

**LAMPIRAN A**  
**PROGRAM MATLAB**

## PROGRAM Membaca Huruf Kapital

```

clc
clear all
close all

% PREPROSESING PROGRAM
A{1}=imread('marisca/A1marisca.bmp');
A{2}=imread('marisca/A2marisca.bmp');
A{3}=imread('marisca/A3marisca.bmp');
A{4}=imread('Ezer/A1Ezer.bmp');
A{5}=imread('Ezer/A2Ezer.bmp');
A{6}=imread('Ezer/A3Ezer.bmp');
A{7}=imread('Roy/A1Roy.bmp');
A{8}=imread('Roy/A2Roy.bmp');
A{9}=imread('Roy/A3Roy.bmp');
A{10}=imread('Edwin/A1Edwin.bmp');
A{11}=imread('Edwin/A2Edwin.bmp');
A{12}=imread('Edwin/A3Edwin.bmp');
A{13}=imread('Ryan/A1ryan.bmp');
A{14}=imread('Ryan/A2ryan.bmp');
A{15}=imread('Ryan/A3ryan.bmp');
for i1=1:15,
    ubahukuran{1,i1}=imresize(A{i1},[20 20]);
    ubahwarna{1,i1}=im2bw(ubahukuran{1,i1});
    ubahbentuk{1,i1}=ubahwarna{1,i1}';
    ubahbentuk{1,i1}=ubahbentuk{1,i1}(:);
    ubahbentuk{1,i1}=ubahbentuk{1,i1}';
end

B{1}=imread('marisca/B1marisca.bmp');
B{2}=imread('marisca/B2marisca.bmp');
B{3}=imread('marisca/B3marisca.bmp');
B{4}=imread('Ezer/B1Ezer.bmp');
B{5}=imread('Ezer/B2Ezer.bmp');
B{6}=imread('Ezer/B3Ezer.bmp');
B{7}=imread('Roy/B1Roy.bmp');
B{8}=imread('Roy/B2Roy.bmp');
B{9}=imread('Roy/B3Roy.bmp');
B{10}=imread('Edwin/B1Edwin.bmp');
B{11}=imread('Edwin/B2Edwin.bmp');
B{12}=imread('Edwin/B3Edwin.bmp');
B{13}=imread('Ryan/B1ryan.bmp');
B{14}=imread('Ryan/B2ryan.bmp');
B{15}=imread('Ryan/B3ryan.bmp');
for i2=1:15,
    ubahukuran{2,i2}=imresize(B{i2},[20 20]);
    ubahwarna{2,i2}=im2bw(ubahukuran{2,i2});
    ubahbentuk{2,i2}=ubahwarna{2,i2}';
    ubahbentuk{2,i2}=ubahbentuk{2,i2}(:);
    ubahbentuk{2,i2}=ubahbentuk{2,i2}';
end

C{1}=imread('marisca/C1marisca.bmp');
C{2}=imread('marisca/C2marisca.bmp');
C{3}=imread('marisca/C3marisca.bmp');
C{4}=imread('Ezer/C1Ezer.bmp');
C{5}=imread('Ezer/C2Ezer.bmp');
C{6}=imread('Ezer/C3Ezer.bmp');
C{7}=imread('Roy/C1Roy.bmp');
C{8}=imread('Roy/C2Roy.bmp');
C{9}=imread('Roy/C3Roy.bmp');
C{10}=imread('Edwin/C1Edwin.bmp');
C{11}=imread('Edwin/C2Edwin.bmp');
C{12}=imread('Edwin/C3Edwin.bmp');
C{13}=imread('Ryan/C1ryan.bmp');
C{14}=imread('Ryan/C2ryan.bmp');
C{15}=imread('Ryan/C3ryan.bmp');
for i3=1:15,
    ubahukuran{3,i3}=imresize(C{i3},[20 20]);
    ubahwarna{3,i3}=im2bw(ubahukuran{3,i3});
    ubahbentuk{3,i3}=ubahwarna{3,i3}';
    ubahbentuk{3,i3}=ubahbentuk{3,i3}(:);
    ubahbentuk{3,i3}=ubahbentuk{3,i3}';
end

D{1}=imread('marisca/D1marisca.bmp');
D{2}=imread('marisca/D2marisca.bmp');
D{3}=imread('marisca/D3marisca.bmp');
D{4}=imread('Ezer/D1Ezer.bmp');
D{5}=imread('Ezer/D2Ezer.bmp');
D{6}=imread('Ezer/D3Ezer.bmp');
D{7}=imread('Roy/D1Roy.bmp');
D{8}=imread('Roy/D2Roy.bmp');
D{9}=imread('Roy/D3Roy.bmp');
D{10}=imread('Edwin/D1Edwin.bmp');
D{11}=imread('Edwin/D2Edwin.bmp');
D{12}=imread('Edwin/D3Edwin.bmp');
D{13}=imread('Ryan/D1ryan.bmp');
D{14}=imread('Ryan/D2ryan.bmp');
D{15}=imread('Ryan/D3ryan.bmp');
for i4=1:15,
    ubahukuran{4,i4}=imresize(D{i4},[20 20]);
    ubahwarna{4,i4}=im2bw(ubahukuran{4,i4});
    ubahbentuk{4,i4}=ubahwarna{4,i4}';
    ubahbentuk{4,i4}=ubahbentuk{4,i4}(:);
    ubahbentuk{4,i4}=ubahbentuk{4,i4}';
end

E{1}=imread('marisca/E1marisca.bmp');
E{2}=imread('marisca/E2marisca.bmp');
E{3}=imread('marisca/E3marisca.bmp');
E{4}=imread('Ezer/E1Ezer.bmp');

```

```

E{5}=imread('Ezer/E2Ezer.bmp');
E{6}=imread('Ezer/E3Ezer.bmp');
E{7}=imread('Roy/E1Roy.bmp');
E{8}=imread('Roy/E2Roy.bmp');
E{9}=imread('Roy/E3Roy.bmp');
E{10}=imread('Edwin/E1Edwin.bmp');
E{11}=imread('Edwin/E2Edwin.bmp');
E{12}=imread('Edwin/E3Edwin.bmp');
E{13}=imread('Ryan/E1ryan.bmp');
E{14}=imread('Ryan/E2ryan.bmp');
E{15}=imread('Ryan/E3ryan.bmp');
for i5=1:15,
    ubahukuran{5,i5}=imresize(E{i5},[20 20]);
    ubahwarna{5,i5}=im2bw(ubahukuran{5,i5});
    ubahbentuk{5,i5}=ubahwarna{5,i5}';
    ubahbentuk{5,i5}=ubahbentuk{5,i5}(:);
    ubahbentuk{5,i5}=ubahbentuk{5,i5}';
end
F{1}=imread('marisca/F1marisca.bmp');
F{2}=imread('marisca/F2marisca.bmp');
F{3}=imread('marisca/F3marisca.bmp');
F{4}=imread('Ezer/F1Ezer.bmp');
F{5}=imread('Ezer/F2Ezer.bmp');
F{6}=imread('Ezer/F3Ezer.bmp');
F{7}=imread('Roy/F1Roy.bmp');
F{8}=imread('Roy/F2Roy.bmp');
F{9}=imread('Roy/F3Roy.bmp');
F{10}=imread('Edwin/F1Edwin.bmp');
F{11}=imread('Edwin/F2Edwin.bmp');
F{12}=imread('Edwin/F3Edwin.bmp');
F{13}=imread('Ryan/F1ryan.bmp');
F{14}=imread('Ryan/F2ryan.bmp');
F{15}=imread('Ryan/F3ryan.bmp');
for i6=1:15,
    ubahukuran{6,i6}=imresize(F{i6},[20 20]);
    ubahwarna{6,i6}=im2bw(ubahukuran{6,i6});
    ubahbentuk{6,i6}=ubahwarna{6,i6}';
    ubahbentuk{6,i6}=ubahbentuk{6,i6}(:);
    ubahbentuk{6,i6}=ubahbentuk{6,i6}';
end
G{1}=imread('marisca/G1marisca.bmp');
G{2}=imread('marisca/G2marisca.bmp');
G{3}=imread('marisca/G3marisca.bmp');
G{4}=imread('Ezer/G1Ezer.bmp');
G{5}=imread('Ezer/G2Ezer.bmp');
G{6}=imread('Ezer/G3Ezer.bmp');
G{7}=imread('Roy/G1Roy.bmp');
G{8}=imread('Roy/G2Roy.bmp');
G{9}=imread('Roy/G3Roy.bmp');
G{10}=imread('Edwin/G1Edwin.bmp');
G{11}=imread('Edwin/G2Edwin.bmp');
G{12}=imread('Edwin/G3Edwin.bmp');
G{13}=imread('Ryan/G1ryan.bmp');
G{14}=imread('Ryan/G2ryan.bmp');
G{15}=imread('Ryan/G3ryan.bmp');

for i7=1:15,
    ubahukuran{7,i7}=imresize(G{i7},[20 20]);
    ubahwarna{7,i7}=im2bw(ubahukuran{7,i7});
    ubahbentuk{7,i7}=ubahwarna{7,i7}';
    ubahbentuk{7,i7}=ubahbentuk{7,i7}(:);
    ubahbentuk{7,i7}=ubahbentuk{7,i7}';
end
H{1}=imread('marisca/H1marisca.bmp');
H{2}=imread('marisca/H2marisca.bmp');
H{3}=imread('marisca/H3marisca.bmp');
H{4}=imread('Ezer/H1Ezer.bmp');
H{5}=imread('Ezer/H2Ezer.bmp');
H{6}=imread('Ezer/H3Ezer.bmp');
H{7}=imread('Roy/H1Roy.bmp');
H{8}=imread('Roy/H2Roy.bmp');
H{9}=imread('Roy/H3Roy.bmp');
H{10}=imread('Edwin/H1Edwin.bmp');
H{11}=imread('Edwin/H2Edwin.bmp');
H{12}=imread('Edwin/H3Edwin.bmp');
H{13}=imread('Ryan/H1ryan.bmp');
H{14}=imread('Ryan/H2ryan.bmp');
H{15}=imread('Ryan/H3ryan.bmp');
for i8=1:15,
    ubahukuran{8,i8}=imresize(H{i8},[20 20]);
    ubahwarna{8,i8}=im2bw(ubahukuran{8,i8});
    ubahbentuk{8,i8}=ubahwarna{8,i8}';
    ubahbentuk{8,i8}=ubahbentuk{8,i8}(:);
    ubahbentuk{8,i8}=ubahbentuk{8,i8}';
end
I{1}=imread('marisca/I1marisca.bmp');
I{2}=imread('marisca/I2marisca.bmp');
I{3}=imread('marisca/I3marisca.bmp');
I{4}=imread('Ezer/I1Ezer.bmp');
I{5}=imread('Ezer/I2Ezer.bmp');
I{6}=imread('Ezer/I3Ezer.bmp');
I{7}=imread('Roy/I1Roy.bmp');
I{8}=imread('Roy/I2Roy.bmp');
I{9}=imread('Roy/I3Roy.bmp');
I{10}=imread('Edwin/I1Edwin.bmp');
I{11}=imread('Edwin/I2Edwin.bmp');
I{12}=imread('Edwin/I3Edwin.bmp');
I{13}=imread('Ryan/A1ryan.bmp');
I{14}=imread('Ryan/I2ryan.bmp');
I{15}=imread('Ryan/I3ryan.bmp');
for i9=1:15,
    ubahukuran{9,i9}=imresize(I{i9},[20 20]);
    ubahwarna{9,i9}=im2bw(ubahukuran{9,i9});
    ubahbentuk{9,i9}=ubahwarna{9,i9}';
    ubahbentuk{9,i9}=ubahbentuk{9,i9}(:);
    ubahbentuk{9,i9}=ubahbentuk{9,i9}';
end
J{1}=imread('marisca/J1marisca.bmp');
J{2}=imread('marisca/J2marisca.bmp');
J{3}=imread('marisca/J3marisca.bmp');
J{4}=imread('Ezer/J1Ezer.bmp');

