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APPENDICES

Appendix A : MATLAB Source Code

```
%For Camera Captured
%
cardum=vcapg2;
x=vcapg2;
imwrite (x,'cam1.jpg');
subplot(4,2,1);
imshow (x);
title('cam1');

% Read Image
x = imread('cam1.jpg');
imshow(x);
subplot(4,2,2);
imwrite (x,'cam1.jpg');
title('Original Image');

%Resizing  and displaying the resized  files
a=imresize(x,[800,600]);
subplot(4,2,3);
imshow(a);
title('Resized Image')

%Convert RGB to Grayscale image
a1 = rgb2gray(a);
subplot(4,2,4);
imshow(a1);
title('Grayscale Image')

%Filtering & Convert Grayscale to Binary image
L=medfilt2(a1,[5 5]);
BL = im2bw(L,0.3);
subplot(4,2,5);
imshow(BL);
title('Binary Image')

%Filtering Binary image
L1=medfilt2(BL,[2 2]);
L2=medfilt2(L1,[4 4]);
subplot(4,2,6);
```

```
imshow(L2);
title('Filtered Image')

%Edge image was extracted to optimise the feature data
S=medfilt2(L2,[3 3]);
S1=medfilt2(S);

%Edge detection using Canny Edge
E=edge(S1,'canny');
subplot(4,2,7);
imshow(E);
title('edge image')

%Feature extraction through singular value decomposition
F=svd(double(E))
fout=fopen('input.dat','a');

  for j= 1:1:40
      fprintf(fout, '%f\t',F(j));
   end
   fprintf(fout,'\n');
fclose(fout);
fprintf('Execution Over');

%--------------------------------------------------------------------

% Read Image
x = imread('C:\MATLAB7\work\henry\s4.jpg');
imshow(x);
subplot(4,2,1);
imwrite (x,'s4.jpg');
title('Original Image');

%Resizing  and displaying the resized  files
