,9:16)=(arah_atas_dua(9:16,9:16)+arah_bawah_dua(9:16,9:16))./2;
```

```
   case 5          %112.5

      for m=brs:-1:1
      for n=brs:-1:1

        if arah_atas_dua(m,n)==0
          r=m+2;
          s=n+1;
          jrk=sqrt(((s-n)^2)+((r-m)^2));
          jar=0;
          while (r<=brs & s<=klm)

            jar=jar+(1/((jrk*((s-n)/1))^2.5));
            arah_atas_dua(m,n)=arah_atas_dua(m,n)+(arah_atas_dua(r,s))/((((s-
n)/1)*jrk)^2.5);

            r=r+2;
            s=s+1;
          end;

          arah_atas_dua(m,n)=arah_atas_dua(m,n)./jar;
        end;
      end;
      end;

      clear m n

      for m=1:brs
      for n=1:klm

        if(arah_bawah_dua(m,n)==0)
          t=m-2;
          u=n-1;
          jrk=sqrt(((n-u)^2)+((m-t)^2));
          jar1=0;
          while (t>=1 & u>=1)

            jar1=jar1+(1/((jrk*((n-u)/1))^2.5));

arah_bawah_dua(m,n)=arah_bawah_dua(m,n)+(arah_bawah_dua(t,u))/((((n-
u)/1)*jrk)^2.5);
            t=t-2;
            u=u-1;
          end;
```

```
            arah_bawah_dua(m,n)=arah_bawah_dua(m,n)./jar1;
          end;
        end;
        end;


gbr_dua(9:16,9:16)=(arah_atas_dua(9:16,9:16)+arah_bawah_dua(9:16,9:16))./2;



    case 6          % 135 degree ( Counter 45 Degree)

        for m=brs:-1:1
        for n=klm:-1:1

          if arah_atas_dua(m,n)==0
            r=m+1;
            s=n+1;
            jar=0;
            jrk=1;
            while (r<=brs & s<=klm)

              jar=jar+(1/((jrk*((s-n))^2.5)));
              arah_atas_dua(m,n)=arah_atas_dua(m,n)+(arah_atas_dua(r,s))/(((s-
n)*jrk)^2.5);

              r=r+1;
              s=s+1;
            end;

            arah_atas_dua(m,n)=arah_atas_dua(m,n)./jar;
          end;
        end;
        end;

         clear m n

        for m=1:brs
        for n=1:klm

          if(arah_bawah_dua(m,n)==0)
            t=m-1;
            u=n-1;
            jar1=0
            jrk=1;
            while (t>=1 & u>=1)
```

```
            jar1=jar1+(1/((jrk*((m-t))^2.5)));

arah_bawah_dua(m,n)=arah_bawah_dua(m,n)+(arah_bawah_dua(t,u))/(((m-
t)*jrk)^2.5);

            t=t-1;
            u=u-1;
           end;

           arah_bawah_dua(m,n)=arah_bawah_dua(m,n)./jar1;
         end;
       end;
       end;


gbr_dua(9:16,9:16)=(arah_atas_dua(9:16,9:16)+arah_bawah_dua(9:16,9:16))./2;


    case 7          % 157,5 degree

       for m=brs:-1:1
       for n=klm:-1:1

         if arah_atas_dua(m,n)==0
           r=m+1;
           s=n+2;
           jrk=sqrt(((s-n)^2)+((m-r)^2));
           jar=0;
           while (r<=brs & s<=klm)

             jar=jar+(1/((jrk*((r-m)/1))^2.5));
             arah_atas_dua(m,n)=arah_atas_dua(m,n)+(arah_atas_dua(r,s))/((((s-
n)/2)*jrk)^2.5);

             r=r+1;
             s=s+2;
           end;

           arah_atas_dua(m,n)=arah_atas_dua(m,n)./jar;
         end;
       end;
       end;

       clear m n

       for m=1:brs
       for n=1:klm
```

```
        if(arah_bawah_dua(m,n)==0)
          t=m-1;
          u=n-2;
          jrk=sqrt(((n-u)^2)+((m-t)^2));
          jar1=0;
          while (t>=1 & u>=1)

            jar1=jar1+(1/((jrk*((m-t)/1))^2.5));

arah_bawah_dua(m,n)=arah_bawah_dua(m,n)+(arah_bawah_dua(t,u))/((((n-
u)/2)*jrk)^2.5);

            t=t-1;
            u=u-2;
           end;
           arah_bawah_dua(m,n)=arah_bawah_dua(m,n)./jar1;
        end;
      end;
      end;


gbr_dua(9:16,9:16)=(arah_atas_dua(9:16,9:16)+arah_bawah_dua(9:16,9:16))./2;

end ; % end switch


function[gbr_tiga]=interpolasi_3a()
clear;
close all;
clc;

global matrik_interpolasi;
global indeks;

 % Multidirectional Interpolation Processing
 gbr_tiga=matrik_interpolasi;
 arah_atas_tiga=matrik_interpolasi;
 arah_bawah_tiga=matrik_interpolasi;
 [brs,klm]=size(matrik_interpolasi);

% Multidirectional Interpolation Processing
switch(indeks(3))
   case 0         % 0 Degree

      for m=brs:-1:1
      for n=klm:-1:1
```

```
          if arah_atas_tiga(m,n)==0
           r=m;
           s=n+1;
           jrk=1;
           jar=0;
           while (s<=klm)
             jar=jar+(1/((jrk*(s-n))^2.5));
             arah_atas_tiga(m,n)=arah_atas_tiga(m,n)+(arah_atas_tiga(r,s))/(((s-
n)*jrk)^2.5);
             s=s+1;
           end;
           arah_atas_tiga(m,n)=arah_atas_tiga(m,n)./jar;
           end;
       end;
       end;

       clear m n

       for m=brs:-1:1
       for n=1:klm

         if(arah_bawah_tiga(m,n)==0)
           t=m;
           u=n-1;
           jrk=1;
           jar1=0;
         while (u>=1)
             jar1=jar1+(1/((jrk*(n-u))^2.5));

arah_bawah_tiga(m,n)=arah_bawah_tiga(m,n)+(arah_bawah_tiga(t,u))/(((n-
u)*jrk)^2.5);
             u=u-1;
         end;
         arah_bawah_tiga(m,n)=arah_bawah_tiga(m,n)./jar1;
         end;
       end;
       end;

gbr_tiga(9:16,9:16)=(arah_atas_tiga(9:16,9:16)+arah_bawah_tiga(9:16,9:16))./2;
       clear m n


    case 1          % 22.5 Degree

       for m=1:brs
       for n=klm:-1:1
```

```
        if arah_atas_tiga(m,n)==0
          r=m-1;
          s=n+2;
          jar=0;
          jrk=sqrt(((s-n)^2)+((m-r)^2));
        while (r>=1 & s<=klm)
          jar=jar+(1/((jrk*((m-r)/1))^2.5));
          arah_atas_tiga(m,n)=arah_atas_tiga(m,n)+(arah_atas_tiga(r,s))/((((s-
n)/2)*jrk)^2.5);
          r=r-1;
          s=s+2;
         end;
          arah_atas_tiga(m,n)=arah_atas_tiga(m,n)./jar;
        end;
      end;
      end;

      clear m n

      for m=brs:-1:1
      for n=1:klm

        if(arah_bawah_tiga(m,n)==0)
          t=m+1;
          u=n-2;
          jrk=sqrt(((t-m)^2)+((n-u)^2));
           jar1=0;
          while (t<=brs & u>=1)
            jar1=jar1+(1/((jrk*((t-m)/1))^2.5));

arah_bawah_tiga(m,n)=arah_bawah_tiga(m,n)+(arah_bawah_tiga(t,u))/((((n-
u)/2)*jrk)^2.5);

            t=t+1;
            u=u-2;
           end;

           arah_bawah_tiga(m,n)=arah_bawah_tiga(m,n)./jar1;
        end;
      end;
      end;


gbr_tiga(9:16,9:16)=(arah_atas_tiga(9:16,9:16)+arah_bawah_tiga(9:16,9:16))./2;


   case 2        % 45 degree ( 135 degree counter )
```

```
for m=1:brs
for n=klm:-1:1

  if arah_atas_tiga(m,n)==0
    r=m-1;
    s=n+1;
    jrk=1;
    jar=0;
    arah_atas_tiga(m,n)=0;
    while (r>=1 & s<=klm)

      jar=jar+(1/((jrk*((m-r))^2.5)));
      arah_atas_tiga(m,n)=arah_atas_tiga(m,n)+(arah_atas_tiga(r,s))/(((m-
r)*jrk)^2.5);
      r=r-1;
      s=s+1;
    end;
    arah_atas_tiga(m,n)=arah_atas_tiga(m,n)./jar;

  end;
end;
end;

 clear m n

for m=brs:-1:1
for n=1:klm
  if(arah_bawah_tiga(m,n)==0)
    t=m+1;
    u=n-1;
    jrk=1;
    jar1=0;
    while (t<=brs & u>=1)

      jar1=jar1+(1/((jrk*((t-m))^2.5)));

arah_bawah_tiga(m,n)=arah_bawah_tiga(m,n)+(arah_bawah_tiga(t,u))/(((t-
m)*jrk)^2.5);

