Labelling Connected Components

Project #1

**Submitted by:**

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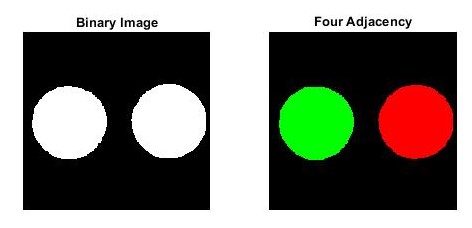
**Objectives:**

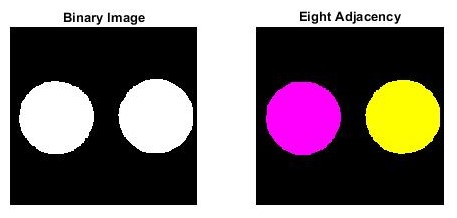
We are going to write a MATLAB program to determine the connected components in a binary image and give different connected components different labels and finally show connected components distinctively with different colors.

**Original Image:**

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**Results**

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**Comments**

Since the input image has two different balls separated distinctly, the labelling of the connected components in both 4-connected and 8-connected seems very accurate.

**Matlab Code (4-connected)**

image\_RGB = imread('two\_balls.jpg');

% RGB\_gray = rgb2gray(image\_RGB);

bw\_image = im2bw(image\_RGB, 0.9);

bw\_image\_inverted = imcomplement(bw\_image);

size\_row = size(bw\_image\_inverted,1);

size\_col = size(bw\_image\_inverted,2);

% to pad zeroes in the first row and first column

binary\_image = [];

for i = 1:size\_row+1

for j = 1:size\_col+1

if (i == 1 | j==1)

binary\_image(i,j) = 0;

else

binary\_image(i,j) = bw\_image\_inverted(i-1, j-1);

end

end

end

labels = zeros(size\_row, size\_col);

give\_label = [];

index\_givelabel = 1;

value\_givelabel = 11;

give\_label(index\_givelabel) = value\_givelabel;

for row = 2:size\_row+1

for col = 2:size\_col+1

if (binary\_image(row, col) == 1)

if (binary\_image(row-1,col) == 0 && binary\_image(row,col-1) == 0)

labels(row, col) = give\_label(index\_givelabel);

index\_givelabel = index\_givelabel + 1;

value\_givelabel = value\_givelabel + 1;

give\_label(index\_givelabel) = value\_givelabel;

elseif (binary\_image(row-1,col) == 1 && binary\_image(row,col-1) == 0)

labels(row, col) = labels(row-1, col);

elseif (binary\_image(row-1,col) == 0 && binary\_image(row,col-1) == 1)

labels(row, col) = labels(row, col-1);

elseif (binary\_image(row-1,col) == 1 && binary\_image(row,col-1) == 1)

if(labels(row -1,col) == labels(row, col-1))

labels(row, col) = labels(row-1, col);

else

labels(row, col) = labels(row-1, col);

labels(row, col-1) = labels(row-1, col);

end

end

else

labels(row, col) = 0;

end

end

end

%to make connected labels same

while 1

count = 0;

for i = 2:size\_row

for j = 2:size\_col

if (labels(i,j) ~= 0)

if (labels(i-1,j) ~=0)

if (labels(i,j) < labels(i-1,j))

labels(i-1,j) = labels(i,j);

count = count + 1;

elseif (labels(i,j) > labels(i-1,j))

labels(i,j) = labels(i-1,j);

count = count + 1;

end

end

if (labels(i,j-1) ~= 0)

if (labels(i,j) < labels(i,j-1))

labels(i,j-1) = labels(i,j);

count = count + 1;

elseif (labels(i,j) > labels(i,j-1))

labels(i,j) = labels(i,j-1);

count = count + 1;

end

end

end

end

end

if (count == 0)

break;

end

end

cmap = [0,0,0;1,0,0;0,1,0];

%remap original image to indeces 1,2,3

B=zeros(size(labels));

B(labels==0)=1;

B(labels==11)=2;

B(labels==13)=3;

%define color image by remapping

color\_labelled\_image = ind2rgb(B,cmap);

%remapped image

figure;

subplot(1,2,1), imshow(bw\_image\_inverted);

subplot(1,2,2), imshow(color\_labelled\_image);