a=imresize(x,[80,60]);
subplot;
imshow(a);
title('Resized Image')

%Convert RGB to Grayscale image
a1 = rgb2gray(a);
subplot(4,2,3);
imshow(a1);
title('Grayscale Image')

%Filtering & Convert Grayscale to Binary image
```

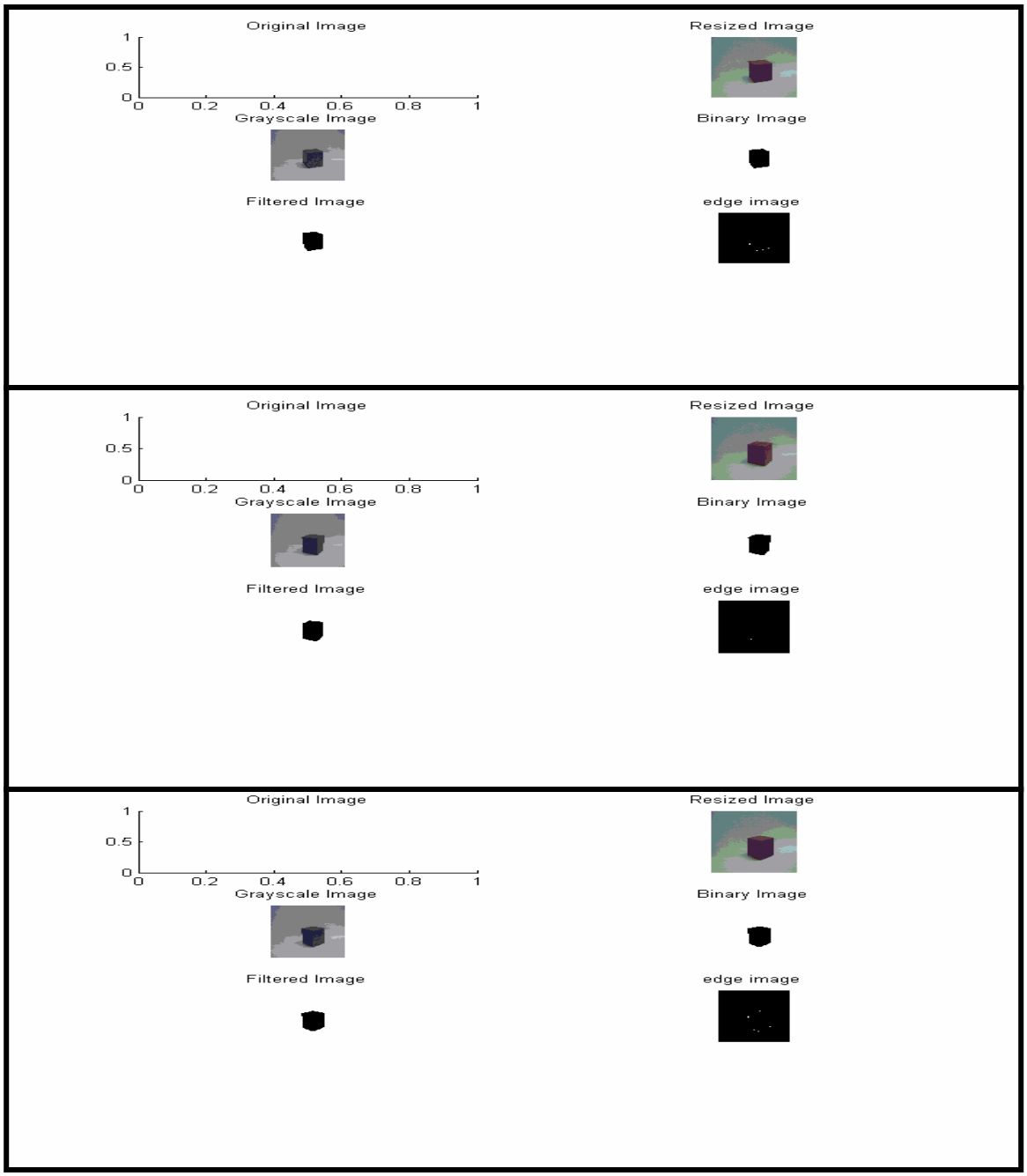
```
L=medfilt2(a1,[5 5]);
BL = im2bw(L,0.3);
subplot(4,2,4);
imshow(BL);
title('Binary Image')

%Filtering Binary image
L1=medfilt2(BL,[2 2]);
L2=medfilt2(L1,[4 4]);
subplot(4,2,5);
imshow(L2);
title('Filtered Image')

%Edge image was extracted to optimise the feature data
S=medfilt2(L2,[3 3]);
S1=medfilt2(S);

%Edge detection using Canny Edge
E=edge(S1,'canny');
subplot(4,2,6);
imshow(E);
title('edge image')

%Feature extraction through singular value decomposition
F=svd(double(E))
fout=fopen('input.dat','a');

  for j= 1:1:40
      fprintf(fout, '%f\t',F(j));
   end
   fprintf(fout,'\n');
fclose(fout);
fprintf('Execution Over');

%--------------------------------------------------------------------

% random_file
%
clear all
clc;
a = xlsread('norinput.xls');
b = xlsread('noroutput.xls');
[c d] = random_matrix(a,b);
xlswrite('rannorinput.xls',c);
xlswrite('rannoroutput.xls',d);
```

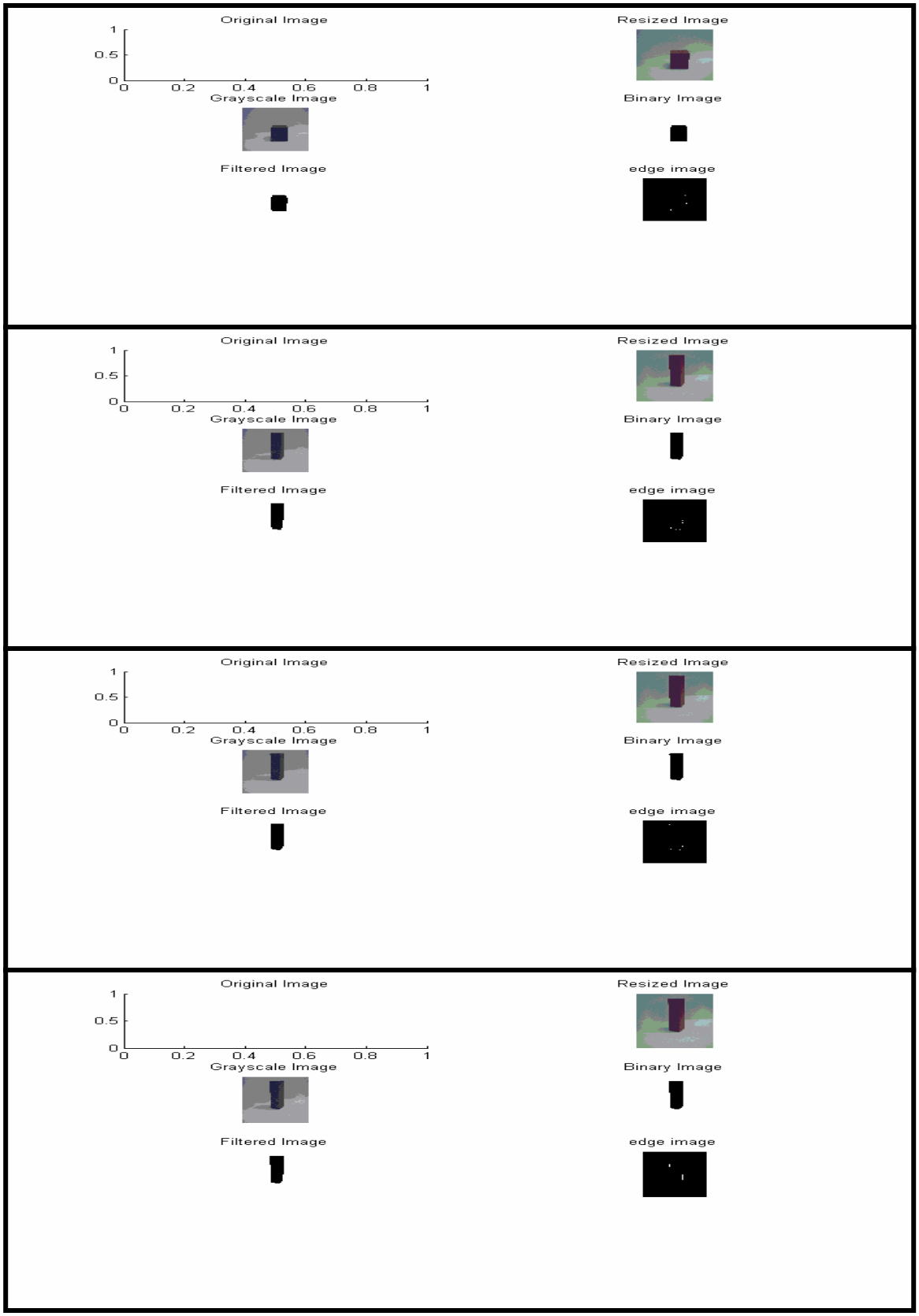
```
%-------------------------------------------------------------

% random_matrix
%
function [c d] = random_matrix(a,b)
[m1 n1] = size(a);
[m2 n2] = size(b);
c  = zeros(m1,n1);
d = zeros(m2,n2);
if (m1 == m2)
   for i = 1:m1
      index = randint(1,1,[1,m1]);
      for j = 1:n1
         c(i,j) = a(index,j);