      t=t+1;
      u=u-1;
    end;

    arah_bawah_tiga(m,n)=arah_bawah_tiga(m,n)./jar1;
  end;
end;
```

```
        end;


gbr_tiga(9:16,9:16)=(arah_atas_tiga(9:16,9:16)+arah_bawah_tiga(9:16,9:16))./2;
%(jar+jar1);


    case 3          %67.5 degree

        for m=1:brs
        for n=klm:-1:1
          if arah_atas_tiga(m,n)==0
            r=m-2;
            s=n+1;
            jrk=sqrt(((s-n)^2)+((m-r)^2));
            jar=0;
            while (r>=1 & s<=klm)

              jar=jar+(1/((jrk*((s-n)/1))^2.5));
              arah_atas_tiga(m,n)=arah_atas_tiga(m,n)+(arah_atas_tiga(r,s))/((((s-
n)/1)*jrk)^2.5);

              r=r-2;
              s=s+1;
            end;

            arah_atas_tiga(m,n)=arah_atas_tiga(m,n)./jar;
          end;
        end;
        end;

        clear m n

        for m=brs:-1:1
        for n=1:klm

          if(arah_bawah_tiga(m,n)==0)
            t=m+2;
            u=n-1;
            jrk=sqrt(((t-m)^2)+((n-u)^2));
            jar1=0;
            while (t<=brs & u>=1)
              jar1=jar1+(1/((jrk*((n-u)/1))^2.5));

arah_bawah_tiga(m,n)=arah_bawah_tiga(m,n)+(arah_bawah_tiga(t,u))/((((n-
u)/1)*jrk)^2.5);
              t=t+2;
```

```
            u=u-1;
           end;

           arah_bawah_tiga(m,n)=arah_bawah_tiga(m,n)./jar1;
         end;
       end;
       end;


gbr_tiga(9:16,9:16)=(arah_atas_tiga(9:16,9:16)+arah_bawah_tiga(9:16,9:16))./2;



   case 4          % 90 degree

       for m=brs:-1:1
       for n=klm:-1:1

         if arah_atas_tiga(m,n)==0
           r=m+1;
           jar=0;
           jrk=1;
           while (r<=brs)
             jar=jar+(1/((jrk*(r-m))^2.5));
             arah_atas_tiga(m,n)=arah_atas_tiga(m,n)+(arah_atas_tiga(r,n))/(((r-
m)*jrk)^2.5);
             r=r+1;
           end;
             arah_atas_tiga(m,n)=arah_atas_tiga(m,n)./jar;
         end;
       end;
       end;

       clear m n jar

       for m=1:brs
       for n=1:klm

         if(arah_bawah_tiga(m,n)==0)
           t=m-1;
           jar1=0;
           jrk=1;
           while (t>=1)

             jar1=jar1+(1/((jrk*(m-t))^2.5));
```

```
arah_bawah_tiga(m,n)=arah_bawah_tiga(m,n)+(arah_bawah_tiga(t,n))/(((m-
t)*jrk)^2.5);

            t=t-1;

           end;

           arah_bawah_tiga(m,n)=arah_bawah_tiga(m,n)./jar1;
         end;
       end;
       end;


gbr_tiga(9:16,9:16)=(arah_atas_tiga(9:16,9:16)+arah_bawah_tiga(9:16,9:16))./2;



   case 5          %112.5

       for m=brs:-1:1
       for n=brs:-1:1

         if arah_atas_tiga(m,n)==0
           r=m+2;
           s=n+1;
           jrk=sqrt(((s-n)^2)+((r-m)^2));
           jar=0;
           while (r<=brs & s<=klm)

             jar=jar+(1/((jrk*((s-n)/1))^2.5));
             arah_atas_tiga(m,n)=arah_atas_tiga(m,n)+(arah_atas_tiga(r,s))/((((s-
n)/1)*jrk)^2.5);

             r=r+2;
             s=s+1;
           end;

           arah_atas_tiga(m,n)=arah_atas_tiga(m,n)./jar;
         end;
       end;
       end;

       clear m n

       for m=1:brs
       for n=1:klm
```

```
        if(arah_bawah_tiga(m,n)==0)
          t=m-2;
          u=n-1;
          jrk=sqrt(((n-u)^2)+((m-t)^2));
          jar1=0;
          while (t>=1 & u>=1)

            jar1=jar1+(1/((jrk*((n-u)/1))^2.5));

arah_bawah_tiga(m,n)=arah_bawah_tiga(m,n)+(arah_bawah_tiga(t,u))/((((n-
u)/1)*jrk)^2.5);
            t=t-2;
            u=u-1;
           end;

           arah_bawah_tiga(m,n)=arah_bawah_tiga(m,n)./jar1;
        end;
      end;
      end;


gbr_tiga(9:16,9:16)=(arah_atas_tiga(9:16,9:16)+arah_bawah_tiga(9:16,9:16))./2;



   case 6        % 135 degree ( Counter 45 Degree)

      for m=brs:-1:1
      for n=klm:-1:1

        if arah_atas_tiga(m,n)==0
           r=m+1;
           s=n+1;
           jar=0;
           jrk=1;
           while (r<=brs & s<=klm)

             jar=jar+(1/((jrk*((s-n))^2.5)));
             arah_atas_tiga(m,n)=arah_atas_tiga(m,n)+(arah_atas_tiga(r,s))/(((s-
n)*jrk)^2.5);

             r=r+1;
             s=s+1;
           end;

           arah_atas_tiga(m,n)=arah_atas_tiga(m,n)./jar;
```

```
    end;
  end;
  end;

   clear m n

  for m=1:brs
  for n=1:klm

    if(arah_bawah_tiga(m,n)==0)
      t=m-1;
      u=n-1;
      jar1=0
      jrk=1;
      while (t>=1 & u>=1)

        jar1=jar1+(1/((jrk*((m-t))^2.5)));

arah_bawah_tiga(m,n)=arah_bawah_tiga(m,n)+(arah_bawah_tiga(t,u))/(((m-
t)*jrk)^2.5);

        t=t-1;
        u=u-1;
       end;

       arah_bawah_tiga(m,n)=arah_bawah_tiga(m,n)./jar1;
    end;
  end;
  end;


gbr_tiga(9:16,9:16)=(arah_atas_tiga(9:16,9:16)+arah_bawah_tiga(9:16,9:16))./2;


 case 7        % 157,5 degree

  for m=brs:-1:1
  for n=klm:-1:1

    if arah_atas_tiga(m,n)==0
      r=m+1;
      s=n+2;
      jrk=sqrt(((s-n)^2)+((m-r)^2));
      jar=0;
      while (r<=brs & s<=klm)

        jar=jar+(1/((jrk*((r-m)/1))^2.5));
```

```
            arah_atas_tiga(m,n)=arah_atas_tiga(m,n)+(arah_atas_tiga(r,s))/((((s-
n)/2)*jrk)^2.5);

            r=r+1;
            s=s+2;
          end;

          arah_atas_tiga(m,n)=arah_atas_tiga(m,n)./jar;
        end;
      end;
      end;

      clear m n

      for m=1:brs
      for n=1:klm

        if(arah_bawah_tiga(m,n)==0)
          t=m-1;
          u=n-2;
          jrk=sqrt(((n-u)^2)+((m-t)^2));
          jar1=0;
          while (t>=1 & u>=1)

            jar1=jar1+(1/((jrk*((m-t)/1))^2.5));

arah_bawah_tiga(m,n)=arah_bawah_tiga(m,n)+(arah_bawah_tiga(t,u))/((((n-
u)/2)*jrk)^2.5);

            t=t-1;
            u=u-2;
          end;
          arah_bawah_tiga(m,n)=arah_bawah_tiga(m,n)./jar1;
        end;
      end;
      end;


gbr_tiga(9:16,9:16)=(arah_atas_tiga(9:16,9:16)+arah_bawah_tiga(9:16,9:16))./2;

end  % end switch
```

```
clear;
close all;
clc;
global matrik_interpolasi
global indeks
% Baca input yang tanpa error
masukan_sehat=imread('boat.jpg');

% Baca input yang sudah rusak
x_input=imread('boat1.jpg');
x_input=double(x_input);

% bagi blok 8 * 8
[bariss,kolomm]=size(x_input);
baris_blok=round(bariss/8);
kolom_blok=round(kolomm/8);

m(1:baris_blok)=8;
n(1:kolom_blok)=8;
A=mat2cell(x_input,[m],[n]);
% cek blok error
matriks_bantu=zeros(8,8);
for j=1:baris_blok
   for k=1:kolom_blok
      if A{j,k}==matriks_bantu
            x=[A{j-1,k-1} A{j-1,k} A{j-1,k+1}];
            y=[A{j-1,k-1};A{j,k-1};A{j+1,k-1}];
            z=[A{j-1,k+1};A{j,k+1};A{j+1,k+1}];
            s=[A{j+1,k-1} A{j+1,k} A{j+1,k+1}];
            %bagian atas
            for m=2:7
               for n=2:23
                  S_x1(m-1,n-1)=-x(m-1,n-1)-2*x(m,n-1)-x(m+1,n-1)+x(m-
1,n+1)+2*x(m,n+1)+x(m+1,n+1);
                  S_y1(m-1,n-1)=x(m-1,n-1)+2*x(m-1,n)+x(m-1,n+1)-x(m+1,n-
1)-2*x(m+1,n)-x(m+1,n+1);
                  G_xy1(m-1,n-1)=sqrt(S_x1(m-1,n-1).^2+S_y1(m-1,n-1).^2);
                  sudut1(m-1,n-1)=atan(S_y1(m-1,n-1)/(S_x1(m-1,n-1)+eps));
                  sudut1_ubah(m-1,n-1)=rad2deg(sudut1(m-1,n-1));
                  %KLASIFIKASI SUDUT%
                   K1(m-1,n-1)=mod((round(sudut1_ubah(m-1,n-1)/22.5)),8);
               end;
            end;
            clear m n
            %samping kiri
            for m=8:17
               for n=2:7
```

