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```
function mask =  
    hough_circle(BW,sup_x,sup_y,xy_range,radius,r_range,delta_limit,generate_pupil)
```

hough transform to find circle in image

INPUT: BW- Edge image, (sup_x,sup_y)-circle center, xy_range-circle center search range, radius-circle radius, r_range-circle radius range, delta_limit-control params, generate_pupil- if set non-zero value, generate pupil depends on given radius OUTPUT: mask-Iris image

```
if nargin < 8  
    generate_pupil = 0;  
end
```

init value

```
mask = false(size(BW));  
[height,width] = size(BW);  
totalnum=sum(sum(BW));  
X=zeros(1,totalnum);  
Y=zeros(1,totalnum);  
k=0;
```

Not enough input arguments.

```
Error in hough_circle (line 13)  
mask = false(size(BW));
```

search for edge point in BW,convert into two vector

```
for x=1:width  
    for y=1:height  
        if BW(y,x)  
            k=k+1;  
            X(k)=x;  
            Y(k)=y;  
            if k==totalnum  
                break;  
            end  
        end  
    end  
end
```

```

        end
    end
end
if k==totalnum
    break;
end
end
end

```

generate hough transform params

```

x_range_list=(sup_x:sup_x+xy_range-1)';
y_range_list=(sup_y:sup_y+xy_range-1)';

r_step=0.5; %search step for radius
count=0;
X_Max_list=[];
Y_Max_list=[];
Max_R=[];

```

search in hough space

```

for r=radius:r_step:radius+r_range
    count=count+1;
    votes=zeros(xy_range,xy_range);
    for k=1:totalnum
        tmp=repmat(((x_range_list-
X(k)).^2)',xy_range,1)+repmat((y_range_list-Y(k)).^2,1,xy_range);
        Difference=round(tmp-r^2);
        possible_ans=(Difference<delta_limit & Difference>=
delta_limit);
        votes=votes+possible_ans;
    end
    maxVote=max(votes(:));
    [y_tmp_max,x_tmp_max]=find(votes==max(votes(:)));
    X_Max_list=[X_Max_list;x_tmp_max];
    Y_Max_list=[Y_Max_list;y_tmp_max];
    Max_R=[Max_R;maxVote];
end

result_radius=find(Max_R==max(Max_R));
R=radius+(result_radius-1)*r_step;

result_x=X_Max_list(result_radius)+sup_x;
result_y=Y_Max_list(result_radius)+sup_y;

```

generate mask, points locate in the circle should be set to 1

```

for i=1:size(BW,2)
    for j=1:size(BW,1)
        if (i-result_x)^2 + (j-result_y)^2 < R^2

```

```
        if generate_pupil ~= 0
            if (i-result_x)^2 + (j-result_y)^2 < generate_pupil^2
                continue;
            end
        end
        mask(j,i) = 1;
    end
end
end
end
```

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