      end;
      for j = 1:n2
         d(i,j) = b(index,j);
      end;
   end;
end


%-------------------------------------------------------------


%function xnor = bin_nor_xls('input.xls')
% Data from an Excel file is normalized along column wise
% and result written into an Excel file
% Activate the function by bin_nor_xls('infile.xls','outfile.xls')
x_un_nor = xlsread('input.xls');

[m,n] = size(x_un_nor);
xmax = max(x_un_nor);
xmin = min(x_un_nor);



d = xmax - xmin;
for i= 1:m
   for j = 1:n
      xnor(i,j) = (0.8/d(j))*(x_un_nor(i,j) - xmin(j)) + 0.1;
      %xnor1(i,j) = (0.8/d(j))*(x_un_nor1(i,j) - xmin(j)) + 0.1;
   end
end
xlswrite('norinput.xls',xnor);
```

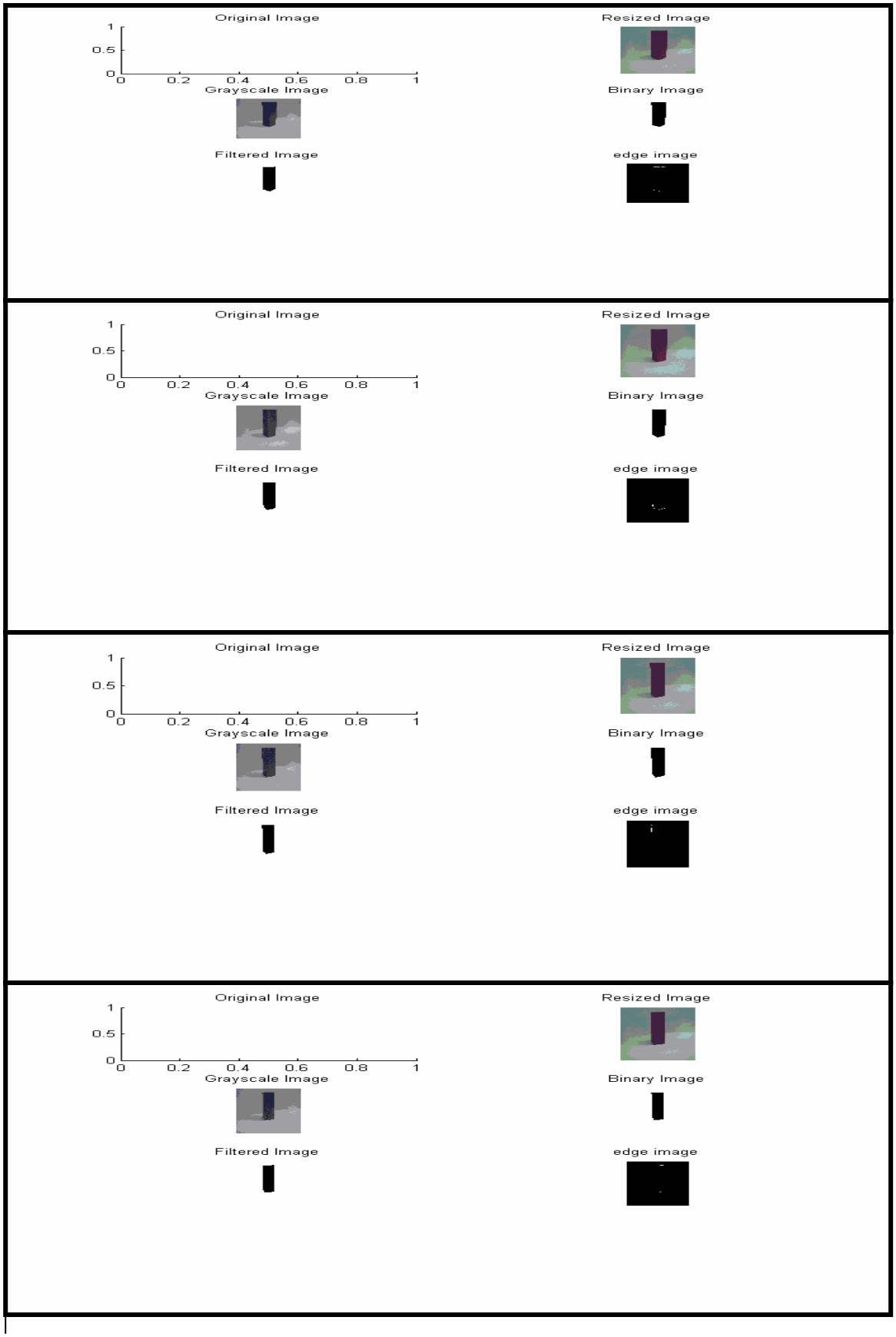
```
x_un_nor1 = xlsread('output.xls');
[m,n] = size(x_un_nor1);
xmax = max(x_un_nor1);
xmin = min(x_un_nor1);
d = xmax - xmin;
for i= 1:m
   for j = 1:n
      %xnor(i,j) = (0.8/d(j))*(x_un_nor(i,j) - xmin(j)) + 0.1;
      xnor1(i,j) = (0.8/d(j))*(x_un_nor1(i,j) - xmin(j)) + 0.1;
   end
end
xlswrite('noroutput.xls',xnor1);


%--------------------------------------------------------------------------


% neural

clear all;
clc;
p1 = xlsread('input.xls');
t1 = xlsread('output.xls');
tic
p = p1';
t = t1';
net=newff(minmax(p),[30,2],{'logsig','logsig'},'trainlm');
net.trainParam.show = 10;
net.trainParam.lr = 0.005;
net.trainParam.epochs = 200;
net.trainParam.goal = 1e-5;
% Maximum validation failures
net.trainParam.max_fail =   5;
% Factor to use for memory/speed trade off.