```
                S_x2(m-1,n-1)=-y(m-1,n-1)-2*y(m,n-1)-y(m+1,n-1)+y(m-
1,n+1)+2*y(m,n+1)+y(m+1,n+1);
                S_y2(m-1,n-1)=y(m-1,n-1)+2*y(m-1,n)+y(m-1,n+1)-y(m+1,n-
1)-2*y(m+1,n)-y(m+1,n+1);
                G_xy2(m-1,n-1)=sqrt(S_x2(m-1,n-1).^2+S_y2(m-1,n-1).^2);
                sudut2(m-1,n-1)=atan(S_y2(m-1,n-1)/(S_x2(m-1,n-1)+eps));
                sudut2_ubah(m-1,n-1)=rad2deg(sudut2(m-1,n-1));
                    %KLASIFIKASI SUDUT%
                K2(m-1,n-1)=mod((round(sudut2_ubah(m-1,n-1)/22.5)),8);
            end;
        end;
        clear m n
        %samping kanan
        for m=8:17
            for n=2:7
                S_x3(m-1,n-1)=-z(m-1,n-1)-2*z(m,n-1)-z(m+1,n-1)+z(m-
1,n+1)+2*z(m,n+1)+z(m+1,n+1);
                S_y3(m-1,n-1)=z(m-1,n-1)+2*z(m-1,n)+z(m-1,n+1)-z(m+1,n-
1)-2*z(m+1,n)-z(m+1,n+1);
                G_xy3(m-1,n-1)=sqrt(S_x3(m-1,n-1).^2+S_y3(m-1,n-1).^2);
                sudut3(m-1,n-1)=atan(S_y3(m-1,n-1)/(S_x3(m-1,n-1)+eps));
                sudut3_ubah(m-1,n-1)=rad2deg(sudut3(m-1,n-1));
                    %KLASIFIKASI SUDUT%
                K3(m-1,n-1)=mod((round(sudut3_ubah(m-1,n-1)/22.5)),8);
            end;
        end;
        clear m n
        %bawah
        for m=2:7
            for n=2:23
                S_x4(m-1,n-1)=-s(m-1,n-1)-2*s(m,n-1)-s(m+1,n-1)+s(m-
1,n+1)+2*s(m,n+1)+s(m+1,n+1);
                S_y4(m-1,n-1)=s(m-1,n-1)+2*s(m-1,n)+s(m-1,n+1)-s(m+1,n-1)-
2*s(m+1,n)-s(m+1,n+1);
                G_xy4(m-1,n-1)=sqrt(S_x4(m-1,n-1).^2+S_y4(m-1,n-1).^2);
                sudut4(m-1,n-1)=atan(S_y4(m-1,n-1)/(S_x4(m-1,n-1)+eps));
                sudut4_ubah(m-1,n-1)=rad2deg(sudut4(m-1,n-1));
            %KLASIFIKASI SUDUT%
                K4(m-1,n-1)=mod((round(sudut4_ubah(m-1,n-1)/22.5)),8);
            end;
        end;

        K_bantu(1:10,1:10)=eps;
        K2_baru=K2(7:16,1:6);
        K3_baru=K3(7:16,1:6);
        G2=G_xy2(7:16,1:6);
        G3=G_xy3(7:16,1:6);
```

```
K_gab=[K1;K2_baru K_bantu K3_baru;K4];
G_gab=[G_xy1;G2 K_bantu G3;G_xy4];


 %sudut 45
  k_dua(baris,kolom)=K_gab(baris,kolom);
if k_dua(baris,kolom)==2
   k_dua(baris,kolom)=1;
else
   k_dua(baris,kolom)=0;
end;

k_dua(1,1:14)=0;k_dua(2,1:13)=0;k_dua(3,1:12)=0;k_dua(4,1:11)=0;

k_dua(5,1:10)=0;k_dua(6,1:9)=0;k_dua(7:9,1:6)=0;k_dua(10,1:5)=0;

k_dua(11,1:4)=0;k_dua(12,1:3)=0;k_dua(13,1:2)=0;k_dua(14,1)=0;

k_dua(9,22)=0;k_dua(10,21:22)=0;k_dua(11,20:22)=0;k_dua(12,19:22)=0;

k_dua(13,18:22)=0;k_dua(14:16,17:22)=0;k_dua(17,14:22)=0;

k_dua(18,13:22)=0;k_dua(19,12:22)=0;k_dua(20,11:22)=0;k_dua(21,10:22)=0;
k_dua(22,9:22)=0;


Dk_dua=Dk_dua+(G_gab(baris,kolom).*k_dua(baris,kolom));

%sudut 67.5
 k_tiga(baris,kolom)=K_gab(baris,kolom);
if k_tiga(baris,kolom)==3
   k_tiga(baris,kolom)=1;
else
    k_tiga(baris,kolom)=0;
end;
k_tiga(1:5,1:9)=0;k_tiga(1:3,10)=0;k_tiga(1,11)=0;
k_tiga(6:7,20:22)=0;k_tiga(4:5,21:22)=0;k_tiga(2:3,22)=0;

k_tiga(7:11,1:6)=0;k_tiga(12:13,1:5)=0;k_tiga(14:15,1:4)=0;k_tiga(16:17,1:3)=0;
k_tiga(18:19,1:2)=0;k_tiga(20:21,1)=0;k_tiga(8:9,19:22)=0;

k_tiga(10:11,18:22)=0;k_tiga(12:16,17:22)=0;k_tiga(17:22,15:22)=0;
k_tiga(18:22,14)=0;k_tiga(20:22,13)=0;k_tiga(22,12)=0;


Dk_tiga=Dk_tiga+(G_gab(baris,kolom).*k_tiga(baris,kolom));
```

```
                    %sudut 90
                     k_empat(baris,kolom)=K_gab(baris,kolom);
                      if k_empat(baris,kolom)==4
                     k_empat(baris,kolom)=1;
                      else
                      k_empat(baris,kolom)=0;
                      end;
                      k_empat(1:22,1:6)=0;k_empat(1:22,17:22)=0;
Dk_nol=0;Dk_satu=1;Dk_dua=2;Dk_tiga=3;Dk_empat=3;Dk_lima=5;Dk_enam=
6;Dk_tujuh=7;
            for baris=1:22
               for kolom=1:22
                  %sudut 0
                  k_nol(baris,kolom)=K_gab(baris,kolom);
                  if k_nol(baris,kolom)==0
                     k_nol(baris,kolom)=1;
                  else
                     k_nol(baris,kolom)=0;
                  end;
                  k_nol(1:6,1:22)=0;k_nol(17:22,1:22)=0;

                  Dk_nol=Dk_nol+(G_gab(baris,kolom).*k_nol(baris,kolom));

                  %sudut 22.5
                  k_satu(baris,kolom)=K_gab(baris,kolom);
                  if k_satu(baris,kolom)==1
                     k_satu(baris,kolom)=1;
                  else
                     k_satu(baris,kolom)=0;
                  end;
                  k_satu(1:6,1:11)=0;k_satu(1:5,12:13)=0;k_satu(1:4,14:15)=0;
                  k_satu(3,16:17)=0;k_satu(2,16:19)=0;k_satu(1,16:21)=0;
                  k_satu(7:8,1:6)=0;k_satu(9,1:5)=0;k_satu(10,1:3)=0;
                  k_satu(11,1)=0;k_satu(12,22)=0;k_satu(13,20:22)=0;

k_satu(14,18:22)=0;k_satu(15:16,17:22)=0;k_satu(17:22,12:22)=0;

k_satu(18:22,10:11)=0;k_satu(19:22,8:9)=0;k_satu(20:22,6:7)=0;k_satu(21:22,4:5
)=0;
                  k_satu(22,2:3)=0;

                   Dk_satu=Dk_satu+(G_gab(baris,kolom).*k_satu(baris,kolom));

Dk_empat=Dk_empat+(G_gab(baris,kolom).*k_empat(baris,kolom));