```

```

J{5}=imread('Ezer/J2Ezer.bmp');
J{6}=imread('Ezer/J3Ezer.bmp');
J{7}=imread('Roy/J1Roy.bmp');
J{8}=imread('Roy/J2Roy.bmp');
J{9}=imread('Roy/J3Roy.bmp');
J{10}=imread('Edwin/J1Edwin.bmp');
J{11}=imread('Edwin/J2Edwin.bmp');
J{12}=imread('Edwin/J3Edwin.bmp');
J{13}=imread('Ryan/J1ryan.bmp');
J{14}=imread('Ryan/J2ryan.bmp');
J{15}=imread('Ryan/J3ryan.bmp');
for i10=1:15,
    ubahukuran{10,i10}=imresize(J{i10},[20 20]);
    ubahwarna{10,i10}=im2bw(ubahukuran{10,i10});
    ubahbentuk{10,i10}=ubahwarna{10,i10}';
    ubahbentuk{10,i10}=ubahbentuk{10,i10}(:);
    ubahbentuk{10,i10}=ubahbentuk{10,i10}';
end
K{1}=imread('marisca/K1marisca.bmp');
K{2}=imread('marisca/K2marisca.bmp');
K{3}=imread('marisca/K3marisca.bmp');
K{4}=imread('Ezer/K1Ezer.bmp');
K{5}=imread('Ezer/K2Ezer.bmp');
K{6}=imread('Ezer/K3Ezer.bmp');
K{7}=imread('Roy/K1Roy.bmp');
K{8}=imread('Roy/K2Roy.bmp');
K{9}=imread('Roy/K3Roy.bmp');
K{10}=imread('Edwin/K1Edwin.bmp');
K{11}=imread('Edwin/K2Edwin.bmp');
K{12}=imread('Edwin/K3Edwin.bmp');
K{13}=imread('Ryan/K1ryan.bmp');
K{14}=imread('Ryan/K2ryan.bmp');
K{15}=imread('Ryan/K3ryan.bmp');
for i11=1:15,
    ubahukuran{11,i11}=imresize(K{i11},[20 20]);
    ubahwarna{11,i11}=im2bw(ubahukuran{11,i11});
    ubahbentuk{11,i11}=ubahwarna{11,i11}';
    ubahbentuk{11,i11}=ubahbentuk{11,i11}(:);
    ubahbentuk{11,i11}=ubahbentuk{11,i11}';
end
L{1}=imread('marisca/L1marisca.bmp');
L{2}=imread('marisca/L2marisca.bmp');
L{3}=imread('marisca/L3marisca.bmp');
L{4}=imread('Ezer/L1Ezer.bmp');
L{5}=imread('Ezer/L2Ezer.bmp');
L{6}=imread('Ezer/L3Ezer.bmp');
L{7}=imread('Roy/L1Roy.bmp');
L{8}=imread('Roy/L2Roy.bmp');
L{9}=imread('Roy/L3Roy.bmp');
L{10}=imread('Edwin/L1Edwin.bmp');
L{11}=imread('Edwin/L2Edwin.bmp');
L{12}=imread('Edwin/L3Edwin.bmp');
L{13}=imread('Ryan/L1ryan.bmp');
L{14}=imread('Ryan/L2ryan.bmp');
L{15}=imread('Ryan/L3ryan.bmp');

for i12=1:15,
    ubahukuran{12,i12}=imresize(L{i12},[20 20]);
    ubahwarna{12,i12}=im2bw(ubahukuran{12,i12});
    ubahbentuk{12,i12}=ubahwarna{12,i12}';
    ubahbentuk{12,i12}=ubahbentuk{12,i12}(:);
    ubahbentuk{12,i12}=ubahbentuk{12,i12}';
end
M{1}=imread('marisca/M1marisca.bmp');
M{2}=imread('marisca/M2marisca.bmp');
M{3}=imread('marisca/M3marisca.bmp');
M{4}=imread('Ezer/M1Ezer.bmp');
M{5}=imread('Ezer/M2Ezer.bmp');
M{6}=imread('Ezer/M3Ezer.bmp');
M{7}=imread('Roy/M1Roy.bmp');
M{8}=imread('Roy/M2Roy.bmp');
M{9}=imread('Roy/M3Roy.bmp');
M{10}=imread('Edwin/M1Edwin.bmp');
M{11}=imread('Edwin/M2Edwin.bmp');
M{12}=imread('Edwin/M3Edwin.bmp');
M{13}=imread('Ryan/M1ryan.bmp');
M{14}=imread('Ryan/M2ryan.bmp');
M{15}=imread('Ryan/M3ryan.bmp');
for i13=1:15,
    ubahukuran{13,i13}=imresize(M{i13},[20 20]);
    ubahwarna{13,i13}=im2bw(ubahukuran{13,i13});
    ubahbentuk{13,i13}=ubahwarna{13,i13}';
    ubahbentuk{13,i13}=ubahbentuk{13,i13}(:);
    ubahbentuk{13,i13}=ubahbentuk{13,i13}';
end
N{1}=imread('marisca/N1marisca.bmp');
N{2}=imread('marisca/N2marisca.bmp');
N{3}=imread('marisca/N3marisca.bmp');
N{4}=imread('Ezer/N1Ezer.bmp');
N{5}=imread('Ezer/N2Ezer.bmp');
N{6}=imread('Ezer/N3Ezer.bmp');
N{7}=imread('Roy/N1Roy.bmp');
N{8}=imread('Roy/N2Roy.bmp');
N{9}=imread('Roy/N3Roy.bmp');
N{10}=imread('Edwin/N1Edwin.bmp');
N{11}=imread('Edwin/N2Edwin.bmp');
N{12}=imread('Edwin/N3Edwin.bmp');
N{13}=imread('Ryan/N1ryan.bmp');
N{14}=imread('Ryan/N2ryan.bmp');
N{15}=imread('Ryan/N3ryan.bmp');
for i14=1:15,
    ubahukuran{14,i14}=imresize(N{i14},[20 20]);
    ubahwarna{14,i14}=im2bw(ubahukuran{14,i14});
    ubahbentuk{14,i14}=ubahwarna{14,i14}';
    ubahbentuk{14,i14}=ubahbentuk{14,i14}(:);
    ubahbentuk{14,i14}=ubahbentuk{14,i14}';
end
O{1}=imread('marisca/O1marisca.bmp');
O{2}=imread('marisca/O2marisca.bmp');
O{3}=imread('marisca/O3marisca.bmp');
O{4}=imread('Ezer/O1Ezer.bmp');

```

```

O{5}=imread('Ezer/O2Ezer.bmp');
O{6}=imread('Ezer/O3Ezer.bmp');
O{7}=imread('Roy/O1Roy.bmp');
O{8}=imread('Roy/O2Roy.bmp');
O{9}=imread('Roy/O3Roy.bmp');
O{10}=imread('Edwin/O1Edwin.bmp');
O{11}=imread('Edwin/O2Edwin.bmp');
O{12}=imread('Edwin/O3Edwin.bmp');
O{13}=imread('Ryan/O1ryan.bmp');
O{14}=imread('Ryan/O2ryan.bmp');
O{15}=imread('Ryan/O3ryan.bmp');
for i15=1:15,
    ubahukuran{15,i15}=imresize(O{i15},[20 20]);
    ubahwarna{15,i15}=im2bw(ubahukuran{15,i15});
    ubahbentuk{15,i15}=ubahwarna{15,i15}';
    ubahbentuk{15,i15}=ubahbentuk{15,i15}(:);
    ubahbentuk{15,i15}=ubahbentuk{15,i15}';
end
P{1}=imread('marisca/P1marisca.bmp');
P{2}=imread('marisca/P2marisca.bmp');
P{3}=imread('marisca/P3marisca.bmp');
P{4}=imread('Ezer/P1Ezer.bmp');
P{5}=imread('Ezer/P2Ezer.bmp');
P{6}=imread('Ezer/P3Ezer.bmp');
P{7}=imread('Roy/P1Roy.bmp');
P{8}=imread('Roy/P2Roy.bmp');
P{9}=imread('Roy/P3Roy.bmp');
P{10}=imread('Edwin/P1Edwin.bmp');
P{11}=imread('Edwin/P2Edwin.bmp');
P{12}=imread('Edwin/P3Edwin.bmp');
P{13}=imread('Ryan/P1ryan.bmp');
P{14}=imread('Ryan/P2ryan.bmp');
P{15}=imread('Ryan/P3ryan.bmp');
for i16=1:15,
    ubahukuran{16,i16}=imresize(P{i16},[20 20]);
    ubahwarna{16,i16}=im2bw(ubahukuran{16,i16});
    ubahbentuk{16,i16}=ubahwarna{16,i16}';
    ubahbentuk{16,i16}=ubahbentuk{16,i16}(:);
    ubahbentuk{16,i16}=ubahbentuk{16,i16}';
end
Q{1}=imread('marisca/Q1marisca.bmp');
Q{2}=imread('marisca/Q2marisca.bmp');
Q{3}=imread('marisca/Q3marisca.bmp');
Q{4}=imread('Ezer/Q1Ezer.bmp');
Q{5}=imread('Ezer/Q2Ezer.bmp');
Q{6}=imread('Ezer/Q3Ezer.bmp');
Q{7}=imread('Roy/Q1Roy.bmp');
Q{8}=imread('Roy/Q2Roy.bmp');
Q{9}=imread('Roy/Q3Roy.bmp');
Q{10}=imread('Edwin/Q1Edwin.bmp');
Q{11}=imread('Edwin/Q2Edwin.bmp');
Q{12}=imread('Edwin/Q3Edwin.bmp');
Q{13}=imread('Ryan/Q1ryan.bmp');
Q{14}=imread('Ryan/Q2ryan.bmp');
Q{15}=imread('Ryan/Q3ryan.bmp');

for i17=1:15,
    ubahukuran{17,i17}=imresize(Q{i17},[20 20]);
    ubahwarna{17,i17}=im2bw(ubahukuran{17,i17});
    ubahbentuk{17,i17}=ubahwarna{17,i17}';
    ubahbentuk{17,i17}=ubahbentuk{17,i17}(:);
    ubahbentuk{17,i17}=ubahbentuk{17,i17}';
end
R{1}=imread('marisca/R1marisca.bmp');
R{2}=imread('marisca/R2marisca.bmp');
R{3}=imread('marisca/R3marisca.bmp');
R{4}=imread('Ezer/R1Ezer.bmp');
R{5}=imread('Ezer/R2Ezer.bmp');
R{6}=imread('Ezer/R3Ezer.bmp');
R{7}=imread('Roy/R1Roy.bmp');
R{8}=imread('Roy/R2Roy.bmp');
R{9}=imread('Roy/R3Roy.bmp');
R{10}=imread('Edwin/R1Edwin.bmp');
R{11}=imread('Edwin/R2Edwin.bmp');
R{12}=imread('Edwin/R3Edwin.bmp');
R{13}=imread('Ryan/R1ryan.bmp');
R{14}=imread('Ryan/R2ryan.bmp');
R{15}=imread('Ryan/R3ryan.bmp');
for i18=1:15,
    ubahukuran{18,i18}=imresize(R{i18},[20 20]);
    ubahwarna{18,i18}=im2bw(ubahukuran{18,i18});
    ubahbentuk{18,i18}=ubahwarna{18,i18}';
    ubahbentuk{18,i18}=ubahbentuk{18,i18}(:);
    ubahbentuk{18,i18}=ubahbentuk{18,i18}';
end
S{1}=imread('marisca/S1marisca.bmp');
S{2}=imread('marisca/S2marisca.bmp');
S{3}=imread('marisca/S3marisca.bmp');
S{4}=imread('Ezer/S1Ezer.bmp');
S{5}=imread('Ezer/S2Ezer.bmp');
S{6}=imread('Ezer/S3Ezer.bmp');
S{7}=imread('Roy/S1Roy.bmp');
S{8}=imread('Roy/S2Roy.bmp');
S{9}=imread('Roy/S3Roy.bmp');
S{10}=imread('Edwin/S1Edwin.bmp');
S{11}=imread('Edwin/S2Edwin.bmp');
S{12}=imread('Edwin/S3Edwin.bmp');
S{13}=imread('Ryan/S1ryan.bmp');
S{14}=imread('Ryan/S2ryan.bmp');
S{15}=imread('Ryan/S3ryan.bmp');
for i19=1:15,
    ubahukuran{19,i19}=imresize(S{i19},[20 20]);
    ubahwarna{19,i19}=im2bw(ubahukuran{19,i19});
    ubahbentuk{19,i19}=ubahwarna{19,i19}';
    ubahbentuk{19,i19}=ubahbentuk{19,i19}(:);
    ubahbentuk{19,i19}=ubahbentuk{19,i19}';
end
T{1}=imread('marisca/T1marisca.bmp');
T{2}=imread('marisca/T2marisca.bmp');
T{3}=imread('marisca/T3marisca.bmp');
T{4}=imread('Ezer/T1Ezer.bmp');