net.trainParam.mem_reduc =   1;
% Minimum performance gradient
net.trainParam.min_grad = 1e-10;
% Initial Mu
net.trainParam.mu  = 0.001;
% Mu decrease factor
net.trainParam.mu_dec  = 0.1;
% Mu increase factor
net.trainParam.mu_inc  =    10;
% Maximum Mu
net.trainParam.mu_max =   200;
```

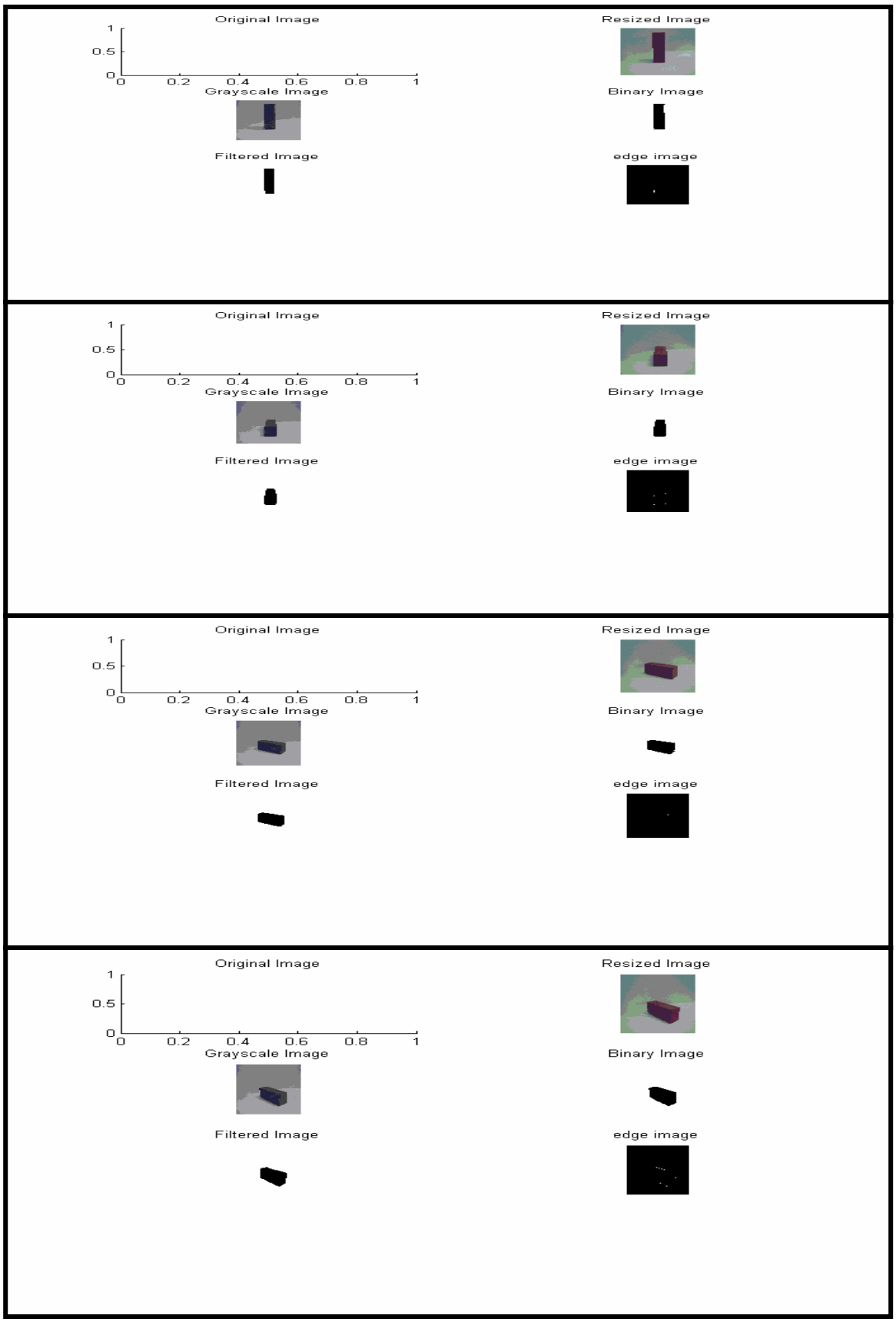
```
[net,tr]=train(net,p,t);
toc
save net1 net;
a = sim(net,p)
at = a';
tt = t';
res = [];
for i = 1:26
   res = [res;at(i,1) tt(i,1) at(i,2) tt(i,2)];
end
res
e = a-t;
et = e';
[m n] = size(et);
count = 0;
for i = 1:m
   flag = 0;
   for j =1:n
      if(et(i,j) > 0.12)
         flag = 1;
      end
   end
   if flag == 0
      count = count + 1;
   end;
end;
perc_class = count/m


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