                     %sudut 112.5
                      k_lima(baris,kolom)=K_gab(baris,kolom);
```

```
if k_lima(baris,kolom)==5
   k_lima(baris,kolom)=1;
else
   k_lima(baris,kolom)=0;
end;


k_enam(1,9:22)=0;k_enam(2,10:22)=0;k_enam(3,11:22)=0;k_enam(4,12:22)=0;

k_enam(5,13:22)=0;k_enam(6,14:22)=0;k_enam(7:9,17:22)=0;k_enam(9,1)=0;

k_enam(10,1:2)=0;k_enam(11,1:3)=0;k_enam(12,1:4)=0;k_enam(13,1:5)=0;

k_enam(14:16,1:6)=0;k_enam(10,18:22)=0;k_enam(11,19:22)=0;k_enam(12,20:2
2)=0;

k_enam(13,21:22)=0;k_enam(14,22)=0;k_enam(17,1:9)=0;k_enam(18,1:10)=0;

k_enam(19,1:11)=0;k_enam(20,1:12)=0;k_enam(21,1:13)=0;k_enam(22,1:14)=0;


Dk_enam=Dk_enam+(G_gab(baris,kolom).*k_enam(baris,kolom));

%sudut 157.5
   k_tujuh(baris,kolom)=K_gab(baris,kolom);
   if k_tujuh(baris,kolom)==7
      k_tujuh(baris,kolom)=1;
    else
      k_tujuh(baris,kolom)=0;
    end;
    k_tujuh(1,2:22)=0;k_tujuh(2,4:22)=0;k_tujuh(3,6:22)=0;

k_tujuh(4,8:22)=0;k_tujuh(5,10:22)=0;k_tujuh(6,12:22)=0;

k_tujuh(7:8,17:22)=0;k_tujuh(9,18:22)=0;k_tujuh(10,20:22)=0;

k_tujuh(18:22,13:17)=0;k_tujuh(11,22)=0;k_tujuh(12,1)=0;

k_tujuh(13,1:3)=0;k_tujuh(14,1:5)=0;k_tujuh(15:16,1:6)=0;

k_tujuh(17,1:11)=0;k_tujuh(18,1:13)=0;k_tujuh(19,1:15)=0;

k_tujuh(20,1:17)=0;k_tujuh(21,1:19)=0;k_tujuh(22,1:21)=0;


Dk_tujuh=Dk_tujuh+(G_gab(baris,kolom).*k_tujuh(baris,kolom));
```

```
                    end;%baris
                 end;%kolom

 %mencari 3 terbesar
                T=0.25;

Dk_gab=[Dk_nol,Dk_satu,Dk_dua,Dk_tiga,Dk_empat,Dk_lima,Dk_enam,Dk_tuj
uh];
  Dk_maks_gab=max(Dk_gab);
   S_cek=[];
   for cek=1:8
       if Dk_gab(cek)>(1-T)*Dk_maks_gab
          S_cek(cek)=Dk_gab(cek);
       end;
       end;
        [bar,col]=size(S_cek);
        if col~=0
            sort_S=sort(S_cek);
              panjang=length(sort_S);
            if panjang>=1|panjang<=2
               Dk_gab_tiga_terbesar=sort_S;
            elseif panjang>2
            Dk_gab_tiga_terbesar=sort_S(1,(panjang-2):panjang);
            end;
      ax=find(Dk_gab_tiga_terbesar==0);
      cx=length(ax);
      bx=find(Dk_gab_tiga_terbesar~=0);
      [dx,ex]=size(Dk_gab_tiga_terbesar);
      for loop=1:ex
          if Dk_gab_tiga_terbesar(loop)==0
             Dk_gab_tiga_terbesar_akhir=Dk_gab_tiga_terbesar(1,cx+1:ex);
            elseif Dk_gab_tiga_terbesar(loop)~=0
             Dk_gab_tiga_terbesar_akhir=Dk_gab_tiga_terbesar;
            end;
            break
        end;
k_lima(2:3,1)=0;k_lima(4:5,1:2)=0;k_lima(6:7,1:3)=0;k_lima(8:9,1:4)=0;

k_lima(10:11,1:5)=0;k_lima(12:22,1:6)=0;k_lima(17:22,7:8)=0;

k_lima(18:22,9)=0;k_lima(20:22,10)=0;k_lima(22,11)=0;k_lima(1,12:22)=0;

k_lima(2:3,13:22)=0;k_lima(4:5,14:22)=0;k_lima(6,15:22)=0;

k_lima(7:11,17:22)=0;k_lima(12:13,18:22)=0;k_lima(14:15,19:22)=0;

k_lima(16:17,20:22)=0;k_lima(18:19,21:22)=0;k_lima(20:21,22)=0;
```

```
Dk_lima=Dk_lima+(G_gab(baris,kolom).*k_lima(baris,kolom));

                                %sudut 135
                                  k_enam(baris,kolom)=K_gab(baris,kolom);
                               if k_enam(baris,kolom)==6
                                  k_enam(baris,kolom)=1;
                               else
                                  k_enam(baris,kolom)=0;
                               end;

        else
           S_cek=S_cek-1;
           Dk_gab_tiga_terbesar_akhir=S_cek;
        end;
        ukur=length(Dk_gab_tiga_terbesar_akhir);
        if ukur<=3
            Dk_gab_tiga_terbesar_akhir=Dk_gab_tiga_terbesar_akhir;
         elseif ukur>3
            Dk_gab_tiga_terbesar_akhir=Dk_gab_tiga_terbesar_akhir(1,(ukur-
2):ukur);
         end;

       [fg,hj]=size(Dk_gab_tiga_terbesar_akhir);
       if hj==1
         if  Dk_gab_tiga_terbesar_akhir==Dk_nol
         indeks(1,1)=0;
        elseif Dk_gab_tiga_terbesar_akhir==Dk_satu
         indeks(1,1)=1;
        elseif Dk_gab_tiga_terbesar_akhir==Dk_dua
         indeks(1,1)=2;
        elseif Dk_gab_tiga_terbesar_akhir==Dk_tiga
         indeks(1,1)=3;
        elseif Dk_gab_tiga_terbesar_akhir ==Dk_empat
         indeks(1,1)=4;
        elseif Dk_gab_tiga_terbesar_akhir ==Dk_lima
         indeks(1,1)=5;
        elseif Dk_gab_tiga_terbesar_akhir ==Dk_enam
         indeks(1,1)=6;
       elseif Dk_gab_tiga_terbesar_akhir ==Dk_tujuh
         indeks(1,1)=7;
       end;

   elseif hj==2
        for apa=1:2
       if  Dk_gab_tiga_terbesar_akhir(1,apa)==Dk_nol
```

```
        indeks(1,apa)=0;
    elseif Dk_gab_tiga_terbesar_akhir(1,apa)==Dk_satu
        indeks(1,apa)=1;
    elseif Dk_gab_tiga_terbesar_akhir(1,apa)==Dk_dua
        indeks(1,apa)=2;
    elseif Dk_gab_tiga_terbesar_akhir(1,apa)==Dk_tiga
        indeks(1,apa)=3;
    elseif Dk_gab_tiga_terbesar_akhir(1,apa)==Dk_empat
        indeks(1,apa)=4;
    elseif Dk_gab_tiga_terbesar_akhir(1,apa)==Dk_lima
        indeks(1,apa)=5;
    elseif Dk_gab_tiga_terbesar_akhir(1,apa)==Dk_enam
        indeks(1,apa)=6;
    elseif Dk_gab_tiga_terbesar_akhir(1,apa)==Dk_tujuh
        indeks(1,apa)=7;
    end;
   end;

elseif hj==3
         for sapa=1:3
       if  Dk_gab_tiga_terbesar_akhir(1,sapa)==Dk_nol
        indeks(1,sapa)=0;
    elseif Dk_gab_tiga_terbesar_akhir(1,sapa)==Dk_satu
        indeks(1,sapa)=1;
    elseif Dk_gab_tiga_terbesar_akhir(1,sapa)==Dk_dua
        indeks(1,sapa)=2;
    elseif Dk_gab_tiga_terbesar_akhir(1,sapa)==Dk_tiga
        indeks(1,sapa)=3;
    elseif Dk_gab_tiga_terbesar_akhir(1,sapa)==Dk_empat
        indeks(1,sapa)=4;
    elseif Dk_gab_tiga_terbesar_akhir(1,sapa)==Dk_lima
        indeks(1,sapa)=5;
    elseif Dk_gab_tiga_terbesar_akhir(1,sapa)==Dk_enam
        indeks(1,sapa)=6;
    elseif Dk_gab_tiga_terbesar_akhir(1,sapa)==Dk_tujuh
        indeks(1,sapa)=7;
    end;
    end;

end;%end if
[as,sa]=size(indeks)
if sa==2
    if indeks(1,1)==indeks(1,2)
        indeks=indeks(1,1);
    end;
 elseif sa==3
     if indeks(1,1)==indeks(1,2)&indeks(1,1)==indeks(1,3)
```