```

```

T{5}=imread('Ezer/T2Ezer.bmp');
T{6}=imread('Ezer/T3Ezer.bmp');
T{7}=imread('Roy/T1Roy.bmp');
T{8}=imread('Roy/T2Roy.bmp');
T{9}=imread('Roy/T3Roy.bmp');
T{10}=imread('Edwin/T1Edwin.bmp');
T{11}=imread('Edwin/T2Edwin.bmp');
T{12}=imread('Edwin/T3Edwin.bmp');
T{13}=imread('Ryan/T1ryan.bmp');
T{14}=imread('Ryan/T2ryan.bmp');
T{15}=imread('Ryan/T3ryan.bmp');
for i20=1:15,
    ubahukuran{20,i20}=imresize(T{i20},[20 20]);
    ubahwarna{20,i20}=im2bw(ubahukuran{20,i20});
    ubahbentuk{20,i20}=ubahwarna{20,i20}';
    ubahbentuk{20,i20}=ubahbentuk{20,i20}(:);
    ubahbentuk{20,i20}=ubahbentuk{20,i20}';
end
U{1}=imread('marisca/U1marisca.bmp');
U{2}=imread('marisca/U2marisca.bmp');
U{3}=imread('marisca/U3marisca.bmp');
U{4}=imread('Ezer/U1Ezer.bmp');
U{5}=imread('Ezer/U2Ezer.bmp');
U{6}=imread('Ezer/U3Ezer.bmp');
U{7}=imread('Roy/U1Roy.bmp');
U{8}=imread('Roy/U2Roy.bmp');
U{9}=imread('Roy/U3Roy.bmp');
U{10}=imread('Edwin/U1Edwin.bmp');
U{11}=imread('Edwin/U2Edwin.bmp');
U{12}=imread('Edwin/U3Edwin.bmp');
U{13}=imread('Ryan/U1ryan.bmp');
U{14}=imread('Ryan/U2ryan.bmp');
U{15}=imread('Ryan/U3ryan.bmp');
for i21=1:15,
    ubahukuran{21,i21}=imresize(U{i21},[20 20]);
    ubahwarna{21,i21}=im2bw(ubahukuran{21,i21});
    ubahbentuk{21,i21}=ubahwarna{21,i21}';
    ubahbentuk{21,i21}=ubahbentuk{21,i21}(:);
    ubahbentuk{21,i21}=ubahbentuk{21,i21}';
end
V{1}=imread('marisca/V1marisca.bmp');
V{2}=imread('marisca/V2marisca.bmp');
V{3}=imread('marisca/V3marisca.bmp');
V{4}=imread('Ezer/V1Ezer.bmp');
V{5}=imread('Ezer/V2Ezer.bmp');
V{6}=imread('Ezer/V3Ezer.bmp');
V{7}=imread('Roy/V1Roy.bmp');
V{8}=imread('Roy/V2Roy.bmp');
V{9}=imread('Roy/V3Roy.bmp');
V{10}=imread('Edwin/V1Edwin.bmp');
V{11}=imread('Edwin/V2Edwin.bmp');
V{12}=imread('Edwin/V3Edwin.bmp');
V{13}=imread('Ryan/V1ryan.bmp');
V{14}=imread('Ryan/V2ryan.bmp');
V{15}=imread('Ryan/V3ryan.bmp');

for i22=1:15,
    ubahukuran{22,i22}=imresize(V{i22},[20 20]);
    ubahwarna{22,i22}=im2bw(ubahukuran{22,i22});
    ubahbentuk{22,i22}=ubahwarna{22,i22}';
    ubahbentuk{22,i22}=ubahbentuk{22,i22}(:);
    ubahbentuk{22,i22}=ubahbentuk{22,i22}';
end
W{1}=imread('marisca/W1marisca.bmp');
W{2}=imread('marisca/W2marisca.bmp');
W{3}=imread('marisca/W3marisca.bmp');
W{4}=imread('Ezer/W1Ezer.bmp');
W{5}=imread('Ezer/W2Ezer.bmp');
W{6}=imread('Ezer/W3Ezer.bmp');
W{7}=imread('Roy/W1Roy.bmp');
W{8}=imread('Roy/W2Roy.bmp');
W{9}=imread('Roy/W3Roy.bmp');
W{10}=imread('Edwin/W1Edwin.bmp');
W{11}=imread('Edwin/W2Edwin.bmp');
W{12}=imread('Edwin/W3Edwin.bmp');
W{13}=imread('Ryan/W1ryan.bmp');
W{14}=imread('Ryan/W2ryan.bmp');
W{15}=imread('Ryan/W3ryan.bmp');
for i23=1:15,
    ubahukuran{23,i23}=imresize(W{i23},[20 20]);
    ubahwarna{23,i23}=im2bw(ubahukuran{23,i23});
    ubahbentuk{23,i23}=ubahwarna{23,i23}';
    ubahbentuk{23,i23}=ubahbentuk{23,i23}(:);
    ubahbentuk{23,i23}=ubahbentuk{23,i23}';
end
X{1}=imread('marisca/X1marisca.bmp');
X{2}=imread('marisca/X2marisca.bmp');
X{3}=imread('marisca/X3marisca.bmp');
X{4}=imread('Ezer/X1Ezer.bmp');
X{5}=imread('Ezer/X2Ezer.bmp');
X{6}=imread('Ezer/X3Ezer.bmp');
X{7}=imread('Roy/X1Roy.bmp');
X{8}=imread('Roy/X2Roy.bmp');
X{9}=imread('Roy/X3Roy.bmp');
X{10}=imread('Edwin/X1Edwin.bmp');
X{11}=imread('Edwin/X2Edwin.bmp');
X{12}=imread('Edwin/X3Edwin.bmp');
X{13}=imread('Ryan/X1ryan.bmp');
X{14}=imread('Ryan/X2ryan.bmp');
X{15}=imread('Ryan/X3ryan.bmp');
for i24=1:15,
    ubahukuran{24,i24}=imresize(X{i24},[20 20]);
    ubahwarna{24,i24}=im2bw(ubahukuran{24,i24});
    ubahbentuk{24,i24}=ubahwarna{24,i24}';
    ubahbentuk{24,i24}=ubahbentuk{24,i24}(:);
    ubahbentuk{24,i24}=ubahbentuk{24,i24}';
end
Y{1}=imread('marisca/Y1marisca.bmp');
Y{2}=imread('marisca/Y2marisca.bmp');
Y{3}=imread('marisca/Y3marisca.bmp');
Y{4}=imread('Ezer/Y1Ezer.bmp');

```

```

Y{5}=imread('Ezer/Y2Ezer.bmp');
Y{6}=imread('Ezer/Y3Ezer.bmp');
Y{7}=imread('Roy/Y1Roy.bmp');
Y{8}=imread('Roy/Y2Roy.bmp');
Y{9}=imread('Roy/Y3Roy.bmp');
Y{10}=imread('Edwin/Y1Edwin.bmp');
Y{11}=imread('Edwin/Y2Edwin.bmp');
Y{12}=imread('Edwin/Y3Edwin.bmp');
Y{13}=imread('Ryan/Y1ryan.bmp');
Y{14}=imread('Ryan/Y2ryan.bmp');
Y{15}=imread('Ryan/Y3ryan.bmp');
for i25=1:15,
    ubahukuran{25,i25}=imresize(Y{i25},[20 20]);
    ubahwarna{25,i25}=im2bw(ubahukuran{25,i25});
    ubahbentuk{25,i25}=ubahwarna{25,i25}';
    ubahbentuk{25,i25}=ubahbentuk{25,i25}(:);
    ubahbentuk{25,i25}=ubahbentuk{25,i25}';
end
Z{1}=imread('marisca/Z1marisca.bmp');
Z{2}=imread('marisca/Z2marisca.bmp');
Z{3}=imread('marisca/Z3marisca.bmp');
Z{4}=imread('Ezer/Z1Ezer.bmp');
Z{5}=imread('Ezer/Z2Ezer.bmp');
Z{6}=imread('Ezer/Z3Ezer.bmp');
Z{7}=imread('Roy/Z1Roy.bmp');
Z{8}=imread('Roy/Z2Roy.bmp');