Appendix B : Comparison Between Filtered, Resized, Binary And Edge Image




Original Image
Grayscale Image
Filtered Image
Resized Image
Binary Image
edge image
Original Image
Grayscale Image
Filtered Image
Resized Image
Binary Image
edge image
Original Image
Grayscale Image
Filtered Image
Resized Image
Binary Image
edge image
Original Image
Grayscale Image
Filtered Image
Resized Image
Binary Image
edge image


Original Image
Grayscale Image
Filtered Image
Resized Image
Binary Image
edge image
Original Image
Grayscale Image
Filtered Image
Resized Image
Binary Image
edge image
Original Image
Grayscale Image
Filtered Image
Resized Image
Binary Image
edge image
Original Image
Grayscale Image
Filtered Image
Resized Image
Binary Image
edge image


Original Image
Grayscale Image
Filtered Image
Resized Image
Binary Image
edge image
Original Image
Grayscale Image
Filtered Image
Resized Image
Binary Image
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Resized Image
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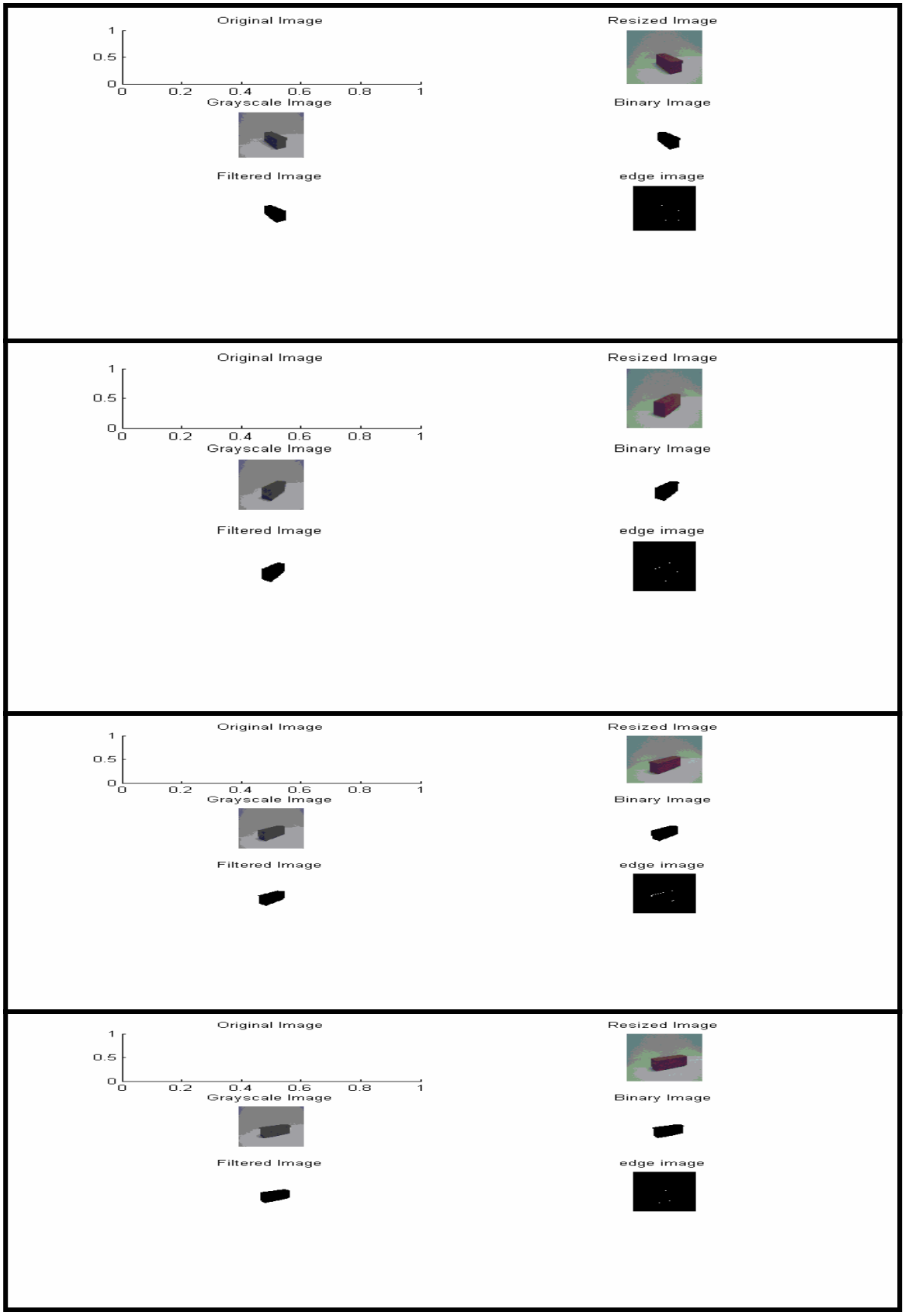
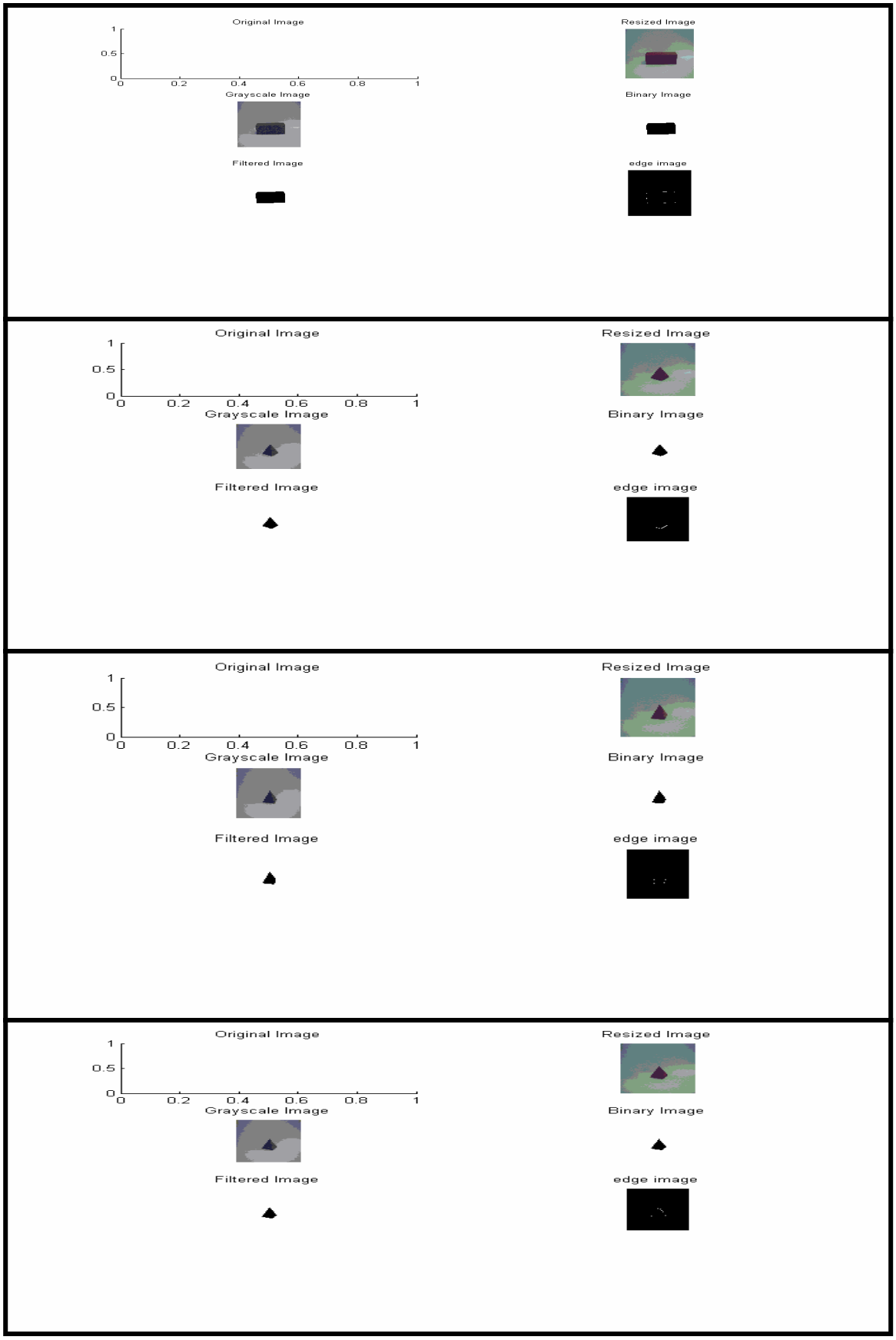
edge image
Original Image
Grayscale Image
Filtered Image
Resized Image
Binary Image
edge image


Original Image
Grayscale Image
Filtered Image
Resized Image
Binary Image
edge image
Original Image
Grayscale Image
Filtered Image
Resized Image
Binary Image
edge image
Original Image
Grayscale Image
Filtered Image
Resized Image
Binary Image
edge image
Original Image
Grayscale Image
Filtered Image