```
        indeks=indeks(1,1);
    elseif indeks(1,1)==indeks(1,3)
        indeks=[indeks(1,2) indeks(1,3)];
    elseif indeks(1,1)==indeks(1,2)
        indeks=[indeks(1,1) indeks(1,3)];
    elseif indeks(1,2)==indeks(1,3)
        indeks=[indeks(1,1) indeks(1,2)];
       end;
   end;
   %interpolasi dan image mixing
  [ef,gh]=size(indeks);
 matrix_interpolasi=[A{j-1,k-1} A{j-1,k} A{j-1,k+1};A{j,k-1} A{j,k}
A{j,k+1};A{j+1,k-1} A{j+1,k} A{j+1,k+1}];
switch gh
   case 1
     gbr_satu=interpolasi_1a;
     hasil_inter=gbr_satu;

for ab=9:16
   for cd=9:16
       M_tam(1,1)=gbr_satu(ab,cd);
       M_tam(1,2)=gbr_dua(ab,cd);
       if
gbr_dua(ab,cd)>(rata(ab,cd)+std(ab,cd))&gbr_satu(ab,cd)>(rata(ab,cd)+std(ab,cd)
)
           hasil_inter(ab,cd)=max(M_tam);
       elseif
gbr_satu(ab,cd)>(rata(ab,cd)+std(ab,cd))&gbr_dua(ab,cd)<=(rata(ab,cd)+std(ab,c
d))&...
              gbr_dua(ab,cd)>=(rata(ab,cd)-std(ab,cd))
           hasil_inter(ab,cd)=max(M_tam);
       elseif
gbr_satu(ab,cd)>(rata(ab,cd)+std(ab,cd))&gbr_dua(ab,cd)<(rata(ab,cd)-std(ab,cd))
           hasil_inter(ab,cd)=(gbr_satu(ab,cd)+gbr_dua(ab,cd))./2;
       elseif
gbr_satu(ab,cd)<=(rata(ab,cd)+std(ab,cd))&gbr_satu(ab,cd)>=(rata(ab,cd)-
std(ab,cd))&...
              gbr_dua(ab,cd)>(rata(ab,cd)+std(ab,cd))
           hasil_inter(ab,cd)=max(M_tam);
       elseif
gbr_satu(ab,cd)<=(rata(ab,cd)+std(ab,cd))&gbr_satu(ab,cd)>=(rata(ab,cd)-
std(ab,cd))&...

gbr_dua(ab,cd)<=(rata(ab,cd)+std(ab,cd))&gbr_dua(ab,cd)>=(rata(ab,cd)-
std(ab,cd))
           hasil_inter(ab,cd)=(gbr_satu(ab,cd)+gbr_dua(ab,cd))./2;
```

```
        elseif
gbr_satu(ab,cd)<=(rata(ab,cd)+std(ab,cd))&gbr_satu(ab,cd)>=(rata(ab,cd)-
std(ab,cd))&...
              gbr_dua(ab,cd)<(rata(ab,cd)-std(ab,cd))
             hasil_inter(ab,cd)=min(M_tam);
        elseif gbr_satu(ab,cd)<(rata(ab,cd)-
std(ab,cd))&gbr_dua(ab,cd)>(rata(ab,cd)+std(ab,cd))
              hasil_inter(ab,cd)=(gbr_satu(ab,cd)+gbr_dua(ab,cd))./2;
        elseif gbr_satu(ab,cd)<(rata(ab,cd)-
std(ab,cd))&gbr_dua(ab,cd)<=(rata(ab,cd)+std(ab,cd))&...
              gbr_dua(ab,cd)>=(rata(ab,cd)-std(ab,cd))
              hasil_inter(ab,cd)=min(M_tam);
         elseif gbr_satu(ab,cd)<(rata(ab,cd)-
std(ab,cd))&gbr_dua(ab,cd)<(rata(ab,cd)-std(ab,cd))
            hasil_inter(ab,cd)=min(M_tam);
         end;
 end;
 end;

         case 3
               case 2
     gbr_satu=interpolasi_1a;
     gbr_dua=interpolasi_2a;


     for aa=9:16
     for bb=9:16
        rata(aa,bb)=(gbr_satu(aa,bb)+gbr_dua(aa,bb))/2;
        std(aa,bb)=sqrt(((gbr_satu(aa,bb)-rata(aa,bb)).^2)+((gbr_dua(aa,bb)-
rata(aa,bb)).^2));
    end;
end;
M_tamp=[];

     gbr_satu=interpolasi_1a;

     gbr_dua=interpolasi_2a;

     gbr_tiga=interpolasi_3a;


     for cc=9:16
     for dd=9:16
        rata(cc,dd)=(gbr_satu(cc,dd)+gbr_dua(cc,dd)+gbr_tiga(cc,dd))./3;
        std(cc,dd)=sqrt((((gbr_satu(cc,dd)-rata(cc,dd)).^2)+((gbr_dua(cc,dd)-
rata(cc,dd)).^2)+...
            ((gbr_tiga(cc,dd)-rata(cc,dd)).^2))./2);
```

```
    end;
    end;
    M_tamp=[];
    for ee=9:16
    for ff=9:16
          M_tam(1,1)=gbr_satu(ee,ff);
          M_tam(1,2)=gbr_dua(ee,ff);
          M_tam(1,3)=gbr_tiga(ee,ff);
          if
gbr_tiga(ee,ff)>(rata(ee,ff)+std(ee,ff))&gbr_dua(ee,ff)>(rata(ee,ff)+std(ee,ff))&gb
r_satu(ee,ff)>(rata(ee,ff)+std(ee,ff))
         hasil_inter(ee,ff)=max(M_tam);

          elseif
gbr_tiga(ee,ff)>(rata(ee,ff)+std(ee,ff))&gbr_dua(ee,ff)>(rata(ee,ff)+std(ee,ff))&gb
r_satu(ee,ff)<=(rata(ee,ff)+std(ee,ff))&...
             gbr_satu(ee,ff)>=(rata(ee,ff)-
std(ee,ff))|gbr_tiga(ee,ff)>(rata(ee,ff)+std(ee,ff))&gbr_dua(ee,ff)<=(rata(ee,ff)+std
(ee,ff))&...
             gbr_dua(ee,ff)>=(rata(ee,ff)-
std(ee,ff))&gbr_satu(ee,ff)>(rata(ee,ff)+std(ee,ff))|gbr_tiga(ee,ff)<=(rata(ee,ff)+st
d(ee,ff))&...
             gbr_tiga(ee,ff)>=(rata(ee,ff)-
std(ee,ff))&gbr_dua(ee,ff)>(rata(ee,ff)+std(ee,ff))&gbr_satu(ee,ff)>(rata(ee,ff)+st
d(ee,ff))
         hasil_inter(ee,ff)=max(M_tam);

          elseif
gbr_tiga(ee,ff)>(rata(ee,ff)+std(ee,ff))&gbr_dua(ee,ff)>(rata(ee,ff)+std(ee,ff))&gb
r_satu(ee,ff)<(rata(ee,ff)-std(ee,ff))|...
             gbr_tiga(ee,ff)>(rata(ee,ff)+std(ee,ff))&gbr_dua(ee,ff)<(rata(ee,ff)-
std(ee,ff))&gbr_satu(ee,ff)>(rata(ee,ff)+std(ee,ff))|...
             gbr_tiga(ee,ff)<(rata(ee,ff)-
std(ee,ff))&gbr_dua(ee,ff)>(rata(ee,ff)+std(ee,ff))&gbr_satu(ee,ff)>(rata(ee,ff)+st
d(ee,ff))
         hasil_inter(ee,ff)=((gbr_satu(ee,ff)+gbr_dua(ee,ff)+gbr_tiga(ee,ff))./3);

          elseif
gbr_tiga(ee,ff)<=(rata(ee,ff)+std(ee,ff))&gbr_tiga(ee,ff)>=(rata(ee,ff)-
std(ee,ff))&gbr_dua(ee,ff)>(rata(ee,ff)+std(ee,ff))&...
            gbr_satu(ee,ff)<=(rata(ee,ff)+std(ee,ff))& gbr_satu(ee,ff)>=(rata(ee,ff)-
std(ee,ff))|gbr_tiga(ee,ff)<=(rata(ee,ff)+std(ee,ff))&...
            gbr_tiga(ee,ff)>=(rata(ee,ff)-
std(ee,ff))&gbr_dua(ee,ff)<=(rata(ee,ff)+std(ee,ff))&gbr_dua(ee,ff)>=(rata(ee,ff)-
std(ee,ff))&...
```