```

## **PROGRAM Membaca Huruf Kecil**

```

clc
clear all
close all

% PREPROSESING PROGRAM
A{1}=imread('marisca/Aa1marisca.bmp');
A{2}=imread('marisca/Aa2marisca.bmp');
A{3}=imread('marisca/Aa3marisca.bmp');
A{4}=imread('Ezer/Aa1Ezer.bmp');
A{5}=imread('Ezer/Aa2Ezer.bmp');
A{6}=imread('Ezer/Aa3Ezer.bmp');
A{7}=imread('Roy/Aa1Roy.bmp');
A{8}=imread('Roy/Aa2Roy.bmp');
A{9}=imread('Roy/Aa3Roy.bmp');
A{10}=imread('Edwin/Aa1Edwin.bmp');
A{11}=imread('Edwin/Aa2Edwin.bmp');
A{12}=imread('Edwin/Aa3Edwin.bmp');
A{13}=imread('Ryan/Aa1ryan.bmp');
A{14}=imread('Ryan/Aa2ryan.bmp');
A{15}=imread('Ryan/Aa3ryan.bmp');
for i1=1:15,
    ubahukuran{1,i1}=imresize(A{i1},[20 20]);
    ubahwarna{1,i1}=im2bw(ubahukuran{1,i1});
    ubahbentuk{1,i1}=ubahwarna{1,i1}';
    ubahbentuk{1,i1}=ubahbentuk{1,i1}(:);
    ubahbentuk{1,i1}=ubahbentuk{1,i1}';

```

```

Z{9}=imread('Roy/Z3Roy.bmp');
Z{10}=imread('Edwin/Z1Edwin.bmp');
Z{11}=imread('Edwin/Z2Edwin.bmp');
Z{12}=imread('Edwin/Z3Edwin.bmp');
Z{13}=imread('Ryan/Z1ryan.bmp');
Z{14}=imread('Ryan/Z2ryan.bmp');
Z{15}=imread('Ryan/Z3ryan.bmp');
for i26=1:15,
    ubahukuran{26,i26}=imresize(Z{i26},[20 20]);
    ubahwarna{26,i26}=im2bw(ubahukuran{26,i26});
    ubahbentuk{26,i26}=ubahwarna{26,i26}';
    ubahbentuk{26,i26}=ubahbentuk{26,i26}(:);
    ubahbentuk{26,i26}=ubahbentuk{26,i26}';
end
ubahbentuk=ubahbentuk';
ubahbentuk=ubahbentuk(:);
inputbesar=ubahbentuk
save input inputbesar;

```

```

end
B{1}=imread('marisca/Bb1marisca.bmp');
B{2}=imread('marisca/Bb2marisca.bmp');
B{3}=imread('marisca/Bb3marisca.bmp');
B{4}=imread('Ezer/Bb1Ezer.bmp');
B{5}=imread('Ezer/Bb2Ezer.bmp');
B{6}=imread('Ezer/Bb3Ezer.bmp');
B{7}=imread('Roy/Bb1Roy.bmp');
B{8}=imread('Roy/Bb2Roy.bmp');
B{9}=imread('Roy/Bb3Roy.bmp');
B{10}=imread('Edwin/Bb1Edwin.bmp');
B{11}=imread('Edwin/Bb2Edwin.bmp');
B{12}=imread('Edwin/Bb3Edwin.bmp');
B{13}=imread('Ryan/Bb1ryan.bmp');
B{14}=imread('Ryan/Bb2ryan.bmp');
B{15}=imread('Ryan/Bb3ryan.bmp');
for i2=1:15,
    ubahukuran{2,i2}=imresize(B{i2},[20 20]);
    ubahwarna{2,i2}=im2bw(ubahukuran{2,i2});
    ubahbentuk{2,i2}=ubahwarna{2,i2}';
    ubahbentuk{2,i2}=ubahbentuk{2,i2}(:);
    ubahbentuk{2,i2}=ubahbentuk{2,i2}';
end
C{1}=imread('marisca/Cc1marisca.bmp');
C{2}=imread('marisca/Cc2marisca.bmp');

```

```

C{3}=imread('marisca/Cc3marisca.bmp');
C{4}=imread('Ezer/Cc1Ezer.bmp');
C{5}=imread('Ezer/Cc2Ezer.bmp');
C{6}=imread('Ezer/Cc3Ezer.bmp');
C{7}=imread('Roy/Cc1Roy.bmp');
C{8}=imread('Roy/Cc2Roy.bmp');
C{9}=imread('Roy/Cc3Roy.bmp');
C{10}=imread('Edwin/Cc1Edwin.bmp');
C{11}=imread('Edwin/Cc2Edwin.bmp');
C{12}=imread('Edwin/Cc3Edwin.bmp');
C{13}=imread('Ryan/Cc1ryan.bmp');
C{14}=imread('Ryan/Cc2ryan.bmp');
C{15}=imread('Ryan/Cc3ryan.bmp');
for i3=1:15,
    ubahukuran{3,i3}=imresize(C{i3},[20 20]);
    ubahwarna{3,i3}=im2bw(ubahukuran{3,i3});
    ubahbentuk{3,i3}=ubahwarna{3,i3}';
    ubahbentuk{3,i3}=ubahbentuk{3,i3}(:);
    ubahbentuk{3,i3}=ubahbentuk{3,i3}';
end

D{1}=imread('marisca/Dd1marisca.bmp');
D{2}=imread('marisca/Dd2marisca.bmp');
D{3}=imread('marisca/Dd3marisca.bmp');
D{4}=imread('Ezer/Dd1Ezer.bmp');
D{5}=imread('Ezer/Dd2Ezer.bmp');
D{6}=imread('Ezer/Dd3Ezer.bmp');
D{7}=imread('Roy/Dd1Roy.bmp');
D{8}=imread('Roy/Dd2Roy.bmp');
D{9}=imread('Roy/Dd3Roy.bmp');
D{10}=imread('Edwin/Dd1Edwin.bmp');
D{11}=imread('Edwin/Dd2Edwin.bmp');
D{12}=imread('Edwin/Dd3Edwin.bmp');
D{13}=imread('Ryan/Dd1ryan.bmp');
D{14}=imread('Ryan/Dd2ryan.bmp');
D{15}=imread('Ryan/Dd3ryan.bmp');
for i4=1:15,
    ubahukuran{4,i4}=imresize(D{i4},[20 20]);
    ubahwarna{4,i4}=im2bw(ubahukuran{4,i4});
    ubahbentuk{4,i4}=ubahwarna{4,i4}';
    ubahbentuk{4,i4}=ubahbentuk{4,i4}(:);
    ubahbentuk{4,i4}=ubahbentuk{4,i4}';
end

E{1}=imread('marisca/Ee1marisca.bmp');
E{2}=imread('marisca/Ee2marisca.bmp');
E{3}=imread('marisca/Ee3marisca.bmp');
E{4}=imread('Ezer/Ee1Ezer.bmp');
E{5}=imread('Ezer/Ee2Ezer.bmp');
E{6}=imread('Ezer/Ee3Ezer.bmp');
E{7}=imread('Roy/Ee1Roy.bmp');
E{8}=imread('Roy/Ee2Roy.bmp');
E{9}=imread('Roy/Ee3Roy.bmp');
E{10}=imread('Edwin/Ee1Edwin.bmp');
E{11}=imread('Edwin/Ee2Edwin.bmp');
E{12}=imread('Edwin/Ee3Edwin.bmp');

E{13}=imread('Ryan/Ee1ryan.bmp');
E{14}=imread('Ryan/Ee2ryan.bmp');
E{15}=imread('Ryan/Ee3ryan.bmp');
for i5=1:15,
    ubahukuran{5,i5}=imresize(E{i5},[20 20]);
    ubahwarna{5,i5}=im2bw(ubahukuran{5,i5});
    ubahbentuk{5,i5}=ubahwarna{5,i5}';
    ubahbentuk{5,i5}=ubahbentuk{5,i5}(:);
    ubahbentuk{5,i5}=ubahbentuk{5,i5}';
end

F{1}=imread('marisca/Ff1marisca.bmp');
F{2}=imread('marisca/Ff2marisca.bmp');
F{3}=imread('marisca/Ff3marisca.bmp');
F{4}=imread('Ezer/Ff1Ezer.bmp');
F{5}=imread('Ezer/Ff2Ezer.bmp');
F{6}=imread('Ezer/Ff3Ezer.bmp');
F{7}=imread('Roy/Ff1Roy.bmp');
F{8}=imread('Roy/Ff2Roy.bmp');
F{9}=imread('Roy/Ff3Roy.bmp');
F{10}=imread('Edwin/Ff1Edwin.bmp');
F{11}=imread('Edwin/Ff2Edwin.bmp');
F{12}=imread('Edwin/Ff3Edwin.bmp');
F{13}=imread('Ryan/Ff1ryan.bmp');
F{14}=imread('Ryan/Ff2ryan.bmp');
F{15}=imread('Ryan/Ff3ryan.bmp');
for i6=1:15,
    ubahukuran{6,i6}=imresize(F{i6},[20 20]);
    ubahwarna{6,i6}=im2bw(ubahukuran{6,i6});
    ubahbentuk{6,i6}=ubahwarna{6,i6}';
    ubahbentuk{6,i6}=ubahbentuk{6,i6}(:);
    ubahbentuk{6,i6}=ubahbentuk{6,i6}';
end

G{1}=imread('marisca/Gg1marisca.bmp');
G{2}=imread('marisca/Gg2marisca.bmp');
G{3}=imread('marisca/Gg3marisca.bmp');
G{4}=imread('Ezer/Gg1Ezer.bmp');
G{5}=imread('Ezer/Gg2Ezer.bmp');
G{6}=imread('Ezer/Gg3Ezer.bmp');
G{7}=imread('Roy/Gg1Roy.bmp');
G{8}=imread('Roy/Gg2Roy.bmp');
G{9}=imread('Roy/Gg3Roy.bmp');
G{10}=imread('Edwin/Gg1Edwin.bmp');
G{11}=imread('Edwin/Gg2Edwin.bmp');
G{12}=imread('Edwin/Gg3Edwin.bmp');
G{13}=imread('Ryan/Gg1ryan.bmp');
G{14}=imread('Ryan/Gg2ryan.bmp');
G{15}=imread('Ryan/Gg3ryan.bmp');
for i7=1:15,
    ubahukuran{7,i7}=imresize(G{i7},[20 20]);
    ubahwarna{7,i7}=im2bw(ubahukuran{7,i7});
    ubahbentuk{7,i7}=ubahwarna{7,i7}';
    ubahbentuk{7,i7}=ubahbentuk{7,i7}(:);
    ubahbentuk{7,i7}=ubahbentuk{7,i7}';
end

H{1}=imread('marisca/Hh1marisca.bmp');