Resized Image
Binary Image
edge image


Original Image
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Grayscale Image
Binary Image
Filtered Image
edge image
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Resized Image
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Filtered Image
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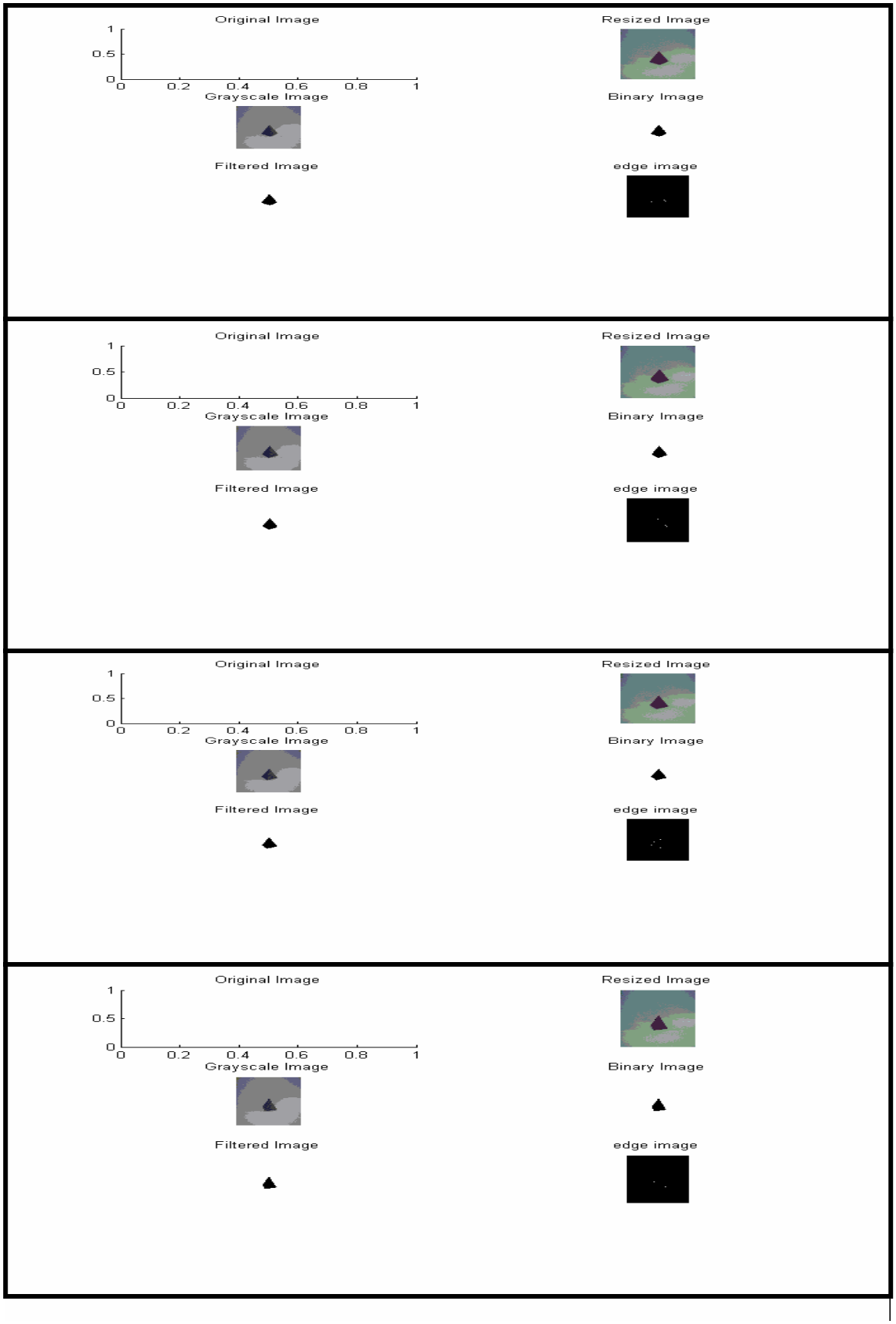
Resized Image
Grayscale Image
Binary Image
Filtered Image
edge image
Original Image
Resized Image
Grayscale Image
Binary Image
Filtered Image
edge image


Original Image
Grayscale Image
Filtered Image
Resized Image
Binary Image
edge image
Original Image
Grayscale Image
Filtered Image
Resized Image
Binary Image
edge image