```
gbr_satu(ee,ff)>(rata(ee,ff)+std(ee,ff))|gbr_tiga(ee,ff)>(rata(ee,ff)+std(ee,ff))&gbr
_dua(ee,ff)<=(rata(ee,ff)+std(ee,ff))&...
            gbr_dua(ee,ff)>=(rata(ee,ff)-
std(ee,ff))&gbr_satu(ee,ff)<=(rata(ee,ff)+std(ee,ff))&
gbr_satu(ee,ff)>=(rata(ee,ff)-std(ee,ff))
          hasil_inter(ee,ff)=max(M_tam);

           elseif
gbr_tiga(ee,ff)<=(rata(ee,ff)+std(ee,ff))&gbr_tiga(ee,ff)>=(rata(ee,ff)-
std(ee,ff))&gbr_dua(ee,ff)<=(rata(ee,ff)+std(ee,ff))&...
            gbr_dua(ee,ff)>=(rata(ee,ff)-
std(ee,ff))&gbr_satu(ee,ff)<=(rata(ee,ff)+std(ee,ff))&gbr_satu(ee,ff)>=(rata(ee,ff)
-std(ee,ff))
            hasil_inter(ee,ff)=((gbr_satu(ee,ff)+gbr_dua(ee,ff)+gbr_tiga(ee,ff))./3);
            end;%end switch
 A{j,k}=hasil_inter(9:16,9:16);
 B=cell2mat(A);

              end;
           end;
        end;
 figure(1);
imshow(masukan_sehat),title('citra tanpa error');
figure(2);
x_input=uint8(x_input);

           elseif
gbr_tiga(ee,ff)<=(rata(ee,ff)+std(ee,ff))&gbr_tiga(ee,ff)>=(rata(ee,ff)-
std(ee,ff))&gbr_dua(ee,ff)<(rata(ee,ff)-std(ee,ff))&...
            gbr_satu(ee,ff)<=(rata(ee,ff)+std(ee,ff))&gbr_satu(ee,ff)>=(rata(ee,ff)-
std(ee,ff))|gbr_tiga(ee,ff)<=(rata(ee,ff)+std(ee,ff))&...
            gbr_tiga(ee,ff)>=(rata(ee,ff)-
std(ee,ff))&gbr_dua(ee,ff)<=(rata(ee,ff)+std(ee,ff))&gbr_dua(ee,ff)>=(rata(ee,ff)-
std(ee,ff))&...
            gbr_satu(ee,ff)<(rata(ee,ff)-std(ee,ff))|gbr_tiga(ee,ff)<(rata(ee,ff)-
std(ee,ff))&gbr_dua(ee,ff)<=(rata(ee,ff)+std(ee,ff))&...
            gbr_dua(ee,ff)>=(rata(ee,ff)-
std(ee,ff))&gbr_satu(ee,ff)<=(rata(ee,ff)+std(ee,ff))&gbr_satu(ee,ff)>=(rata(ee,ff)
-std(ee,ff))
          hasil_inter(ee,ff)=min(M_tam);

           elseif gbr_tiga(ee,ff)<(rata(ee,ff)-
std(ee,ff))&gbr_dua(ee,ff)>(rata(ee,ff)+std(ee,ff))&gbr_satu(ee,ff)<(rata(ee,ff)-
std(ee,ff))|...
            gbr_tiga(ee,ff)<(rata(ee,ff)-std(ee,ff))&gbr_dua(ee,ff)<(rata(ee,ff)-
std(ee,ff))&gbr_satu(ee,ff)>(rata(ee,ff)+std(ee,ff))|...
```

```
            gbr_tiga(ee,ff)>(rata(ee,ff)+std(ee,ff))&gbr_dua(ee,ff)<(rata(ee,ff)-
std(ee,ff))&gbr_satu(ee,ff)<(rata(ee,ff)-std(ee,ff))
            hasil_inter_2(ee,ff)=((gbr_satu(ee,ff)+gbr_dua(ee,ff)+gbr_tiga(ee,ff))./3);

          elseif gbr_tiga(ee,ff)<(rata(ee,ff)-
std(ee,ff))&gbr_dua(ee,ff)<=(rata(ee,ff)+std(ee,ff))&gbr_dua(ee,ff)>=(rata(ee,ff)-
std(ee,ff))&...
            gbr_satu(ee,ff)<(rata(ee,ff)-std(ee,ff))|gbr_tiga(ee,ff)<(rata(ee,ff)-
std(ee,ff))&gbr_dua(ee,ff)<(rata(ee,ff)-std(ee,ff))&...
            gbr_satu(ee,ff)<=(rata(ee,ff)+std(ee,ff))&gbr_satu(ee,ff)>=(rata(ee,ff)-
std(ee,ff))|gbr_tiga(ee,ff)<=(rata(ee,ff)+std(ee,ff))&...
            gbr_tiga(ee,ff)>=(rata(ee,ff)-std(ee,ff))&gbr_dua(ee,ff)<(rata(ee,ff)-
std(ee,ff))&gbr_satu(ee,ff)<(rata(ee,ff)-std(ee,ff))
          hasil_inter(ee,ff)=min(M_tam);

          elseif gbr_tiga(ee,ff)<(rata(ee,ff)-std(ee,ff))&gbr_satu(ee,ff)<(rata(ee,ff)-
std(ee,ff))&gbr_dua(ee,ff)<(rata(ee,ff)-std(ee,ff))
         hasil_inter(ee,ff)=min(M_tam);

          elseif
gbr_tiga(ee,ff)>(rata(ee,ff)+std(ee,ff))&gbr_dua(ee,ff)<=(rata(ee,ff)+std(ee,ff))&g
br_dua(ee,ff)>=(rata(ee,ff)-std(ee,ff))&...
            gbr_satu(ee,ff)<(rata(ee,ff)-
std(ee,ff))|gbr_tiga(ee,ff)>(rata(ee,ff)+std(ee,ff))&gbr_dua(ee,ff)<(rata(ee,ff)-
std(ee,ff))&...
            gbr_satu(ee,ff)<=(rata(ee,ff)+std(ee,ff))&gbr_satu(ee,ff)>=(rata(ee,ff)-
std(ee,ff))|gbr_tiga(ee,ff)<(rata(ee,ff)-std(ee,ff))&...
            gbr_dua(ee,ff)<=(rata(ee,ff)+std(ee,ff))&gbr_dua(ee,ff)>=(rata(ee,ff)-
std(ee,ff))&gbr_satu(ee,ff)>(rata(ee,ff)+std(ee,ff))|...
            gbr_tiga(ee,ff)<(rata(ee,ff)-
std(ee,ff))&gbr_dua(ee,ff)>(rata(ee,ff)+std(ee,ff))&gbr_satu(ee,ff)<=(rata(ee,ff)+s
td(ee,ff))&...
            gbr_satu(ee,ff)>=(rata(ee,ff)-
std(ee,ff))|gbr_tiga(ee,ff)<=(rata(ee,ff)+std(ee,ff))&gbr_tiga(ee,ff)>=(rata(ee,ff)-
std(ee,ff))&...
            gbr_dua(ee,ff)<(rata(ee,ff)-
std(ee,ff))&gbr_satu(ee,ff)>(rata(ee,ff)+std(ee,ff))|gbr_tiga(ee,ff)<=(rata(ee,ff)+st
d(ee,ff))&...
            gbr_tiga(ee,ff)>=(rata(ee,ff)-
std(ee,ff))&gbr_dua(ee,ff)>(rata(ee,ff)+std(ee,ff))&gbr_satu(ee,ff)<(rata(ee,ff)-
std(ee,ff))
          hasil_inter(ee,ff)=((gbr_satu(ee,ff)+gbr_dua(ee,ff)+gbr_tiga(ee,ff))./3);

        end;
    end;
end;
```

```
imshow(x_input),title('citra yang rusak');
figure(3);
x_hasil=uint8(B);
imshow(x_hasil),title('citra perbaikan');

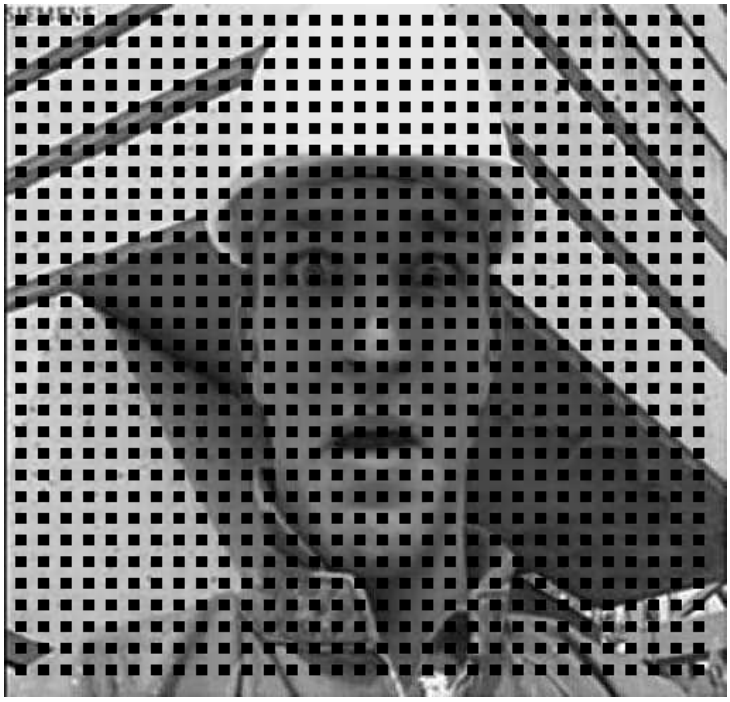
% ---------------------------------------------------
% Perhitungan SNR awal sebelum rekonstruksi
% ---------------------------------------------------
masukan_sehat=double(masukan_sehat);
masukan_sehat=reshape(masukan_sehat,1,bariss*kolomm);
% ---------------------------------------------------
% Perhitungan SNR akhir sesudah rekonstruksi
% ---------------------------------------------------
masukan_sehat=double(masukan_sehat);
sdh_rekonstruksi=reshape(B,1,bariss*kolomm);
MSE_rekonstruksi=sum((masukan_sehat-sdh_rekonstruksi).^2);
PSNR_rekonstruksi=10.*log10((255.^2)./(MSE_rekonstruksi/(bariss*kolomm)));
disp(['Nilai SNR akhir sesudah rekonstruksi = ',num2str(PSNR_rekonstruksi),'
dB']);
disp('                    ');
x_sakit=double(x_input);
x_sakit=reshape(x_sakit,1,bariss*kolomm);
MSE_sakit=sum((masukan_sehat-x_sakit).^2);
PSNR_sakit=10.*log10((255.^2)./(MSE_sakit/(bariss*kolomm)));
disp(['Nilai SNR awal sebelum rekonstruksi = ',num2str(PSNR_sakit),' dB']);
disp('                    ');