```



```

H{2}=imread('marisca/Hh2marisca.bmp');
H{3}=imread('marisca/Hh3marisca.bmp');
H{4}=imread('Ezer/Hh1Ezer.bmp');
H{5}=imread('Ezer/Hh2Ezer.bmp');
H{6}=imread('Ezer/Hh3Ezer.bmp');
H{7}=imread('Roy/Hh1Roy.bmp');
H{8}=imread('Roy/Hh2Roy.bmp');
H{9}=imread('Roy/Hh3Roy.bmp');
H{10}=imread('Edwin/Hh1Edwin.bmp');
H{11}=imread('Edwin/Hh2Edwin.bmp');
H{12}=imread('Edwin/Hh3Edwin.bmp');
H{13}=imread('Ryan/Hh1ryan.bmp');
H{14}=imread('Ryan/Hh2ryan.bmp');
H{15}=imread('Ryan/Hh3ryan.bmp');
for i8=1:15,
    ubahukuran{8,i8}=imresize(H{i8},[20 20]);
    ubahwarna{8,i8}=im2bw(ubahukuran{8,i8});
    ubahbentuk{8,i8}=ubahwarna{8,i8}';
    ubahbentuk{8,i8}=ubahbentuk{8,i8}(:);
    ubahbentuk{8,i8}=ubahbentuk{8,i8}';
end
I{1}=imread('marisca/Ii1marisca.bmp');
I{2}=imread('marisca/Ii2marisca.bmp');
I{3}=imread('marisca/Ii3marisca.bmp');
I{4}=imread('Ezer/Ii1Ezer.bmp');
I{5}=imread('Ezer/Ii2Ezer.bmp');
I{6}=imread('Ezer/Ii3Ezer.bmp');
I{7}=imread('Roy/Ii1Roy.bmp');
I{8}=imread('Roy/Ii2Roy.bmp');
I{9}=imread('Roy/Ii3Roy.bmp');
I{10}=imread('Edwin/Ii1Edwin.bmp');
I{11}=imread('Edwin/Ii2Edwin.bmp');
I{12}=imread('Edwin/Ii3Edwin.bmp');
I{13}=imread('Ryan/Ii1ryan.bmp');
I{14}=imread('Ryan/Ii2ryan.bmp');
I{15}=imread('Ryan/Ii3ryan.bmp');
for i9=1:15,
    ubahukuran{9,i9}=imresize(I{i9},[20 20]);
    ubahwarna{9,i9}=im2bw(ubahukuran{9,i9});
    ubahbentuk{9,i9}=ubahwarna{9,i9}';
    ubahbentuk{9,i9}=ubahbentuk{9,i9}(:);
    ubahbentuk{9,i9}=ubahbentuk{9,i9}';
end
J{1}=imread('marisca/Jj1marisca.bmp');
J{2}=imread('marisca/Jj2marisca.bmp');
J{3}=imread('marisca/Jj3marisca.bmp');
J{4}=imread('Ezer/Jj1Ezer.bmp');
J{5}=imread('Ezer/Jj2Ezer.bmp');
J{6}=imread('Ezer/Jj3Ezer.bmp');
J{7}=imread('Roy/Jj1Roy.bmp');
J{8}=imread('Roy/Jj2Roy.bmp');
J{9}=imread('Roy/Jj3Roy.bmp');
J{10}=imread('Edwin/Jj1Edwin.bmp');
J{11}=imread('Edwin/Jj2Edwin.bmp');
J{12}=imread('Edwin/Jj3Edwin.bmp');
J{13}=imread('Ryan/Jj1ryan.bmp');
J{14}=imread('Ryan/Jj2ryan.bmp');
J{15}=imread('Ryan/Jj3ryan.bmp');
for i10=1:15,
    ubahukuran{10,i10}=imresize(J{i10},[20 20]);
    ubahwarna{10,i10}=im2bw(ubahukuran{10,i10});
    ubahbentuk{10,i10}=ubahwarna{10,i10}';
    ubahbentuk{10,i10}=ubahbentuk{10,i10}(:);
    ubahbentuk{10,i10}=ubahbentuk{10,i10}';
end
K{1}=imread('marisca/Kk1marisca.bmp');
K{2}=imread('marisca/Kk2marisca.bmp');
K{3}=imread('marisca/Kk3marisca.bmp');
K{4}=imread('Ezer/Kk1Ezer.bmp');
K{5}=imread('Ezer/Kk2Ezer.bmp');
K{6}=imread('Ezer/Kk3Ezer.bmp');
K{7}=imread('Roy/Kk1Roy.bmp');
K{8}=imread('Roy/Kk2Roy.bmp');
K{9}=imread('Roy/Kk3Roy.bmp');
K{10}=imread('Edwin/Kk1Edwin.bmp');
K{11}=imread('Edwin/Kk2Edwin.bmp');
K{12}=imread('Edwin/Kk3Edwin.bmp');
K{13}=imread('Ryan/Kk1ryan.bmp');
K{14}=imread('Ryan/Kk2ryan.bmp');
K{15}=imread('Ryan/Kk3ryan.bmp');
for i11=1:15,
    ubahukuran{11,i11}=imresize(K{i11},[20 20]);
    ubahwarna{11,i11}=im2bw(ubahukuran{11,i11});
    ubahbentuk{11,i11}=ubahwarna{11,i11}';
    ubahbentuk{11,i11}=ubahbentuk{11,i11}(:);
    ubahbentuk{11,i11}=ubahbentuk{11,i11}';
end
L{1}=imread('marisca/Li1marisca.bmp');
L{2}=imread('marisca/Li2marisca.bmp');
L{3}=imread('marisca/Li3marisca.bmp');
L{4}=imread('Ezer/Li1Ezer.bmp');
L{5}=imread('Ezer/Li2Ezer.bmp');
L{6}=imread('Ezer/Li3Ezer.bmp');
L{7}=imread('Roy/Li1Roy.bmp');
L{8}=imread('Roy/Li2Roy.bmp');
L{9}=imread('Roy/Li3Roy.bmp');
L{10}=imread('Edwin/Li1Edwin.bmp');
L{11}=imread('Edwin/Li2Edwin.bmp');
L{12}=imread('Edwin/Li3Edwin.bmp');
L{13}=imread('Ryan/Li1ryan.bmp');
L{14}=imread('Ryan/Li2ryan.bmp');
L{15}=imread('Ryan/Li3ryan.bmp');
for i12=1:15,
    ubahukuran{12,i12}=imresize(L{i12},[20 20]);
    ubahwarna{12,i12}=im2bw(ubahukuran{12,i12});
    ubahbentuk{12,i12}=ubahwarna{12,i12}';
    ubahbentuk{12,i12}=ubahbentuk{12,i12}(:);
    ubahbentuk{12,i12}=ubahbentuk{12,i12}';
end
M{1}=imread('marisca/Mm1marisca.bmp');

```

```

M{2}=imread('marisca/Mm2marisca.bmp');
M{3}=imread('marisca/Mm3marisca.bmp');
M{4}=imread('Ezer/Mm1Ezer.bmp');
M{5}=imread('Ezer/Mm2Ezer.bmp');
M{6}=imread('Ezer/Mm3Ezer.bmp');
M{7}=imread('Roy/Mm1Roy.bmp');
M{8}=imread('Roy/Mm2Roy.bmp');
M{9}=imread('Roy/Mm3Roy.bmp');
M{10}=imread('Edwin/Mm1Edwin.bmp');
M{11}=imread('Edwin/Mm2Edwin.bmp');
M{12}=imread('Edwin/Mm3Edwin.bmp');
M{13}=imread('Ryan/Mm1ryan.bmp');
M{14}=imread('Ryan/Mm2ryan.bmp');
M{15}=imread('Ryan/Mm3ryan.bmp');
for i13=1:15,
    ubahukuran{13,i13}=imresize(M{i13},[20 20]);
    ubahwarna{13,i13}=im2bw(ubahukuran{13,i13});
    ubahbentuk{13,i13}=ubahwarna{13,i13}';
    ubahbentuk{13,i13}=ubahbentuk{13,i13}(:);
    ubahbentuk{13,i13}=ubahbentuk{13,i13}';
end
N{1}=imread('marisca/Nn1marisca.bmp');
N{2}=imread('marisca/Nn2marisca.bmp');
N{3}=imread('marisca/Nn3marisca.bmp');
N{4}=imread('Ezer/Nn1Ezer.bmp');
N{5}=imread('Ezer/Nn2Ezer.bmp');
N{6}=imread('Ezer/Nn3Ezer.bmp');
N{7}=imread('Roy/Nn1Roy.bmp');
N{8}=imread('Roy/Nn2Roy.bmp');
N{9}=imread('Roy/Nn3Roy.bmp');
N{10}=imread('Edwin/Nn1Edwin.bmp');
N{11}=imread('Edwin/Nn2Edwin.bmp');
N{12}=imread('Edwin/Nn3Edwin.bmp');
N{13}=imread('Ryan/Nn1ryan.bmp');
N{14}=imread('Ryan/Nn2ryan.bmp');
N{15}=imread('Ryan/Nn3ryan.bmp');
for i14=1:15,
    ubahukuran{14,i14}=imresize(N{i14},[20 20]);
    ubahwarna{14,i14}=im2bw(ubahukuran{14,i14});
    ubahbentuk{14,i14}=ubahwarna{14,i14}';
    ubahbentuk{14,i14}=ubahbentuk{14,i14}(:);
    ubahbentuk{14,i14}=ubahbentuk{14,i14}';
end
O{1}=imread('marisca/Oo1marisca.bmp');
O{2}=imread('marisca/Oo2marisca.bmp');
O{3}=imread('marisca/Oo3marisca.bmp');
O{4}=imread('Ezer/Oo1Ezer.bmp');
O{5}=imread('Ezer/Oo2Ezer.bmp');
O{6}=imread('Ezer/Oo3Ezer.bmp');
O{7}=imread('Roy/Oo1Roy.bmp');
O{8}=imread('Roy/Oo2Roy.bmp');
O{9}=imread('Roy/Oo3Roy.bmp');
O{10}=imread('Edwin/Oo1Edwin.bmp');
O{11}=imread('Edwin/Oo2Edwin.bmp');
O{12}=imread('Edwin/Oo3Edwin.bmp');
O{13}=imread('Ryan/Oo1ryan.bmp');
O{14}=imread('Ryan/Oo2ryan.bmp');
O{15}=imread('Ryan/Oo3ryan.bmp');
for i15=1:15,
    ubahukuran{15,i15}=imresize(O{i15},[20 20]);
    ubahwarna{15,i15}=im2bw(ubahukuran{15,i15});
    ubahbentuk{15,i15}=ubahwarna{15,i15}';
    ubahbentuk{15,i15}=ubahbentuk{15,i15}(:);
    ubahbentuk{15,i15}=ubahbentuk{15,i15}';
end
P{1}=imread('marisca/Pp1marisca.bmp');
P{2}=imread('marisca/Pp2marisca.bmp');
P{3}=imread('marisca/Pp3marisca.bmp');
P{4}=imread('Ezer/Pp1Ezer.bmp');
P{5}=imread('Ezer/Pp2Ezer.bmp');
P{6}=imread('Ezer/Pp3Ezer.bmp');
P{7}=imread('Roy/Pp1Roy.bmp');
P{8}=imread('Roy/Pp2Roy.bmp');
P{9}=imread('Roy/Pp3Roy.bmp');
P{10}=imread('Edwin/Pp1Edwin.bmp');
P{11}=imread('Edwin/Pp2Edwin.bmp');
P{12}=imread('Edwin/Pp3Edwin.bmp');
P{13}=imread('Ryan/Pp1ryan.bmp');
P{14}=imread('Ryan/Pp2ryan.bmp');
P{15}=imread('Ryan/Pp3ryan.bmp');
for i16=1:15,
    ubahukuran{16,i16}=imresize(P{i16},[20 20]);
    ubahwarna{16,i16}=im2bw(ubahukuran{16,i16});
    ubahbentuk{16,i16}=ubahwarna{16,i16}';
    ubahbentuk{16,i16}=ubahbentuk{16,i16}(:);
    ubahbentuk{16,i16}=ubahbentuk{16,i16}';
end
Q{1}=imread('marisca/Qq1marisca.bmp');
Q{2}=imread('marisca/Qq2marisca.bmp');
Q{3}=imread('marisca/Qq3marisca.bmp');
Q{4}=imread('Ezer/Qq1Ezer.bmp');
Q{5}=imread('Ezer/Qq2Ezer.bmp');
Q{6}=imread('Ezer/Qq3Ezer.bmp');
Q{7}=imread('Roy/Qq1Roy.bmp');
Q{8}=imread('Roy/Qq2Roy.bmp');
Q{9}=imread('Roy/Qq3Roy.bmp');
Q{10}=imread('Edwin/Qq1Edwin.bmp');
Q{11}=imread('Edwin/Qq2Edwin.bmp');
Q{12}=imread('Edwin/Qq3Edwin.bmp');
Q{13}=imread('Ryan/Qq1ryan.bmp');
Q{14}=imread('Ryan/Qq2ryan.bmp');
Q{15}=imread('Ryan/Qq3ryan.bmp');
for i17=1:15,
    ubahukuran{17,i17}=imresize(Q{i17},[20 20]);
    ubahwarna{17,i17}=im2bw(ubahukuran{17,i17});
    ubahbentuk{17,i17}=ubahwarna{17,i17}';
    ubahbentuk{17,i17}=ubahbentuk{17,i17}(:);
    ubahbentuk{17,i17}=ubahbentuk{17,i17}';
end
R{1}=imread('marisca/Rr1marisca.bmp');