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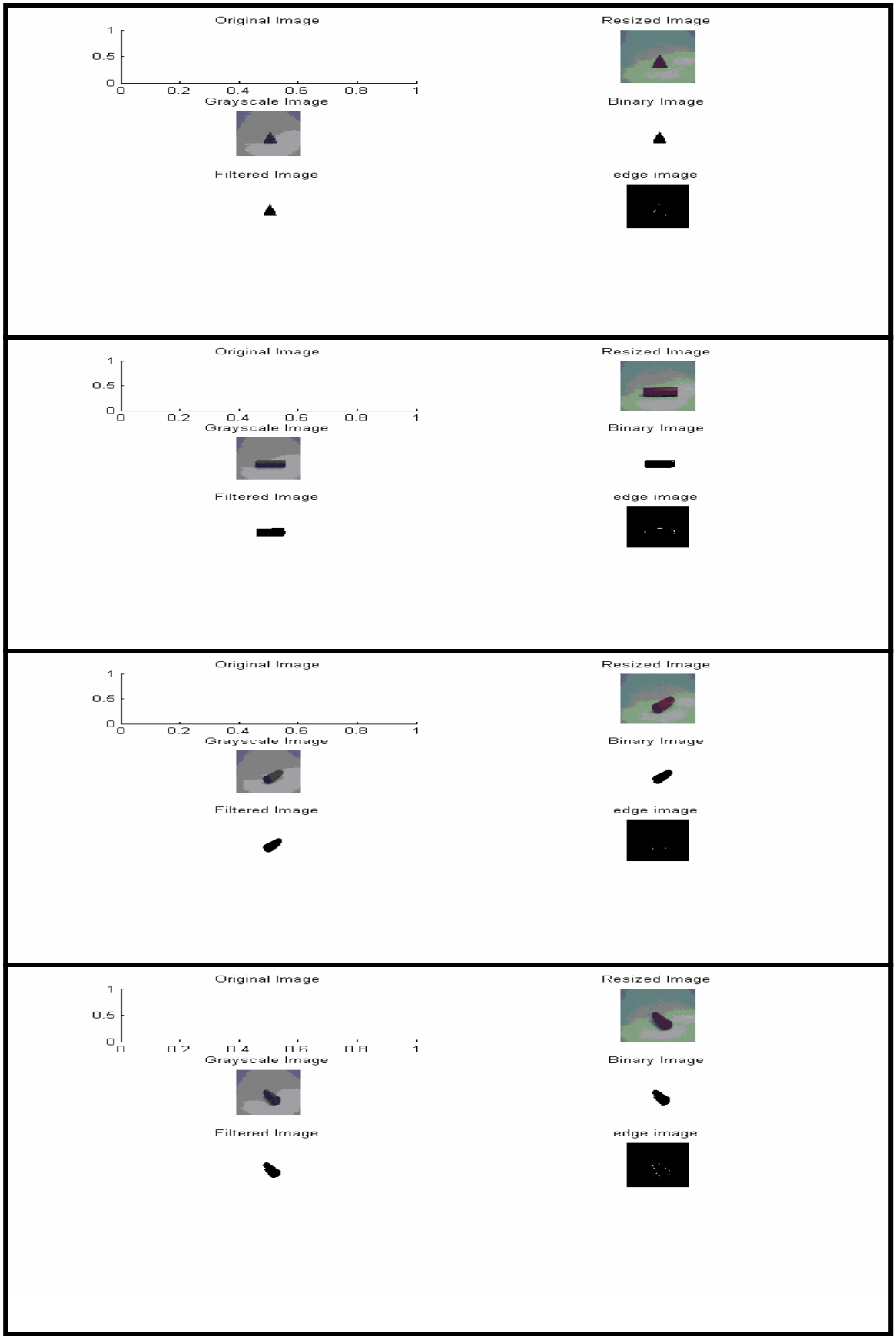
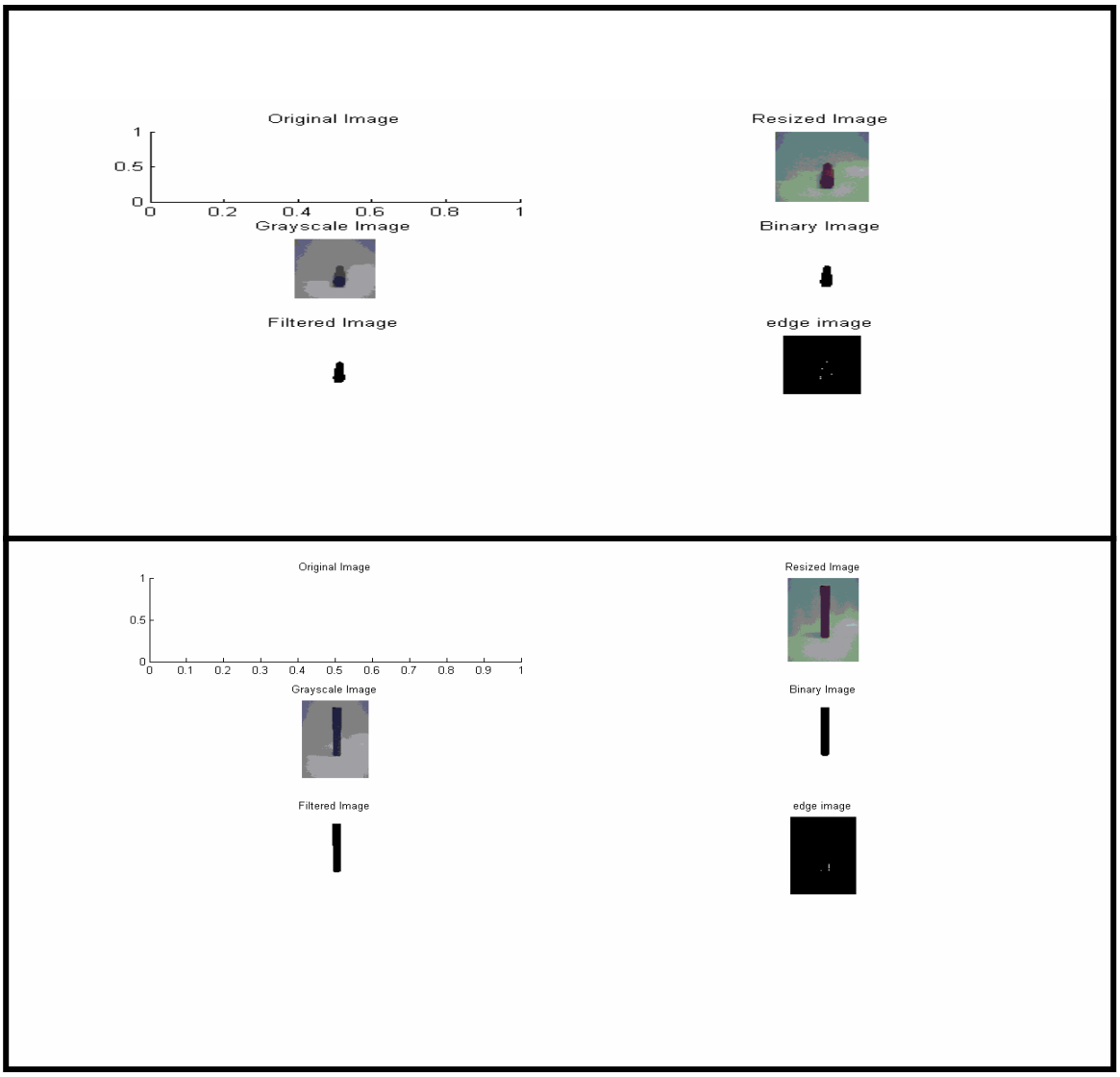
Grayscale Image
Filtered Image
Resized Image
Binary Image
edge image
Original Image
Grayscale Image
Filtered Image
Resized Image
Binary Image
edge image


Original Image
Grayscale Image
Filtered Image
Resized Image
Binary Image
edge image
Original Image
Grayscale Image
Filtered Image
Resized Image
Binary Image
edge image
Original Image
Grayscale Image
Filtered Image
Resized Image
Binary Image
edge image
Original Image
Grayscale Image
Filtered Image
Resized Image
Binary Image
edge image


Original Image
Resized Image
Grayscale Image
Binary Image
Filtered Image
edge image
Original Image
Resized Image
Grayscale Image
Binary Image
Filtered Image
edge image