kenaikan_PSNR=PSNR_rekonstruksi-PSNR_sakit;
disp(['Perbaikan SNR sebesar ',num2str(kenaikan_PSNR),' dB']);
disp('                              ');

if PSNR_sakit <= PSNR_rekonstruksi
   disp('Rekonstruksi telah berhasil');
else
   disp('Rekonstruksi gagal');
end;
```

LAMPIRAN B

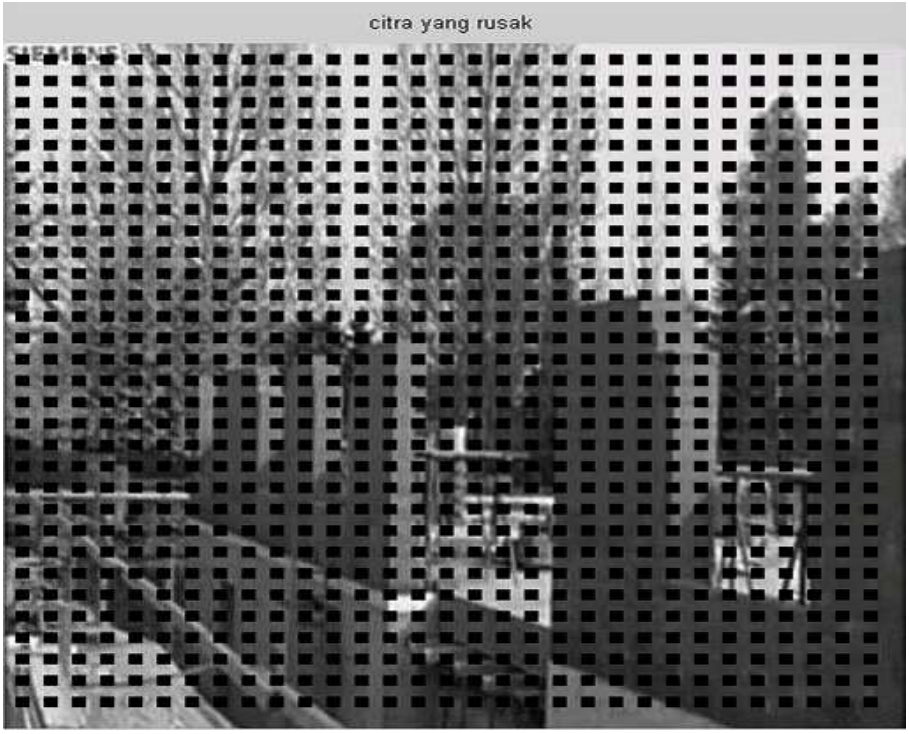
DATA CITRA



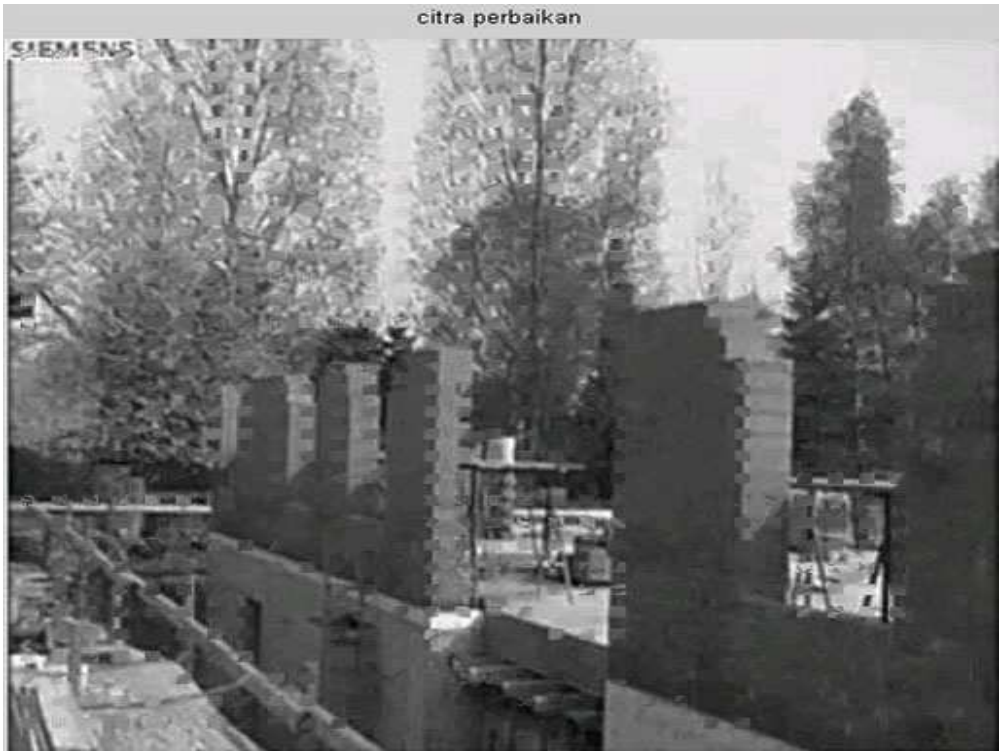
Gambar B.1 (a) citra rusak ’foreman.jpg (512 x 512)’

Gambar B.1 (b) citra hasil penyembunyian *error* ’foreman.jpg (512 x 512)’

Gambar B.2 (a) citra tanpa *error* ’taman.jpg (512 x 512 piksel)’

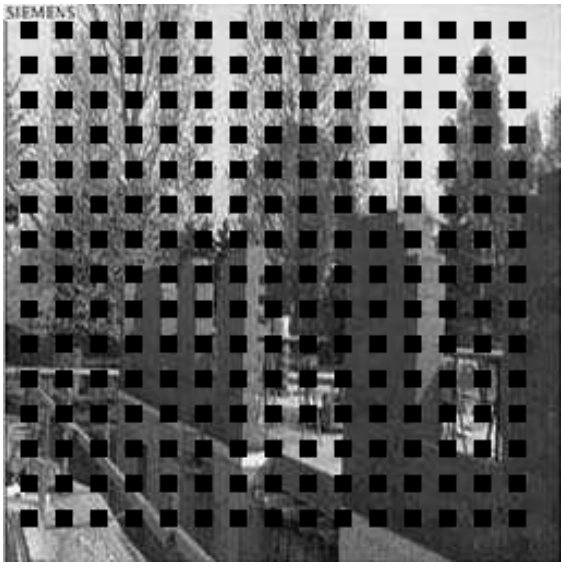


Gambar B.2 (b) citra yang rusak ’taman.jpg (512 x 512 piksel)’



Gambar B.2 (c) citra hasil perbaikan ’taman.jpg (512 x 512 piksel)’

Gambar B.2 (d)citra tanpa error ’taman.jpg(256 x 256 piksel)’



Gambar B.2 (e) citra rusak ’taman.jpg (256 x 256 piksel)’

Gambar B.2(f)citra hasil perbaikan ’taman.jpg(256 x 256 piksel)’

Gambar B.3 (a)citra tanpa error’lena.tif (512 x 512 piksel)’