```

```

R{2}=imread('marisca/Rr2marisca.bmp');
R{3}=imread('marisca/Rr3marisca.bmp');
R{4}=imread('Ezer/Rr1Ezer.bmp');
R{5}=imread('Ezer/Rr2Ezer.bmp');
R{6}=imread('Ezer/Rr3Ezer.bmp');
R{7}=imread('Roy/Rr1Roy.bmp');
R{8}=imread('Roy/Rr2Roy.bmp');
R{9}=imread('Roy/Rr3Roy.bmp');
R{10}=imread('Edwin/Rr1Edwin.bmp');
R{11}=imread('Edwin/Rr2Edwin.bmp');
R{12}=imread('Edwin/Rr3Edwin.bmp');
R{13}=imread('Ryan/Rr1ryan.bmp');
R{14}=imread('Ryan/Rr2ryan.bmp');
R{15}=imread('Ryan/Rr3ryan.bmp');
for i18=1:15,
    ubahukuran{18,i18}=imresize(R{i18},[20 20]);
    ubahwarna{18,i18}=im2bw(ubahukuran{18,i18});
    ubahbentuk{18,i18}=ubahwarna{18,i18}';
    ubahbentuk{18,i18}=ubahbentuk{18,i18}(:);
    ubahbentuk{18,i18}=ubahbentuk{18,i18}';
end
S{1}=imread('marisca/Ss1marisca.bmp');
S{2}=imread('marisca/Ss2marisca.bmp');
S{3}=imread('marisca/Ss3marisca.bmp');
S{4}=imread('Ezer/Ss1Ezer.bmp');
S{5}=imread('Ezer/Ss2Ezer.bmp');
S{6}=imread('Ezer/Ss3Ezer.bmp');
S{7}=imread('Roy/Ss1Roy.bmp');
S{8}=imread('Roy/Ss2Roy.bmp');
S{9}=imread('Roy/Ss3Roy.bmp');
S{10}=imread('Edwin/Ss1Edwin.bmp');
S{11}=imread('Edwin/Ss2Edwin.bmp');
S{12}=imread('Edwin/Ss3Edwin.bmp');
S{13}=imread('Ryan/Ss1ryan.bmp');
S{14}=imread('Ryan/Ss2ryan.bmp');
S{15}=imread('Ryan/Ss3ryan.bmp');
for i19=1:15,
    ubahukuran{19,i19}=imresize(S{i19},[20 20]);
    ubahwarna{19,i19}=im2bw(ubahukuran{19,i19});
    ubahbentuk{19,i19}=ubahwarna{19,i19}';
    ubahbentuk{19,i19}=ubahbentuk{19,i19}(:);
    ubahbentuk{19,i19}=ubahbentuk{19,i19}';
end
T{1}=imread('marisca/Tt1marisca.bmp');
T{2}=imread('marisca/Tt2marisca.bmp');
T{3}=imread('marisca/Tt3marisca.bmp');
T{4}=imread('Ezer/Tt1Ezer.bmp');
T{5}=imread('Ezer/Tt2Ezer.bmp');
T{6}=imread('Ezer/Tt3Ezer.bmp');
T{7}=imread('Roy/Tt1Roy.bmp');
T{8}=imread('Roy/Tt2Roy.bmp');
T{9}=imread('Roy/Tt3Roy.bmp');
T{10}=imread('Edwin/Tt1Edwin.bmp');
T{11}=imread('Edwin/Tt2Edwin.bmp');
T{12}=imread('Edwin/Tt3Edwin.bmp');

T{13}=imread('Ryan/Tt1ryan.bmp');
T{14}=imread('Ryan/Tt2ryan.bmp');
T{15}=imread('Ryan/Tt3ryan.bmp');
for i20=1:15,
    ubahukuran{20,i20}=imresize(T{i20},[20 20]);
    ubahwarna{20,i20}=im2bw(ubahukuran{20,i20});
    ubahbentuk{20,i20}=ubahwarna{20,i20}';
    ubahbentuk{20,i20}=ubahbentuk{20,i20}(:);
    ubahbentuk{20,i20}=ubahbentuk{20,i20}';
end
U{1}=imread('marisca/Uu1marisca.bmp');
U{2}=imread('marisca/Uu2marisca.bmp');
U{3}=imread('marisca/Uu3marisca.bmp');
U{4}=imread('Ezer/Uu1Ezer.bmp');
U{5}=imread('Ezer/Uu2Ezer.bmp');
U{6}=imread('Ezer/Uu3Ezer.bmp');
U{7}=imread('Roy/Uu1Roy.bmp');
U{8}=imread('Roy/Uu2Roy.bmp');
U{9}=imread('Roy/Uu3Roy.bmp');
U{10}=imread('Edwin/Uu1Edwin.bmp');
U{11}=imread('Edwin/Uu2Edwin.bmp');
U{12}=imread('Edwin/Uu3Edwin.bmp');
U{13}=imread('Ryan/Uu1ryan.bmp');
U{14}=imread('Ryan/Uu2ryan.bmp');
U{15}=imread('Ryan/Uu3ryan.bmp');
for i21=1:15,
    ubahukuran{21,i21}=imresize(U{i21},[20 20]);
    ubahwarna{21,i21}=im2bw(ubahukuran{21,i21});
    ubahbentuk{21,i21}=ubahwarna{21,i21}';
    ubahbentuk{21,i21}=ubahbentuk{21,i21}(:);
    ubahbentuk{21,i21}=ubahbentuk{21,i21}';
end
V{1}=imread('marisca/Vv1marisca.bmp');
V{2}=imread('marisca/Vv2marisca.bmp');
V{3}=imread('marisca/Vv3marisca.bmp');
V{4}=imread('Ezer/Vv1Ezer.bmp');
V{5}=imread('Ezer/Vv2Ezer.bmp');
V{6}=imread('Ezer/Vv3Ezer.bmp');
V{7}=imread('Roy/Vv1Roy.bmp');
V{8}=imread('Roy/Vv2Roy.bmp');
V{9}=imread('Roy/Vv3Roy.bmp');
V{10}=imread('Edwin/Vv1Edwin.bmp');
V{11}=imread('Edwin/Vv2Edwin.bmp');
V{12}=imread('Edwin/Vv3Edwin.bmp');
V{13}=imread('Ryan/Vv1ryan.bmp');
V{14}=imread('Ryan/Vv2ryan.bmp');
V{15}=imread('Ryan/Vv3ryan.bmp');
for i22=1:15,
    ubahukuran{22,i22}=imresize(V{i22},[20 20]);
    ubahwarna{22,i22}=im2bw(ubahukuran{22,i22});
    ubahbentuk{22,i22}=ubahwarna{22,i22}';
    ubahbentuk{22,i22}=ubahbentuk{22,i22}(:);
    ubahbentuk{22,i22}=ubahbentuk{22,i22}';
end
W{1}=imread('marisca/Ww1marisca.bmp');

