

Ex: 10

Date:

Fuzzy Logic - Image Processing

Aim:

TO implement a fuzzy logic-based edge detection algorithm for digital images

Source code:

```
lrgb = imread('Pepper.png');  
lgray = rgb2gray(lrgb);  
figure;  
image(lgray, 'Data Mapping', 'scaled');  
colormap('gray');  
title('Input Image in Grayscale');  
  
I = im2double(lgray);  
Gx = [-1 1];  
Gy = Gx';  
Ix = conv2(I, Gx, 'same');  
Iy = conv2(I, Gy, 'same');  
  
figure;  
image(Ix, 'Data Mapping', 'scaled');  
colormap('gray');  
title('Ix')  
  
figure;  
image(Iy, 'Data Mapping', 'scaled');  
colormap('gray');  
title('Iy')
```

```

edgeFIS = mamfis('Name','edge Detection');
edgeFIS = addInput(edgeFIS,[1 1],'Name','lx');
edgeFIS = addInput(edgeFIS,[1 1],'Name','ly');
sx = 0.1; sy = 0.1;
edgeFIS = addMF(edgeFIS,'lx','gaussmf',[sx 0],'Name','zero');
edgeFIS = addMF(edgeFIS,'ly','gaussmf',[sy 0],'Name','zero');
edgeFIS = addOutput(edgeFIS,[0 1],'Name','out');
wa = 0.1; wb = 1; wc = 1;
ba = 0; bb = 0; bc = 0.7;
edgeFIS = addMF(edgeFIS,'out','trimf',[wa wb wc],'Name','white');
edgeFIS = addMF(edgeFIS,'out','trimf',[ba bb bc],'Name','black');

figure;
subplot(2,2,1);
plotmf(edgeFIS,'input',1);
title('lx');
subplot(2,2,2);
plotmf(edgeFIS,'input',2);
title('ly');
subplot(2,2,[3 4]);
plotmf(edgeFIS,'output',1);
title('out');

r1 = "If lx is zero and ly is zero then out is white";
r2 = "If lx is not zero or ly is not zero then out is black";
edgeFIS = addRule(edgeFIS,[r1 r2]);

eval = zeros(size(cu));
for ii = 1:size(cu,1)
    eval(ii,:) = evalfis(edgeFIS,[cx(ii,:); cy(ii,:)]);
end

```

```
figure;  
image(1, 'DataMapping', 'scaled');  
colormap('gray');  
title('Original Grayscale Image');
```

```
figure;  
image(1, 'DataMapping', 'scaled');  
colormap('gray');  
title('Edge Detection Using Fuzzy Logic');
```

Result:

Thus Project of Fuzzy Logic - Image Processing has been executed successfully.