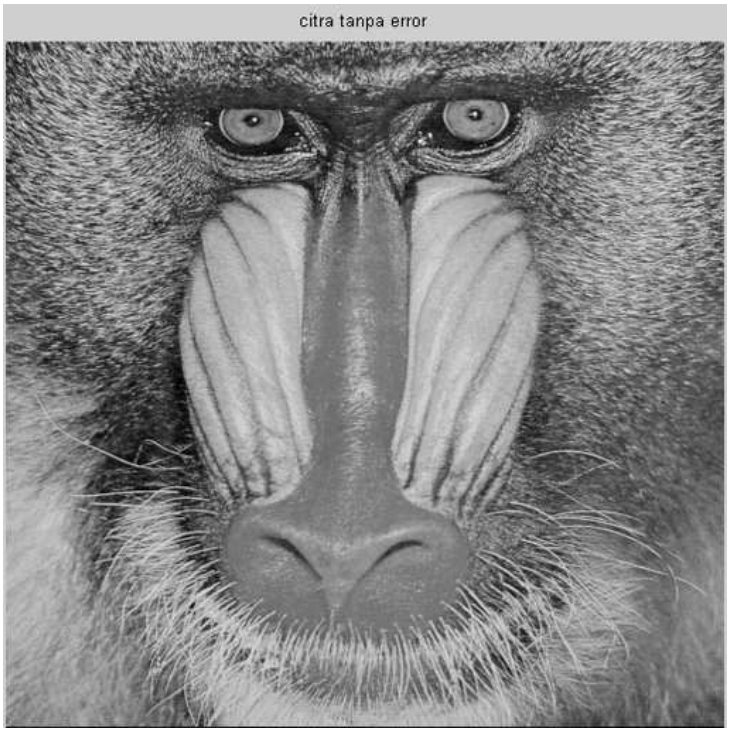
Gambar B.3 (b) citra rusak’lena.tif (512 x 512 piksel)’

Gambar B.3(c) citra hasil perbaikan'lena.tif (512 x 512 piksel)'

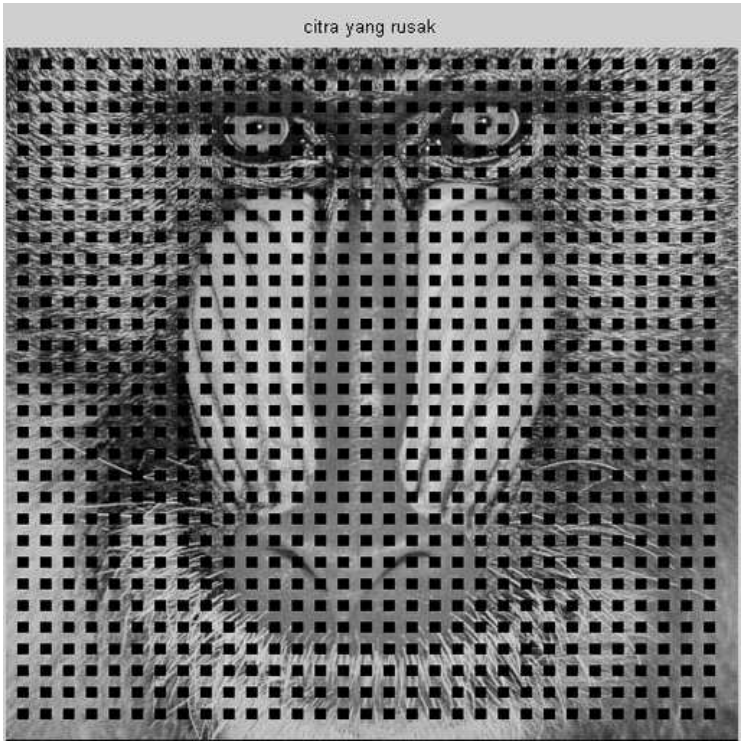
Gambar B.3 (d)citra tanpa error'lena.tif (256 x 256 piksel)'

Gambar B.3 (e) citra rusak’lena.tif (256 x 256 piksel)’

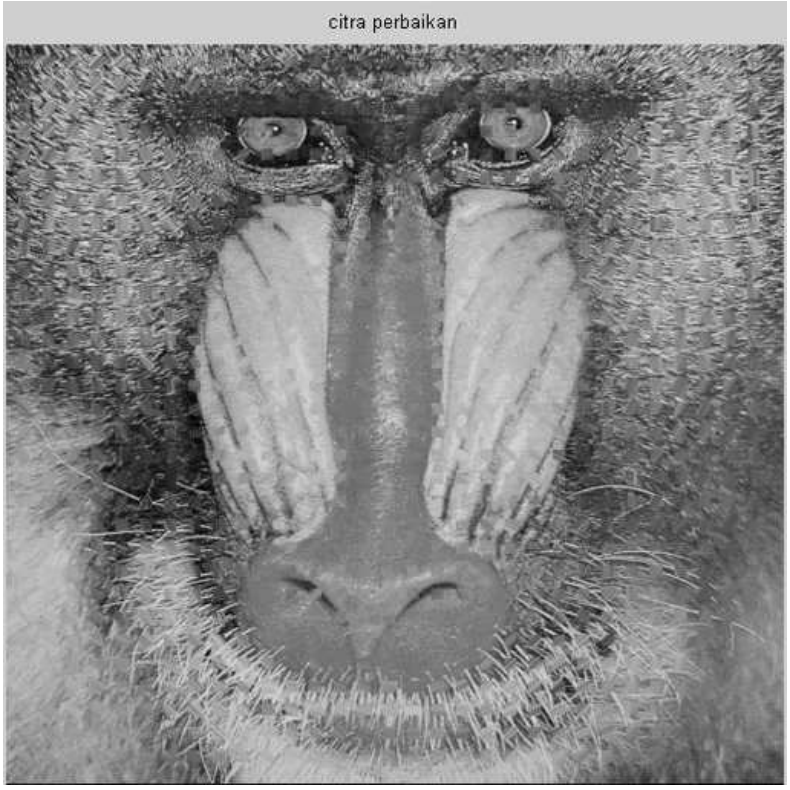
Gambar B.3(f) citra hasil perbaikan’lena.tif (256 x 256 piksel)’



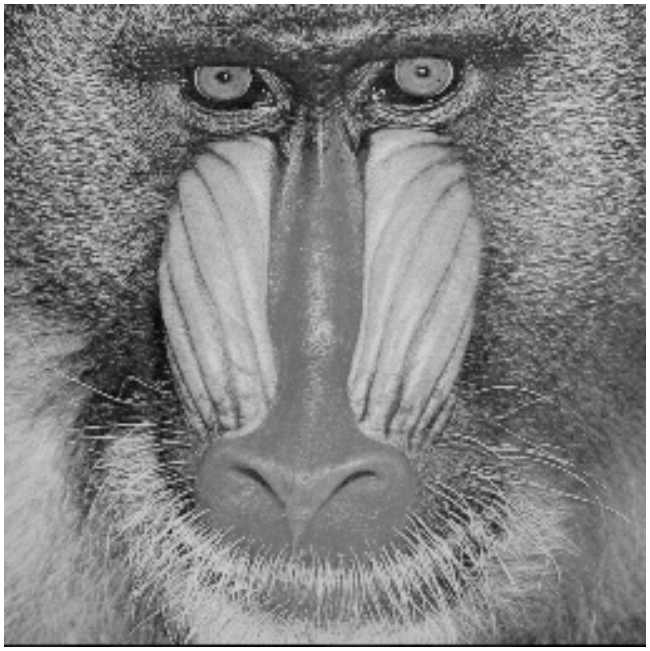
Gambar B.4 (a) citra tanpa *error* ’baboon.tif (512 x 512 piksel)’



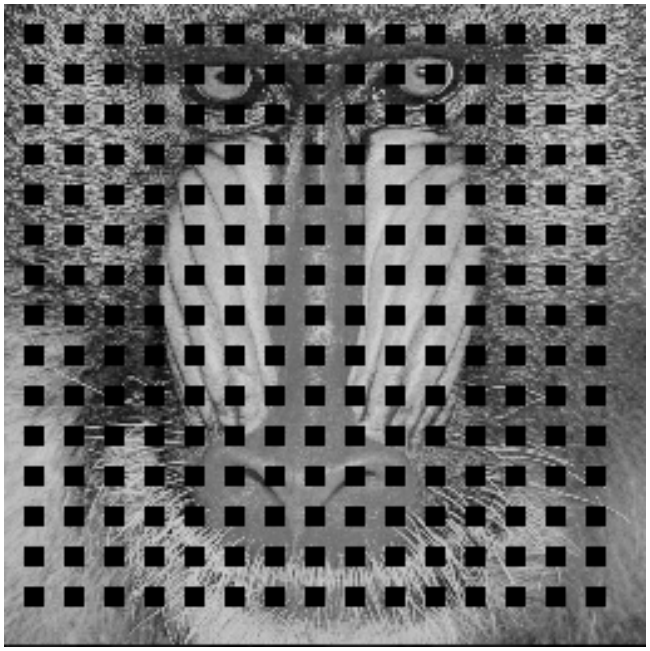
Gambar B.4 (b) citra rusak ’baboon.tif (512 x 512 piksel)’



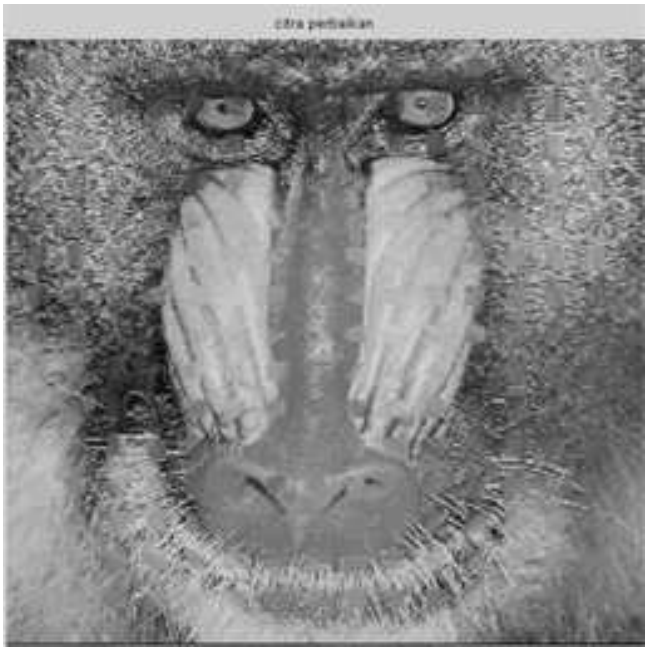
Gambar B.4 (c) citra hasil penyembunyian *error* ’baboon.tif (512 x 512 piksel)’



Gambar B.4 (d) citra tanpa *error* ’baboon.tif (256 x 256 piksel)’



Gambar B.4 (e) citra rusak ’baboon.tif (256 x 256 piksel)’



Gambar B.4 (f) citra hasil penyembunyian *error* ’baboon.tif (256 x 256 piksel)’