```

```

W{2}=imread('marisca/Ww2marisca.bmp');
W{3}=imread('marisca/Ww3marisca.bmp');
W{4}=imread('Ezer/Ww1Ezer.bmp');
W{5}=imread('Ezer/Ww2Ezer.bmp');
W{6}=imread('Ezer/Ww3Ezer.bmp');
W{7}=imread('Roy/Ww1Roy.bmp');
W{8}=imread('Roy/Ww2Roy.bmp');
W{9}=imread('Roy/Ww3Roy.bmp');
W{10}=imread('Edwin/Ww1Edwin.bmp');
W{11}=imread('Edwin/Ww2Edwin.bmp');
W{12}=imread('Edwin/Ww3Edwin.bmp');
W{13}=imread('Ryan/Ww1ryan.bmp');
W{14}=imread('Ryan/Ww2ryan.bmp');
W{15}=imread('Ryan/Ww3ryan.bmp');
for i23=1:15,
    ubahukuran{23,i23}=imresize(W{i23},[20 20]);
    ubahwarna{23,i23}=im2bw(ubahukuran{23,i23});
    ubahbentuk{23,i23}=ubahwarna{23,i23}';
    ubahbentuk{23,i23}=ubahbentuk{23,i23}(:);
    ubahbentuk{23,i23}=ubahbentuk{23,i23}';
end
X{1}=imread('marisca/Xx1marisca.bmp');
X{2}=imread('marisca/Xx2marisca.bmp');
X{3}=imread('marisca/Xx3marisca.bmp');
X{4}=imread('Ezer/Xx1Ezer.bmp');
X{5}=imread('Ezer/Xx2Ezer.bmp');
X{6}=imread('Ezer/Xx3Ezer.bmp');
X{7}=imread('Roy/Xx1Roy.bmp');
X{8}=imread('Roy/Xx2Roy.bmp');
X{9}=imread('Roy/Xx3Roy.bmp');
X{10}=imread('Edwin/Xx1Edwin.bmp');
X{11}=imread('Edwin/Xx2Edwin.bmp');
X{12}=imread('Edwin/Xx3Edwin.bmp');
X{13}=imread('Ryan/Xx1ryan.bmp');
X{14}=imread('Ryan/Xx2ryan.bmp');
X{15}=imread('Ryan/Xx3ryan.bmp');
for i24=1:15,
    ubahukuran{24,i24}=imresize(X{i24},[20 20]);
    ubahwarna{24,i24}=im2bw(ubahukuran{24,i24});
    ubahbentuk{24,i24}=ubahwarna{24,i24}';
    ubahbentuk{24,i24}=ubahbentuk{24,i24}(:);
    ubahbentuk{24,i24}=ubahbentuk{24,i24}';
end
Y{1}=imread('marisca/Yy1marisca.bmp');
Y{2}=imread('marisca/Yy2marisca.bmp');
Y{3}=imread('marisca/Yy3marisca.bmp');
Y{4}=imread('Ezer/Yy1Ezer.bmp');
Y{5}=imread('Ezer/Yy2Ezer.bmp');
Y{6}=imread('Ezer/Yy3Ezer.bmp');
Y{7}=imread('Roy/Yy1Roy.bmp');
Y{8}=imread('Roy/Yy2Roy.bmp');
Y{9}=imread('Roy/Yy3Roy.bmp');
Y{10}=imread('Edwin/Yy1Edwin.bmp');
Y{11}=imread('Edwin/Yy2Edwin.bmp');
Y{12}=imread('Edwin/Yy3Edwin.bmp');
Y{13}=imread('Ryan/Yy1ryan.bmp');
Y{14}=imread('Ryan/Yy2ryan.bmp');
Y{15}=imread('Ryan/Yy3ryan.bmp');
for i25=1:15,
    ubahukuran{25,i25}=imresize(Y{i25},[20 20]);
    ubahwarna{25,i25}=im2bw(ubahukuran{25,i25});
    ubahbentuk{25,i25}=ubahwarna{25,i25}';
    ubahbentuk{25,i25}=ubahbentuk{25,i25}(:);
    ubahbentuk{25,i25}=ubahbentuk{25,i25}';
end
Z{1}=imread('marisca/Zz1marisca.bmp');
Z{2}=imread('marisca/Zz2marisca.bmp');
Z{3}=imread('marisca/Zz3marisca.bmp');
Z{4}=imread('Ezer/Zz1Ezer.bmp');
Z{5}=imread('Ezer/Zz2Ezer.bmp');
Z{6}=imread('Ezer/Zz3Ezer.bmp');
Z{7}=imread('Roy/Zz1Roy.bmp');
Z{8}=imread('Roy/Zz2Roy.bmp');
Z{9}=imread('Roy/Zz3Roy.bmp');
Z{10}=imread('Edwin/Zz1Edwin.bmp');
Z{11}=imread('Edwin/Zz2Edwin.bmp');
Z{12}=imread('Edwin/Zz3Edwin.bmp');
Z{13}=imread('Ryan/Zz1ryan.bmp');
Z{14}=imread('Ryan/Zz2ryan.bmp');
Z{15}=imread('Ryan/Zz3ryan.bmp');
for i26=1:15,
    ubahukuran{26,i26}=imresize(Z{i26},[20 20]);
    ubahwarna{26,i26}=im2bw(ubahukuran{26,i26});
    ubahbentuk{26,i26}=ubahwarna{26,i26}';
    ubahbentuk{26,i26}=ubahbentuk{26,i26}(:);
    ubahbentuk{26,i26}=ubahbentuk{26,i26}';
end
ubahbentuk=ubahbentuk';
ubahbentuk=ubahbentuk(:);
inputkecil=ubahbentuk
save input inputkecil;

```

## Program Pelatihan

```
clc
clear all

load inputbesar inputbesar;
input_final=[];
input3=[];
for jj=1:390,
    input1=[];
    input1=inputbesar{jj};
    input4=[];
    input3=[input3 ;input1];
end
[x y]=size(input3);
for i=1:x,
    for j=1:y,
        if input3(i,j)==0;
            input3(i,j)=-1;

        else
            input3(i,j)=1;

        end
    end
end

input2=eye(390,26);

bobot1=rand(390,400);
bobot2=rand(26,26);

alpha=0.6;
a=0.1;
epoch=0;
```

```

baris=size(input3,1);
erorout=10;

while (erorout>0.001)
    epoch=epoch+1
    for data=1:baris
        for klaster=1:26
            d(klaster)=sum((bobot1(klaster,:)-input3(data,:)).^2);
            if klaster==1
                dmin=d(klaster);
                din=klaster;
            end
            if (klaster>1)&&(dmin>d(klaster))
                dmin=d(klaster);
                din=klaster;
            end
            masukan{ data,1 }=din;
            masukan{ data,2 }=data;
        end
    end
    bobot1(din,:)=bobot1(din,:)+alpha*(input3(data,:)-bobot1(din,:));
    for data=1:baris
        for klaster=1:26
            d(klaster)=sum((bobot1(klaster,:)-input3(data,:)).^2);
            if klaster==1
                dmin=d(klaster);
                din=klaster;
            end
            if (klaster>1)&&(dmin>d(klaster))
                dmin=d(klaster);
                din=klaster;
            end
        end
    end
    bobot1(din,:)=bobot1(din,:)+alpha*(input3(data,:)-bobot1(din,:));
    bobot2(din,:)=bobot2(din,:)+a*(input2(data,:)-bobot2(din,:));
    eror=sum((input2(data,:)-bobot2(din,:)).^2);
    l=size(input3,1);
    m=size(input3,2);
    erorout=sqrt(eror/(l*m))
    alpha=0.5*alpha;
    a=0.5*a;
    masukan
    bobot1besar1=bobot1;
    bobot2besar2=bobot2;
    save bobot1besar1 bobot1besar1;

```

```

save bobot2besar2 bobot2besar2;
subplot(1,1,1);
plot(epoch,errorout,'-g');
hold on;
title('grafik eror');
ylabel('nilai eror');

```

```

if epoch==1000
    break
end
end

```

## **Program Pengujian**

```

clc
clear all

```

```

input3=imread('marisca/d1marisca.bmp');
input3=imresize(input3, [20 20]);
input3=im2bw(input3);
input3=input3';
input3=input3(:);
input3=input3';
load bobot1besar bobot1besar;
load bobot2besar bobot2besar;

```

```

input2=eye(390,5);

```

```

alpha=0.6;
a=0.1;
baris=size(input3,1);

```

```

for data=1:baris
    for klaster=1:5
        d(klaster)=sum((bobot1besar(klaster,:)-input3(data,:)).^2);
        if klaster==1
            dmin=d(klaster);
            din=klaster;
        end
        if (klaster>1)&&(dmin>d(klaster))
            dmin=d(klaster);
            din=klaster;
        end
        masukan{data,1}=din;
        masukan{data,2}=data;
    end
end
for data=1:baris

```

```

for klaster=1:5
    d(klaster)=sum((bobot1besar(klaster,:)-input3(data,:)).^2);
    if klaster==1
        dmin=d(klaster);
        din=klaster;
    end
    if (klaster>1)&&(dmin>d(klaster))
        dmin=d(klaster);
        din=klaster;
    end
end
end
error=((input2(data,:)-bobot2besar(din,:)).^2);
l=size(input3,1);
m=size(input3,2);
% errorout=sqrt(error/(l*m))
masukan
error
for i=1:5
    if error(i)<=0.5
        error(i)=0;
    else
        error(i)=1;
    end
end
end
end

```

## **Program GUI untuk Pelatihan**

```

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

close;

% --- Executes on button press in pushbutton3.
function pushbutton3_Callback(hObject, eventdata, handles)
% hObject handle to pushbutton3 (see GCBO)
% eventdata reserved - to be defined in a future version of MATLAB
% handles structure with handles and user data (see GUIDATA)
myform=guidata(gcbo);
load inputbesar inputbesar;
input_final=[];
input3=[];
for jj=1:390,

```



```

input1=[];
input1=inputbesar{jj};
input4=[];
input3=[input3 ;input1];
end
input2=eye(390,26);

bobot1=rand(390,400);
bobot2=rand(26,26);

alpha=0.6;
a=0.1;
epoch=0;
baris=size(input3,1);
erorout=10;

while (erorout>0.001)
    epoch=epoch+1
    for data=1:baris
        for klaster=1:26
            d(klaster)=sum((bobot1(klaster,:)-input3(data,:)).^2);
            if klaster==1
                dmin=d(klaster);
                din=klaster;
            end
            if (klaster>1)&&(dmin>d(klaster))
                dmin=d(klaster);
                din=klaster;
            end
            masukan{data,1}=din;
            masukan{data,2}=data;
        end
    end
    bobot1(din,:)=bobot1(din,:)+alpha*(input3(data,:)-bobot1(din,:));
    for data=1:baris
        for klaster=1:26
            d(klaster)=sum((bobot1(klaster,:)-input3(data,:)).^2);
            if klaster==1
                dmin=d(klaster);
                din=klaster;
            end
            if (klaster>1)&&(dmin>d(klaster))
                dmin=d(klaster);
                din=klaster;
            end
        end
    end

    bobot1(din,:)=bobot1(din,:)+alpha*(input3(data,:)-bobot1(din,:));
    bobot2(din,:)=bobot2(din,:)+a*(input2(data,:)-bobot2(din,:));
end

```

```

error=sum((input2(data,:)-bobot2(din,:)).^2);
l=size(input3,1);
m=size(input3,2);
errorout=sqrt(error/(l*m))
alpha=0.5*alpha;
a=0.5*a;
masukan
bobot1besar=bobot1;
bobot2besar=bobot2;
save bobot1besar bobot1besar;
save bobot2besar bobot2besar;
axes=(myform.axes1);
plot(epoch,errorout,'g')
hold on
if epoch==10
    break
end
end
set(myform.edit4,'string',errorout)

```

```

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

```

```

% Hint: slider controls usually have a light gray background, change
% 'usewhitebg' to 0 to use default. See ISPC and COMPUTER.
usewhitebg = 1;
if usewhitebg
    set(hObject,'BackgroundColor',[.9 .9 .9]);
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

```

```

% --- Executes on button press in pushbutton5.
function pushbutton5_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton5 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)
myform=guidata(gcbo);
load inputkecil inputkecil;
input_final=[];
input3=[];
for jj=1:390,
    input1=[];
    input1=inputkecil{jj};
    input4=[];

```

```

    input3=[input3 ;input1];
end
input2=eye(390,26);

bobot1=rand(390,400);
bobot2=rand(26,26);

alpha=0.6;
a=0.1;
epoch=0;
baris=size(input3,1);
erorout=10;
while (erorout>0.005)
    epoch=epoch+1
    for data=1:baris
        for klaster=1:26
            d(klaster)=sum((bobot1(klaster,:)-input3(data,:)).^2);
            if klaster==1
                dmin=d(klaster);
                din=klaster;
            end
            if (klaster>1)&&(dmin>d(klaster))
                dmin=d(klaster);
                din=klaster;
            end
            masukan{data,1}=din;
            masukan{data,2}=data;
        end
    end
    bobot1(din,:)=bobot1(din,:)+alpha*(input3(data,:)-bobot1(din,:));
    for data=1:baris
        for klaster=1:26
            d(klaster)=sum((bobot1(klaster,:)-input3(data,:)).^2);
            if klaster==1
                dmin=d(klaster);
                din=klaster;
            end
            if (klaster>1)&&(dmin>d(klaster))
                dmin=d(klaster);
                din=klaster;
            end
        end
    end
    bobot1(din,:)=bobot1(din,:)+alpha*(input3(data,:)-bobot1(din,:));
    bobot2(din,:)=bobot2(din,:)+a*(input2(data,:)-bobot2(din,:));
    eror=sum((input2(data,:)-bobot2(din,:)).^2);
    l=size(input3,1);
    m=size(input3,2);
    erorout=sqrt(eror/(l*m))
    alpha=0.5*alpha;

```

```

a=0.5*a;
masukan
bobot1kecil=bobot1;
bobot2kecil=bobot2;
save bobot1kecil bobot1kecil;
save bobot2kecil bobot2kecil;
axes=(myform.axes1);
plot(epoch,erorout,'b')
hold on
if epoch==10
    break
end
end
set(myform.edit4,'string',erorout)

```

### **Program GUI Untuk Pengujian**

```

% --- Executes on button press in pushbutton12.
function pushbutton12_Callback(hObject, eventdata, handles)
% hObject handle to pushbutton12 (see GCBO)
% eventdata reserved - to be defined in a future version of MATLAB
% handles structure with handles and user data (see GUIDATA)

file=uigetfile('*.bmp');
if ~isequal(file,0)
    myform=guidata(gcbo);

    gambar=imread(file);
    imshow(gambar);axes=(myform.axes7);
    open(file);
end

% --- Executes on button press in pushbutton13.
function pushbutton13_Callback(hObject, eventdata, handles)
% hObject handle to pushbutton13 (see GCBO)
% eventdata reserved - to be defined in a future version of MATLAB
% handles structure with handles and user data (see GUIDATA)

myform=guidata(gcbo);
gambar=(myform.pushbutton12);
gambar=imresize(gambar, [20 20]);
gambar=im2bw(gambar);
gambar=gambar';
gambar=gambar(:);
gambar=gambar';
input3=gambar;
load bobot1 bobot1
load bobot2 bobot2

input2=eye(390,26);
baris=size(input3,1);

```

```

for data=1:baris
    for klaster=1:26
        d(klaster)=sum(min(bobot1(klaster,:),input3(data,:)).^2);
        if klaster==1
            dmin=d(klaster);
            din=klaster;
        end
        if (klaster>1)&&(dmin>d(klaster))
            dmin=d(klaster);
            din=klaster;
        end
        masukan{data,1}=din;
        masukan{data,2}=data;
    end
end
for data=1:baris
    for klaster=1:26
        d(klaster)=sum((bobot1(klaster,)-input3(data,:)).^2);
        if klaster==1
            dmin=d(klaster);
            din=klaster;
        end
        if (klaster>1)&&(dmin>d(klaster))
            dmin=d(klaster);
            din=klaster;
        end
    end
end
error=sum((input2(data,:)-bobot2(din,:)).^2);
l=size(input3,1);
m=size(input3,2);
errorout=sqrt(error/(l*m))
masukan;
set(myform.edit4,'string',errorout)

% --- Executes on button press in pushbutton14.
function pushbutton14_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton14 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

close

% --- Executes during object creation, after setting all properties.
function edit4_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit4 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.

```

```
% See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function edit4_Callback(hObject, eventdata, handles)
% hObject handle to edit4 (see GCBO)
% eventdata reserved - to be defined in a future version of MATLAB
% handles structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit4 as text
% str2double(get(hObject,'String')) returns contents of edit4 as a double
```

**LAMPIRAN B**  
**KUMPULAN CITRA SAMPLE**

1.Edwin

A	B	C	D	E	F	G	H	I	
J	K	L	M	N	O	P	Q	R	
S	T	U	V	W	X	Y	Z		
a	b	c	d	e	f	g	h	i	
j	k	l	m	n	o	p	q	r	
s	t	u	v	w	x	y	z		

A	B	C	D	E	F	G	H	I	
J	K	L	M	N	O	P	Q	R	
S	T	U	V	W	X	Y	Z		
a	b	c	d	e	f	g	h	i	
j	k	l	m	n	o	p	q	r	
s	t	u	v	y	x	y	z	w	

A	B	C	D	E	F	G	H	I	
J	K	L	M	N	O	P	Q	R	
S	T	U	V	W	X	Y	Z		
a	b	c	d	e	f	g	h	i	
j	k	m	l	n	o	p	q	r	
s	t	u	v	w	x	y	z		

A	B	C	D	E	F	G	H	I	
J	K	L	M	N	O	P	Q	R	
S	T	U	V	Y	<del>W</del>	X	Z		
a	b	c	d	e	f	g	h	i	
j	k	l	m	n	o	p	q	r	
s	t	u	v	w	x	y	z		

A	B	C	D	E	F	G	H	I	
J	K	L	M	N	O	P	Q	R	
S	T	U	V	W	X	Y	Z		
a	b	c	d	e	f	g	h	i	
j	k	l	m	n	o	p	q	r	
s	t	u	v	w	x	y	z		



2. Ezer

Ezer

A	B	C	D	E	F	G	H	I	
J	K	L	M	N	O	P	Q	R	
S	T	U	V	W	X	Y	Z		
q	b	c	d	e	f	g	h	i	
j	k	l	m	n	o	p	q	r	
s	t	u	v	w	x	y	z		

Ezer

A	B	C	D	E	F	G	H	I	
J	K	L	M	N	O	P	Q	R	
S	T	U	V	W	X	Y	Z		
q	b	c	d	e	f	g	h	i	
j	k	l	m	n	o	p	q	r	
s	t	u	v	w	x	y	z		

Ezer

A	B	C	D	E	F	G	H	I	
J	K	L	M	N	O	P	Q	R	
S	T	U	V	W	X	Y	Z		
q	b	c	d	e	f	g	h	i	
j	k	l	m	n	o	p	q	r	
s	t	u	v	w	x	y	z		

Ezer

A	B	C	D	E	F	G	H	I	
J	K	L	M	N	O	P	Q	R	
S	T	U	<del>V</del>	W	X	Y	Z	V	
q	b	c	d	e	f	g	h	i	
j	k	l	m	n	o	p	q	r	
s	t	u	v	w	x	y	z		

Ezer

A	B	C	D	E	F	G	H	I	
J	K	L	M	N	O	P	Q	R	
S	T	U	V	W	X	Y	Z		
q	b	c	d	e	f	g	h	i	
j	k	l	m	n	o	p	q	r	
s	t	u	v	w	x	y	z		

### 3. Marisca

A	B	C	D	E	F	G	H	I	
J	K	L	M	N	O	P	Q	R	
S	T	U	V	W	X	Y	Z		
a	b	c	d	e	f	g	h	i	
j	k	l	m	n	o	p	q	r	
s	t	u	v	w	x	y	z		

Marisca 1

A	B	C	D	E	F	G	H	I	
J	K	L	M	N	O	P	Q	R	
S	T	U	V	W	X	Y	Z		
a	b	c	d	e	f	g	h	i	
j	k	l	m	n	o	p	q	r	
s	t	u	v	w	x	y	z		

Marisca 4

A	B	C	D	E	F	G	H	I	
J	K	L	M	N	O	P	Q	R	
S	T	U	V	W	X	Y	Z		
a	b	c	d	e	f	g	h	i	
j	k	l	m	n	o	p	q	r	
s	t	u	v	w	x	y	z		

Marisca 2

A	B	C	D	E	F	G	H	I	
J	K	L	M	N	O	P	Q	R	
S	T	U	V	W	X	Z	Y		
a	b	c	d	e	f	g	h	i	
j	k	l	m	n	o	p	q	r	
s	t	u	v	w	x	y	z		

Marisca 5

A	B	C	D	E	F	G	H	I	
J	K	L	M	N	O	P	Q	R	
S	T	U	V	W	X	Y	Z		
a	b	c	d	e	f	g	h	i	
j	k	l	m	n	o	p	q	r	
s	t	u	v	w	x	z	y		

Marisca 3

4. Roy

A	B	C	D	E	F	G	H	I	
J	K	L	M	N	O	P	Q	R	
S	T	U	V	W	X	Y	Z		
a	b	c	d	e	f	g	h	i	
j	k	l	m	n	o	p	q	r	
s	t	u	v	w	x	y	z		

A	B	C	D	E	F	G	H	I	
J	K	L	M	N	O	P	Q	R	
S	T	U	V	W	X	Y	Z		
a	b	c	d	e	f	g	h	i	
j	k	l	m	n	o	p	q	r	
s	t	u	v	w	x	y	z		

A	B	C	D	E	F	G	H	I	
J	K	L	M	N	O	P	Q	R	
S	T	U	V	W	X	Y	Z		
a	b	c	d	e	f	g	h	i	
j	k	l	m	n	o	p	q	r	
s	t	u	v	w	x	y	z		

A	B	C	D	E	F	G	H	I	
J	K	L	M	N	O	P	Q	R	
S	T	U	V	W	X	Y	Z		
a	b	c	d	e	f	g	h	i	
j	k	l	m	n	o	p	q	r	
s	t	u	v	w	x	y	z		

A	B	C	D	E	F	G	H	I	
J	K	L	M	N	O	P	Q	R	
S	T	U	V	W	X	Y	Z		
a	b	c	d	e	f	g	h	i	
j	k	l	m	n	o	p	q	r	
s	t	u	v	w	x	y	z		

5. Ryan

A	B	C	D	E	F	G	H	I	
J	K	L	M	N	O	P	Q	R	
S	T	U	V	W	X	Y	Z		
a	b	c	d	e	f	g	h	i	
j	k	l	m	n	o	p	q	r	
s	t	u	v	w	x	y	z		

A	B	C	D	E	F	G	H	I	
J	K	L	M	N	O	P	Q	R	
S	T	U	V	W	X	Y	Z		
a	b	c	d	e	f	g	h	i	
j	k	l	m	n	o	p	q	r	
s	t	u	v	w	x	y	z		

A	B	C	D	E	F	G	H	I	
J	K	L	M	N	O	P	Q	R	
S	T	U	V	W	X	Y	Z		
a	b	c	d	e	f	g	h	i	
j	k	l	m	n	o	p	q	r	
s	t	u	v	w	x	y	z		

A	B	C	D	E	F	G	H	I	
J	K	L	M	N	O	P	Q	R	
S	T	U	V	W	X	Y	Z		
a	b	c	d	e	f	g	h	i	
j	k	l	m	n	o	p	q	r	
s	t	u	v	w	x	y	z		

A	B	C	D	E	F	G	H	I	
J	K	L	M	N	O	P	Q	R	
S	T	U	V	W	X	Y	Z		
a	b	c	d	e	f	g	h	i	
j	k	l	m	n	o	p	q	r	
s	t	u	v	w	x	y	z		

Catatan:

- Gambar asli berukuran A4 dengan Format (\*.jpg)